



September 15, 2005

PROPRIETARY INFORMATION ENCLOSED
Pursuant to 10 CFR 2.390, withhold the proprietary compact disc for the calculations listed in Enclosure 10 from public disclosure. Upon separation of the proprietary CD, the remainder of this letter may be decontrolled.

L-MT-05-093
10 CFR 50.90
10 CFR 50.67
10 CFR 50.12

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555

Monticello Nuclear Generating Plant
Docket 50-263
License No. DPR-22

License Amendment Request - Full Scope Application of an Alternative Source Term

Pursuant to 10 CFR 50.90, 10 CFR 50.67 and 10 CFR 50.12 Nuclear Management Company, LLC (NMC) hereby proposes to amend Appendix A of Facility Operating License, DPR-22, Technical Specifications, by incorporating a revision to the licensing basis of the Monticello Nuclear Generating Plant (MNGP). This submittal supports a full scope application of an Alternative Source Term (AST) methodology. Associated, proposed Technical Specification (TS) changes, which are supported by the AST analyses, are included in this application for a license amendment. In addition, NMC is requesting a specific exemption from 10 CFR 50.54(o) and the requirements of Sections III.A and III.B of 10 CFR 50, Appendix J, Option B, for MNGP.

10 CFR 50.67, "Accident Source Term," provides a mechanism for currently licensed nuclear power reactors to replace the traditional source term used in design basis accident analyses with an alternative source term. Under this provision, licensees who seek to revise the accident source term in design basis radiological consequence analyses must apply for a license amendment under 10 CFR 50.90.

By letter dated April 29, 2004, as supplemented by letters dated November 23, 2004, January 20, January 31, February 28 and April 12, 2005, NMC requested a license amendment for MNGP to support a Selective Scope Application of an Alternative Source Term Methodology for Re-evaluation of the Fuel Handling Accident. This submittal for a Full Scope AST assumes the approval of the previous MNGP license amendment request, therefore the changes associated with the previous submittal were not included in this submittal. However, several of the input criteria associated with the previous submittal have been re-evaluated for this submittal (See Enclosure 3).

The Full Scope AST analyses were performed by NMC in accordance with the guidance in Regulatory Guide 1.183, "Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors," July 2000. NMC performed AST analyses for the design basis accidents that could potentially result in significant control room and offsite doses. These include the Loss of Coolant Accident, the Main Steam Line Break Accident, Fuel Handling Accident and the Control Rod Drop Accident. The analyses demonstrate that using AST methodologies, post-accident control room and offsite doses remain below 10 CFR 50.67 and Regulatory Guide 1.183 acceptance limits.

NMC proposes implementation of this proposed change through a change to the MNGP licensing basis, including the TS and associated Bases. Upon approval, conforming changes will be made to the MNGP Updated Safety Analysis Report (USAR) and submitted to the NRC staff in accordance with 10 CFR 50.71(e) as part of the regular USAR update process.

The use of an AST results in changes to the design basis accident radiological consequences; however, the AST methodology has no direct impact on the probability or initiation of the evaluated design basis accidents. Application of AST methodology and the other changes requested by this application for a license amendment do not increase the core damage frequency or the large early release frequency. Therefore, this request for a revision to MNGP's licensing basis is not being submitted as a "risk-informed licensing action," as defined by Regulatory Guide 1.174, "An Approach For Using Probabilistic Risk Assessment In Risk-Informed Decisions On Plant-Specific Changes To The Licensing Basis," Revision 1, 2002.

By letter dated June 29, 2005, NMC submitted a License Amendment Request (LAR) converting MNGP custom TS to Improved Technical Specifications (ITS) (ADAMS Accession No. ML051960175). Upon approval of the ITS LAR, NMC will provide a supplemental submittal updating this AST LAR with revised marked-up and retyped ITS pages.

Enclosure 1 contains a description and summary safety assessment of each proposed TS change. Enclosure 2 contains a request for a regulatory exemption that NMC requests the NRC staff grant concurrently with the license amendment. Enclosure 3 contains the AST Technical Analysis for MNGP, which was used in the development of this submittal. Enclosure 4 contains a Table of Commitments made in this Submittal. Enclosure 5 provides a comparison of the MNGP AST analysis assumptions with Regulatory Guide 1.183. Enclosure 6 contains the marked-up Technical Specification pages. Enclosure 7 contains the page change instructions and the retyped Technical Specification pages. Enclosure 8 contains the marked-up Technical Specification Bases pages (provided for information only). Enclosure 9 contains the Non-Proprietary version of the calculations that support the Safety Assessment and Technical Analysis. Enclosure 10 provides the Proprietary version of the calculations provided by Applied Analysis Corp. The calculations in Enclosure 10 are clearly marked as Proprietary and should be withheld from public disclosure in accordance with 10 CFR 2.390. Applied Analysis Corp. affidavit for proprietary information is also contained within Enclosure 10.

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The Technical Support Center (TSC) project is ongoing at the time of this submittal with a resolution tentatively scheduled for 2006. Therefore, a TSC 30-day dose analysis is not being provided with this transmittal, but the analysis results will be reported after project completion.

The MNGP Plant Operations Review Committee has reviewed this application. A copy of this submittal, along with the Determination of No Significant Hazards Consideration, is being forwarded to our appointed state official pursuant to 10 CFR 50.91(b)(1).

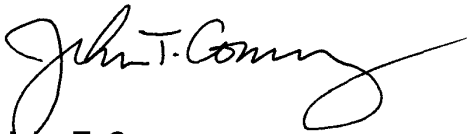
Nuclear Management Company, LLC requests approval of the amendment by January 4, 2007, to support the currently scheduled March 2007 Refueling Outage. Once approved the amendment will be implemented within 60 days.

NMC has concluded, as described in Section 5 of Enclosure 1, that the proposed license amendment presents no significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and that pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed amendment.

Commitments provided by this letter are included in Enclosure 4.0.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on September 15, 2005.



John T. Conway
Site Vice President, Monticello Nuclear Generating Plant
Nuclear Management Company, LLC

Enclosures (10)

cc: Administrator, Region III, USNRC (w/o Enclosure 10)
Project Manager, Monticello, USNRC
Resident Inspector, Monticello, USNRC (w/o Enclosure 10)
Minnesota Department of Commerce (w/o Enclosure 10)

ATTACHMENT

Subject

Enclosed is NMC's License Amendment Request for the Monticello Nuclear Generating Plant's Application of an Alternative Source Term.

Request to Withhold from Public Disclosure

The files on Disk 2 titled "(Proprietary) MNGP AST Calculation," contain proprietary information and NMC requests that the information contained on this disk be withheld from public disclosure.

Contact

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Documents Components:

A total of two (2) CD-ROMs are included in this submittal. The CD-ROMs contain the information listed below:

CD (1) titled, "License Amendment Request for Alternative Source Term," including the scanned cover letter, complete MNGP application, and Non-Proprietary Calculations. The following file in Adobe® PDF format is provided on the CD:

- 001 MNGP AST LAR.pdf, approximately 4 MB

CD (2) titled, "(Proprietary) MNGP AST Calculations" which includes Enclosure 10 with proprietary versions of six calculations. The following file and folders are provided on the CD:

- 001 AST FSA Enclosure 10.pdf, approximately 0.4 MB
- 002 CA-04-036 R1 (OS XQ, Proprietary) – Complete calculation with functional attachments. Contains approximately 10.5 MB (88

files), including one document (full calculation text) as well as non-document content (calculation attachments primarily associated with PAVAN computer program use including text files, spreadsheets, and signature pages).

- 003 CA-04-037 R2 (CR XQ, Proprietary) – Complete calculation with functional attachments. Contains approximately 6.2 MB (88 files), including one document (full calculation text) as well as non-document content (calculation attachments primarily associated with PAVAN and ARCON96 computer program use including text files, spreadsheets, and signature pages).
- 004 CA-04-038 R0 (LOCA, Proprietary) – Complete calculation with functional attachments. Contains approximately 4.3 MB (46 files), including one document (full calculation text) as well as non-document content (calculation attachments primarily associated with RADTRAD computer program use including text files, spreadsheets, and signature pages).
- 005 CA-04-039 R0 (MSLBA, Proprietary) – Complete calculation with functional attachments. Contains approximately 2.4 MB (81 files), including one document (full calculation text) as well as non-document content (calculation attachments primarily associated with RADTRAD computer program use including text files, spreadsheets, and signature pages).
- 006 CA-04-040 R0 (CRDA, Proprietary) – Complete calculation with functional attachments. Contains approximately 2.5 MB (63 files), including one document (full calculation text) as well as non-document content (calculation attachments primarily associated with RADTRAD and MicroShield computer program use including text files, spreadsheets, and signature pages).
- 007 CA-04-041 R1 (FHA, Proprietary) – Complete calculation with functional attachments. Contains approximately 2.1 MB (43 files), including one document (full calculation text) as well as non-document content (calculation attachments primarily associated with RADTRAD computer program use including text files, spreadsheets, and signature pages).

ENCLOSURE 1

NMC EVALUATION TO SUPPORT A FULL SCOPE APPLICATION OF AN ALTERNATIVE SOURCE TERM

1.0 DESCRIPTION

This submittal is a request to amend Operating License DPR-22 for the Monticello Nuclear Generating Plant. Pursuant to the requirements of 10 CFR 50.90 and 10 CFR 50.67, Nuclear Management Company, LLC (NMC) hereby proposes to amend Appendix A of Facility Operating License, DPR-22, Technical Specifications. This request incorporates a revision to the licensing basis of the Monticello Nuclear Generating Plant (MNGP) that supports a full scope application of an Alternative Source Term (AST) methodology. Proposed Technical Specification (TS) changes, which are supported by the AST Design Basis Accident (DBA) radiological consequence analyses, are included in this application for a license amendment. In addition, NMC is requesting for MNGP, in accordance with 10 CFR 50.12, a specific exemption from 10 CFR 50.54(o) and the requirements of Paragraphs III.A and III.B of 10 CFR 50, Appendix J, Option B.

The AST methodology will modify MNGP's licensing bases by: 1) replacing the current accident source term with an alternative source term as described in 10 CFR 50.67 for DBA radiological consequences, and 2) establishing the 10 CFR 50.67 Total Effective Dose Equivalent (TEDE) dose limits as acceptance criteria for the radiological consequences of DBAs.

By letter dated April 29, 2004, NMC requested a License Amendment for MNGP to support a selective scope application of an Alternative Source Term Methodology for re-evaluation of the Fuel Handling Accident. This submittal for a Full Scope AST assumes the approval of the April 29, 2004 MNGP License Amendment Request (LAR). Some of the input criteria associated with the previous submittal have been re-evaluated for this submittal. Also, some of the TS pages changed by the previous LAR are included in this submittal with additional changes as proposed herein. The additional TS changes proposed herein do not impact the prior submittal.

The Full Scope AST analyses were performed by NMC in accordance with the guidance of Regulatory Guide (RG) 1.183, "Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors," July 2000. A comparison of analysis methods and assumptions supporting this LAR and the guidance of RG 1.183 is provided in Enclosure 5.

NMC performed AST radiological consequence analyses for the DBAs in the current licensing basis (CLB). The DBAs include Loss of Coolant Accident (LOCA), Control Rod Drop Accident (CRDA), Main Steam Line Break Accident (MSLBA), and Fuel Handling Accident (FHA). The AST DBA radiological consequence analyses demonstrate control room operator and offsite doses are below the regulatory limits of 10CFR50.67 and RG 1.183.

Changes proposed to the MNGP CLB from AST implementation include:

- Revise the TS definition of DOSE EQUIVALENT I-131 to reflect adoption of dose conversion factors used in AST methodology and to better align with wording contained in NUREG-1433, "Standard Technical Specifications General Electric Plants, BWR/4," Revision 3, June 2004.
- Change the TS requirements for control room habitability protection from actuation on control room air intake high radiation to actuation on Low Low Reactor Water Level or High Drywell Pressure (signals indicative of a possible LOCA).
- Add a new TS requirement for instrumentation that initiates the Mechanical Vacuum Pump (MVP) trip on high main steam line radiation. A TS requirement is needed to support AST DBA CRDA radiological consequence analysis assumptions that credit MVP isolation.
- Add a new design basis function for the standby liquid control system to buffer suppression pool pH post LOCA. Expand the TS mode requirements when the system is required to be operable to include Hot Shutdown.
- Revise the TS reactor coolant radioiodine activity limit to be consistent with AST DBA MSLBA radiological consequence analysis assumptions.
- Remove the TS requirement for the control room ventilation system and the emergency filtration train system to be operable during movement of irradiated fuel assemblies. These requirements are no longer needed based on AST DBA radiological consequence analysis assumptions.
- Add new, separate, TS leakage requirements for the main steam isolation valves and associated main steam pathway consistent with AST DBA LOCA radiological consequence analysis leakage assumptions. This change also requires approval of an exemption to 10 CFR 50, Appendix J, Option B requirements.
- Revise TS Bases to reflect the proposed TS changes, incorporate AST DBA radiological consequence analyses results where appropriate, and reflect the adoption of AST and 10 CFR 50.67.

Alternative Source Term is not part of the MNGP CLB. The AST selective scope application LAR, submitted on April 29, 2004, as supplemented, and this AST full scope LAR comprise the total requested scope for CLB application. Upon LAR approval and implementation, future uses of AST will be evaluated in accordance with 10 CFR 50.59, "Changes, tests and experiments."

2.0 PROPOSED CHANGES

A description of the proposed TS changes and reasons for the changes are provided below. The TS changes are supported by the Regulatory Safety Analysis in this Enclosure, the Technical Analysis in Enclosure 3, and the AST radiological consequence calculations in Enclosure 9. The descriptions below correspond to the detailed marked-up TS and TS Bases pages provided in Enclosures 6 and 8, respectively. Re-typed pages depicting TS changes are included in Enclosure 7. The determination of no significant hazards considerations and environmental considerations assessment are included in Sections 5 and 6 of this Enclosure.

TS 1.0, Definition AK, “Dose Equivalent I-131”

Revise the definition of Dose Equivalent I-131 to: (1) remove the word "thyroid"; (2) delete reference to TID-14844; and (3) add reference to Federal Guidance Report (FGR) 11, "Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion, and Ingestion," September 1988 and FGR 12, "External Exposure to Radionuclides In Air, Water and Soil," September 1993. This change reflects application of the AST methodology. The existing TS definition is revised to conform to the dose conversion factors and TEDE acceptance criteria of AST.

TS 3.2.I, “Instrumentation for Control Room Habitability Protection”

Remove the word “radiation” from the Limiting Conditions for Operation (LCO). Table 3.2.9, referred to by this TS requirement, is being changed to eliminate requirements for radiation instrumentation for control room habitability protection and replace them with Low Low Reactor Water Level and High Drywell Pressure instrumentation. See proposed change to Table 3.2.9 below.

TS 3.2.J, “Mechanical Vacuum Pump Isolation Instrumentation”

Add a new LCO to TS Section 3.2 for Mechanical Vacuum Pump (MVP) isolation instrumentation. This change is consistent with proposed TS changes to add a new Table 3.2.10 for MVP isolation instrumentation as described below. Isolation of the MVP is assumed in the AST DBA CRDA radiological consequence analysis (see Enclosure 3). Operability of the MVP isolation instrumentation is only required during run or startup operating conditions with the MVP in service. During shutdown or refueling with control rods inserted, a CRDA is not expected to result in any fuel damage or fission product release as limited by existing TS 3.3.A.1, Control Rod Drive System Reactivity Limitations. TS 3.3.A.1 requires the reactor be made subcritical with all control rods inserted during the most reactive condition of the operating cycle with the strongest operable control rod in its full out position.

TS Table 3.2.9, “Instrumentation for Control Room Habitability Protection”

Revise TS Table 3.2.9 to delete radiation instrumentation requirements and replace with similar requirements for Low Low Reactor Water Level and High Drywell Pressure instrumentation.

The AST DBA LOCA radiological consequence analysis assumes credit for automatic operation of one of two trains of the emergency filtration train (EFT) system to mitigate the radiological consequences of the AST DBA LOCA to control room operators. No credit for EFT system operation is assumed in any of the other AST DBAs (FHA, MSLBA, and CRDA). Therefore, EFT system initiation on signals indicative of a LOCA is consistent with AST analysis assumptions and meets Criterion 2 of 10 CFR 50.36. The analysis demonstrates that control room operator dose remains below the regulatory limits of 10 CFR 50.67 with an operable EFT system.

The proposed initiating signals of Low Low Reactor Water Level and High Drywell Pressure are anticipatory, functionally diverse, and are directly indicative of conditions associated with a DBA LOCA. Instrument channel design is consistent with Section 5.1.2 of RG 1.183 per credit for engineered safety features (ESFs). EFT system initiation signals added to TS Table 3.2.9 are taken from the same safety related devices that initiate the standby gas treatment (SBGT) system described in Table 3.2.4 of the TS, which is also an ESF.

A modification was performed that involved inclusion of an auxiliary contact from the SBGT system initiation relay into the EFT system initiation logic. The modification did not affect the design, reliability, or operation of the existing SBGT system and EFT system initiation logic, both of which meet the design requirements of Section 5.1.2 of RG 1.183. This modification did not introduce any new single failure modes.

The EFT system is designed to limit the accident dose to the control room operators. The proposed signals are preferred over the existing radiation monitor signals because the proposed signals will result in reduced radiation exposure and reduced accident dose to the control room operators. The sensor actuates well in advance of the two-minute time to the onset of fuel gap source term releases as described in Table 4 of RG 1.183. Actuation of the EFT system occurs on Low Low Reactor Water Level or High Drywell Pressure regardless of whether or not actual fuel damage occurs. This is consistent with analysis assumptions which credit single train EFT system operation at minimum flow requirements prior to transport of the radiological release to the control room (see Enclosure 3).

The existing radiation-based initiation signals are confirmatory and not anticipatory. The radiation detector actuation time is a function of the time to cause a radiation material release and to transport sufficient radioactivity to trip the detector. During the time to establish and buildup the radiation field at the detector, the operators will have experienced some exposure through unfiltered air intake. Consequently, use

of the existing radiation detectors would result in increased exposure time and increased accident dose compared to the proposed anticipatory signals. This is consistent with Section 4.2.4 of RG 1.183 which notes reliance on radiation monitors can result in a delay of control room isolation and that use of ESF signals is effective for certain accidents. For the AST DBA LOCA, use of ESF signals is more effective than reliance on radiation monitors; EFT operation is not required for the other AST DBAs.

The proposed applicable modes and required conditions for the Low Low Reactor Water Level and High Drywell Pressure instruments are consistent with applicable modes in which a LOCA can be postulated and in which the EFT system is required to be operable. This includes Run, Startup, and Hot Shutdown. It also includes a requirement for the Low Low Reactor Water Level instrumentation to be operable during conditions with the potential for draining the reactor vessel. Proposed trip settings are identical to those established in TS Table 3.2.2 for emergency core cooling system (ECCS) actuation on conditions indicative of a LOCA. The proposed number of instrument channels per trip system, minimum number of operable channels per trip system, and required actions support requirements for maintaining system operability and redundancy and are identical to the corresponding requirements from TS Table 3.2.4 for instrumentation that initiates reactor building ventilation isolation and starts the standby gas treatment (SBGT) system, which are also required to operate for the AST DBA LOCA. The proposed allowable out of service times (AOTs) and surveillance test intervals (STIs) are the same as those previously approved for TS Table 3.2.4 Low Low Reactor Water Level and High Drywell Pressure functions in License Amendment 103. The AOTs and STIs were established using the approach of GE Topical Reports NEDC-30851P, Supplement 2, "Technical Specification Improvement Analysis for BWR Isolation Instrumentation Common to RPS and ECCS Instrumentation," and NEDC-31677P, "Technical Specification Improvement Analysis for BWR Isolation Actuation Instrumentation," both previously approved by the staff.

TS Table 3.2.10, "Instrumentation That Initiates Mechanical Vacuum Pump Isolation"

New Table 3.2.10 is added to TS to include requirements for the radiation monitors that initiate MVP isolation on high main steam line radiation. The AST DBA CRDA radiological consequence analysis assumes credit for automatic operation of the main steam line radiation monitors (MSLRMs) for the isolation of the MVP in CRDA Licensing Basis Case 2 as described in Enclosure 3. The MVP is normally operated during startup and not above 5% thermal power. Subsequent radioactive release after MVP isolation is modeled as a ground level release from main condenser leakage. No credit for MSLRMs is assumed in any of the other AST DBAs (FHA, LOCA, and MSLBA). Therefore, MVP isolation on signals indicative of a CRDA radiological release is consistent with AST analysis assumptions and meets Criterion 2 of 10 CFR 50.36. The AST DBA CRDA radiological consequence analysis

demonstrates that control room operator dose and offsite dose remain below the regulatory limits of 10 CFR 50.67 and RG 1.183.

The MSLRMs meet the ESF considerations of Section 5.1.2 of RG 1.183 and are used to perform the function of TS Table 3.2.10. The MSLRMs provide a highly reliable means to automatically isolate the MVP using a one-out-of-two taken twice logic. The original logic design and the MSLRMs were previously included in TS prior to License Amendment 83. Amendment 83 is described in Section 7.5.2.4.3 of the MNGP USAR. In License Amendment 83 it was demonstrated that the scram/isolation function was no longer required and removing it would eliminate the potential for unnecessary inadvertent scrams.

The AST DBA radiological consequence analyses did not change the original basis or conclusions surrounding the removal of the MSLRMs from TS as part of License Amendment 83. Elimination of the scram and main steam isolation valve (MSIV) closure functions of the MSLRMs as part of that prior amendment remain unaffected by the AST DBA radiological consequence analyses. Proposed changes to TS Table 3.2.10 do not restore the scram and MSIV closure functions. The AST analyses have determined, however, that automatic MVP isolation is necessary to maintain control room operator dose and EAB dose with the regulatory limits of 10 CFR 50.67 and RG 1.183.

Following License Amendment 83, a modification was performed to remove the scram and MSIV isolation functions of the MSLRMs. These changes did not affect the automatic MVP isolation function of this instrumentation, which is an original plant design feature. All of the original logic and inherent reliability of the Plant Protection system to isolate the MVP based on processing the signals from the MSLRMs remained unchanged. The associated instrumentation is currently being maintained as safety-related equipment. Consequently, the proposed TS change does not involve any physical changes to the MNGP.

The following discussion pertains to new TS Table 3.2.10:

The trip setting of 6.9 Rem/Hour (R/hr) is based on supporting the AST DBA CRDA radiological consequence analysis assumption of MSLRM actuation at an analytical limit of 9 R/hr. The calculations in Enclosures 9 and 10 demonstrate that the MSLRMs will experience a radiation field at the sensor location over a factor of 10 above the analytical limit, thus assuring actuation as credited. The selection of 6.9 Rem/Hour as the allowable value in TS Table 3.2.10 was determined consistent with the MNGP setpoint control process, which employs the General Electric Setpoint Methodology. This analysis accounts for prior operating experience in calibrating the radiation monitors and expected tolerance in the source term used for calibration to ensure actuation within the analytical limit. Further, it also supports the proposed instrument calibration frequency of a once per operating cycle basis in TS Table 4.2.1.

The MSLRMs are required to be operable during Run and Startup, consistent with plant conditions when the CRDA is postulated to potentially cause fuel damage. During shutdown or refueling with control rods inserted, a CRDA is not expected to result in any fuel damage or fission product release due to TS 3.3.A Control Rod Drive System reactivity limitations.

The total number of instrument channels, required operating conditions and AOTs are the same as those previously approved for the MSLRMs in License Amendment 81 when the instruments performed a scram and MSIV closure function. The AOTs were established using the approach of NEDC-30851P-A, Supplement 2. As noted above, the design satisfies the considerations of Section 5.1.2 of RG 1.183 to be credited in AST DBA radiological consequence analyses. Proposed required actions for inoperable instruments are the same as those proposed for the control room habitability protection instruments and are consistent with similar requirements for other radiological release mitigation functions in Section 3.2 of TS. These actions include placing the plant in a condition where a postulated radiological release from the CRDA cannot progress through the MVP release path (isolate the MVP or MSIVs) OR place the plant in Hot Shutdown within 12 hours to eliminate the potential for a CRDA. Action times are consistent with other TS actions that require Hot Shutdown in 12 hours when a condition of operability cannot be restored.

TS 3.4.A.1, “Standby Liquid Control”

TS 3.4.A.1 is revised to require the standby liquid control (SBLC) system to be operable at all times during Run, Startup and Hot Shutdown, except as specified in 3.4.A.2. This change reflects the use of SBLC for maintaining suppression pool pH following an AST DBA LOCA involving fuel damage as assumed in the radiological consequence analysis described further in Enclosure 3. Existing TS performance requirements (e.g., minimum required flow and boron concentration) of the SBLC system were assumed for its pH control. As presented in Section 5.0 of Enclosure 3, the SBLC system is fully capable, without modification, of performing the pH control function.

As a result of the pH control function, the SBLC system is now required to be operable during plant conditions when a LOCA may result. It is expected that the radiological effects of a LOCA during Hot Shutdown would be less severe than those effects at full power. However, TS 3.4.A.1 is being revised to add additional requirements for the SBLC system operability.

TS 3.6.C and TS 4.6.C, “Coolant Chemistry”

Consistent with assumptions contained in the AST DBA MSLBA radiological consequence analysis on radioiodine concentration in reactor coolant and the guidance of Section 2.0 and Footnote 1 of Appendix D of RG 1.183, changes to existing TS limits on reactor coolant DOSE EQUIVALENT I-131 activity concentrations are proposed. The proposed changes will: (1) change MNGP TS

requirements to be more consistent with the corresponding section in NUREG-1433, (2) require more restrictive (lower) coolant activity limits on radioiodine concentration in plant operating modes where the AST DBA MSLBA has been postulated to occur, (3) extend the current reactor coolant sampling frequency to confirm radioiodine concentration from 96 hours to 7 days during run, startup or hot shutdown conditions, and (4) replace existing surveillance requirements for increased sampling when levels are not met by more frequent sampling actions under these conditions consistent with NUREG-1433. Each of these proposed changes is described in more detail below.

TS 3.6.C.1.(a) is revised consistent with the requirements of Section 3.4.7 of NUREG-1433 as follows:

In Run, or in Startup and Hot Shutdown with any main steam line not isolated, the specific activity of the reactor coolant shall be limited to DOSE EQUIVALENT I-131 specific activity ≤ 0.2 microcuries per gram.

- (1) With reactor coolant specific activity >0.2 microcuries per gram and ≤ 2.0 microcuries per gram DOSE EQUIVALENT I-131, determine the DOSE EQUIVALENT I-131 once per 4 hours and restore DOSE EQUIVALENT I-131 to within limits within 48 hours. During this condition entry into Run, Startup, or Hot Shutdown is allowed.*
- (2) If the required actions and completion time of 3.6.C.1.(a)(1) are not met OR reactor coolant specific activity is > 2.0 microcuries per gram DOSE EQUIVALENT I-131 then, determine DOSE EQUIVALENT I-131 once per 4 hours, AND*
 - a. Isolate all main steam lines within 12 hours, OR*
 - b. Be in Hot Shutdown in 12 hours and be in Cold Shutdown in 36 hours.*

This change is acceptable as it imposes more restrictive operating limits on radioiodine concentration than required by current TS. The current steady state radioiodine concentration is being reduced from 2.0 microcuries of DOSE EQUIVALENT I-131 per gram of water to 0.2 microcuries of DOSE EQUIVALENT I-131 per gram of water.

Existing TS SR 4.6.C.1.(a) is revised consistent with NUREG-1433 SR 3.4.7.1 and the surveillance interval is being extended from 96 hours to 7 days, also consistent with the NUREG, as follows:

A sample of reactor coolant shall be taken at least every 7 days to verify DOSE EQUIVALENT I-131 specific activity is ≤ 0.2 microcuries per gram during power operation.

This change is acceptable because it revises the existing SR to match the new lower required operating limit of 0.2 microcuries per gram DOSE EQUIVALENT I-131. Based on past plant operating history, iodine concentration does not vary significantly during steady state power operation. Therefore sampling every seven days is sufficient to trend radioiodine concentration.

Also proposed is the elimination of existing TS SRs 4.6.C.1.(e) and 4.6.C.1.(f), which define routine or increased sampling frequencies when limits are not met. For steady state operation, these requirements are adequately met by the proposed SR sampling frequency of 7 days and by the proposed TS actions replacing TS 3.6.C.1.(a) which require more frequent sampling (every 4 hours) when limits are not met.

Limits on the maximum allowable level of radioactivity in the reactor coolant are established to ensure that in the event of a release of radioactive material to the environment during an AST DBA MSLBA, radiation doses are maintained within the limits of 10 CFR 50.67 and RG 1.183. AST DBA MSLBA radiological consequence analysis assumes coolant activities of 2.0 and 0.2 microcuries per gram DOSE EQUIVALENT I-131, as described in Enclosure 3, and demonstrates both control room operator and offsite doses will remain below regulatory limits.

TS 3.17, Control Room Habitability

Proposed Change 1:

TS Sections 3.17.A.1, 3.17.A.2.c, 3.17.A.3.c, 3.17.B.1, 3.17.B.1.c, and 3.17.B.1.d are revised to eliminate the requirement for the CRV and EFT systems to be operable during the movement of irradiated fuel assemblies. As discussed in Enclosure 3, operation of the CRV and EFT systems was not assumed in the AST DBA FHA radiological consequence analysis for radiation protection of the control room operators. As such, inclusion of the CRV and EFT systems in TS to meet Criterion 2 of 10 CFR 50.36 for the FHA is no longer required. Analysis demonstrates the control room operator dose remains below the regulatory limits of 10 CFR 50.67 and RG 1.183 for this AST DBA. The CRV and EFT systems are still required to be operable in modes as specified in TS 3.17, including activities having the potential for draining the reactor vessel, as credit for CRV and EFT systems operation is assumed in the AST DBA LOCA radiological consequence analysis.

The FHA analysis includes a key assumption that the fuel decay time is 24 hours prior to the initiation of the accident. Existing TS LCO 3.10.D restricts the movement of fuel in the reactor vessel for the first 24 hours following reactor shutdown. This is consistent with 10 CFR 50.36 Criterion 2 since the 24 hours is an operational restriction that is an initial condition assumed for the FHA.

The proposed TS page changes are in addition to those included in the prior AST LAR dated April 29, 2004 in that no irradiated fuel assembly movement restrictions

are now proposed. These changes supplement, but do not impact, the prior submittal.

In summary, changes are proposed to TS 3.17 to eliminate CRV and EFT system operability requirements during the movement of irradiated fuel assemblies because they are no longer required. As demonstrated by the AST DBA FHA radiological consequence analysis, inclusion of the CRV and EFT systems in TS to meet Criterion 2 of 10 CFR 50.36 for the FHA is no longer required. The FHA analysis, in conjunction with TS 3.10.D on 24 hour fuel movement restrictions, provides the basis for demonstrating control room operator doses during a postulated AST DBA FHA remain below regulatory limits.

Proposed Change 2:

TS 3.17.B.2.c.(3) is revised to change “receipt of a high radiation signal” to “receipt of a Low Low Reactor Water Level or High Drywell Pressure signal.” Consistent with changes to TS Table 3.2.9, operability of the EFT system is no longer dependent on the control room air intake radiation monitors. The EFT system is now required to actuate on conditions indicative of a LOCA. The CRV and EFT systems are assumed to operate during the AST DBA LOCA. A discussion of the instrument changes and their basis is provided above.

TS Table 4.2.1, “Minimum Test and Calibration Frequency for Core Cooling, Rod Block and Isolation Instrumentation”

Consistent with changes to Tables 3.2.9 and 3.2.10, corresponding instrument changes for test, calibration and sensor check frequencies are included in TS Table 4.2.1. The new Surveillance Requirements (SRs) in Table 4.2.1 will confirm that the initiating signals of Low Low Reactor Water Level and High Drywell Pressure are operable for the initiation of control room habitability protection. The new SRs in Table 4.2.1 will also confirm that the initiating signals of Main Steam Line High Radiation initiate MVP isolation.

For the Low Low Reactor Water Level and High Drywell Pressure instrument channels, the proposed test, calibration, and sensor check frequencies are identical to those in TS Table 4.2.1 for the Reactor Building Ventilation & Standby Gas Treatment instruments from which the signals providing control room habitability protection are actually derived. The proposed STIs are the same as those previously approved for TS Table 3.2.4 Low Low Reactor Water Level and High Drywell Pressure functions in License Amendment 103. The STIs were established using the approach of GE Topical Reports NEDC-30851P, Supplement 2, and NEDC-31677P.

For the Main Steam Line Radiation instrument channels, the proposed functional test and sensor check frequencies are identical to those previously approved for the MSLRMs in License Amendment 81 when the instruments performed a scram and

MSIV closure function. The frequencies were established using the approach of NEDC-30851P-A, Supplement 2. The calibration frequency, using a radioactive source check, is proposed to be performed once per operating cycle. This is consistent with the frequency that was approved in MNGP License Amendment 81. In order to support a 24-month calibration frequency, an analysis was performed in accordance with the MNGP setpoint control process, which employs the GE Setpoint Methodology.

TS SR 4.7.D.1.e, “Primary Containment Isolation Valves (PCIVs)”

New TS SR 4.7.D.1.e is added to include revised leakage requirements for the MSIVs and the main steam pathway. The main steam pathway includes the combined leakage through the eight MSIVs and through two PCIVs which isolate the inboard MSIV drain lines. Leakage through the main steam pathway is quantified by summing the leakage from Type C tests for these valves.

The new TS SR will add specific leakage requirements for this pathway consistent with assumptions included in the AST DBA LOCA radiological consequence analysis regarding radiological releases (see Enclosure 3). As described under proposed changes to TS 6.8.M, this leakage is separate, and in addition to, the primary containment leakage requirement of 1.2% per day (L_a) at a pressure (P_a) of 42 psig.

Proposed TS SR 4.7.D.1.e is as follows:

- e. In accordance with the Primary Containment Leakage Rate Testing Program, verify the following leakage rates are within limits:*
 - 1. The leakage rate from any one MSIV is ≤ 100 scfh when tested at ≥ 42 psig (P_a) (≤ 77 scfh when tested at ≥ 25 psig).*
 - 2. The leakage rate from the main steam pathway is ≤ 200 scfh when tested at ≥ 42 psig (P_a) (≤ 154 scfh when tested at ≥ 25 psig).*

Separate MSIV and main steam pathway leakage limits are proposed consistent with AST DBA LOCA radiological consequence analysis assumptions. MSIV closure is not credited as a radiological release barrier in the AST DBA FHA and CRDA radiological consequence analyses. No design changes or modifications to the valves or pathway are proposed as part of this TS change. This change does not impact or change the safety function of the MSIVs.

The inclusion of leakage limits at 25 psig serves to explicitly identify leakage requirements at normal test pressure. These leakage values are conservative, do not credit the effects of air in the determination, and are based on a ratio comparison to the proposed leakage limits at P_a using a simplified flow orifice model of flow rate to the square root of pressure, as follows:

$$\text{MSIV Test Leakage} / \sqrt{\text{Test Pressure}} = 100 \text{ scfh} / \sqrt{P_a}$$

$$\text{Test Leakage} = (100 \text{ scfh} / \sqrt{42 \text{ psig}}) * (\sqrt{25 \text{ psig}}) = 77 \text{ scfh}$$

And:

$$\text{Main Steam Pathway Test Leakage} / \sqrt{\text{Test Pressure}} = 200 \text{ scfh} / \sqrt{P_a}$$

$$\text{Test Leakage} = (200 \text{ scfh} / \sqrt{42 \text{ psig}}) * (\sqrt{25 \text{ psig}}) = 154 \text{ scfh}$$

TS 6.8.M.1, "Primary Containment Leakage Rate Testing Program"

TS 6.8.M.1 currently specifies that the Primary Containment Leakage Rate Testing Program shall be in accordance with Regulatory Guide (RG) 1.163, "Performance-Based Containment Leak-Test Program," Revision 0, August 1990, except as modified by an exception to NEI 94-01, "Industry Guideline for Implementing Performance-Based Option of 10 CFR 50 Appendix J," Revision 0, July 26, 1995.

TS 6.8.M.1 will be revised to incorporate an exemption to Paragraphs III.A and III.B of 10 CFR 50, Appendix J, Option B for the main steam pathway. The exemption request is included in Enclosure 2. Consistent with proposed TS changes to add SR 4.7.D.1.e and the exemption request, TS 6.8.M is changed to exclude the main steam pathway leakage contribution from the both the sum of Type B and Type C primary containment leakage test results and from the overall integrated leakage result from Type A tests.

TS 6.8.M.1 will be revised to include three exceptions. The first exception remains unchanged and is currently included in TS 6.8.M.1. The two exceptions to be added address the proposed exemption from including the main steam pathway leakage. Proposed wording is shown below. Words to be deleted are shown with strikeout and words to be added are shown in bracketed italics.

This program shall establish the leakage rate testing of the containment as required by 10 CFR 50.54(o) and 10 CFR Part 50, Appendix J, Option B as modified by approved exemptions. This program shall be in accordance with the guidelines contained in Regulatory Guide 1.163, "Performance-Based Containment Leak-Test Program," dated September 1995, as modified by the following exception[s]: ~~NEI 94-01, Rev. 0, "Industry Guideline for Implementing Performance Based Option of 10 CFR 50, Appendix J."~~

~~Section 9.2.3: The first Type A test after the March 1993 Type A test shall be performed no later than March 2008.~~

- *[The first Type A test after the March 1993 Type A test shall be performed no later than March 2008. (This is an exception to Section 9.2.3 of NEI 94-01, Rev.*

0, "Industry Guideline for Implementing Performance-Based Option of 10CFR50, Appendix J.")]

- *[The leakage contribution from the main steam pathway is excluded from the sum of the leakage rates from Type B and Type C tests specified in (1) Section III.B of 10 CFR 50, Appendix J, Option B; (2) Section 6.4.4 of ANSI/ANS 56.8-1994, "Containment System Leakage Testing Requirements"; and (3) Section 10.2 of NEI 94-01, Rev. 0.]*
- *[The leakage contribution from the main steam pathway is excluded from the overall integrated leakage rate from Type A tests specified in (1) Section III.A of 10 CFR 50, Appendix J, Option B; (2) Section 3.2 of ANSI/ANS 56.8-1994; and (3) Sections 8.0 and 9.0 of NEI 94-01, Rev. 0.]*

NMC is requesting an exemption from the requirements of Paragraphs III.A and III.B of 10 CFR 50, Appendix J, Option B to exclude the leakage contributions of the main steam pathway from the overall integrated leakage rates from Type A tests and from the sum of the leakage rates from Type B and Type C tests. The exemption (see Enclosure 2) is consistent with leakage rate assumptions used in the AST DBA radiological consequence analyses which demonstrate control room operator and offsite doses remain below the regulatory limits of 10 CFR 50.67 and RG 1.183.

Because TS 6.8.M.1 invokes compliance to RG 1.163, which endorses, with certain exceptions, NEI 94-01, and ANSI/ANS-56.8-1994, certain exceptions are also needed to these associated guidelines. For Type A tests, in addition to the exemption to Section III.A of Appendix J, Option B, exceptions are needed to Section 3.2 of ANSI/ANS 56.8-1994 and Sections 8.0 and 9.0 of NEI 94-01, Revision 0. Compliance with ANSI/ANS 56.8-1994 is required as a condition of compliance with RG 1.163 for Type B and Type C tests. In addition to the exemption to Section III.B of Appendix J, Option B, exceptions are needed to Section 6.4.4 of ANSI/ANS 56.8-1994 and Section 10.2 of NEI 94-01, Revision 0. These exceptions are acceptable because they conform to the exemption requested.

Upon granting the requested exemption, the exceptions for including the main steam pathway leakage rate in the introductory paragraph of TS 6.8.M.1 are acceptable because the leakage rate acceptance criteria is controlled and within leakage rate assumptions of the AST DBA LOCA analysis. The AST DBA LOCA analysis demonstrates control room operator and offsite doses remain below the regulatory limits of 10 CFR 50.67.

Editorial and minor reformatting changes are also being proposed for TS 6.8.M.1 to clarify the meaning and understanding of the TS to minimize the potential for confusion or error. These changes are acceptable because they do not change the technical meaning or intent of the specification and are made for clarity and consistency.

TS Bases

The TS Bases provide rationale and additional detail associated with the corresponding TS requirements. Marked up TS bases changes, associated with the above proposed TS requirements, are provided in Enclosure 8. In addition to changes needed to support the proposed TS changes above, the bases were revised to include the regulatory limits of 10 CFR 50.67 for the purpose of AST DBA radiological consequence analyses.

Bases do not establish actual requirements, and as such do not change technical requirements of the TS. The Bases changes have been included in this LAR as they provide additional understanding for the associated TS requirements.

3.0 BACKGROUND

On December 23, 1999, the NRC published 10 CFR 50.67, "Accident source term," in the *Federal Register*. This regulation provides a mechanism for licensed power reactors to replace the current accident source term used in DBA analyses with an alternative source term. The direction provided in 10 CFR 50.67 is that licensees who seek to revise their current accident source term in design basis radiological consequence analyses shall apply for a license amendment under 10 CFR 50.90.

The guidance of RG 1.183 was used by NMC in preparing AST DBA radiological consequence analyses for MNGP. The NRC staff prepared RG 1.183 to provide guidance to licensees of operating power reactors on acceptable applications of alternative source terms; the scope, nature, and documentation of associated analyses and evaluations; consideration of impacts on analyzed risk; and content of submittals.

The criteria of 10 CFR 50.67 were used to evaluate the CLB DBAs for radiological consequences. The CLB DBAs are the Loss of Coolant Accident, Main Steam Line Break Accident, Fuel Handling Accident, and Control Rod Drop Accident. Methods used and analysis assumptions are consistent with RG 1.183 as presented in Enclosure 5.

4.0 TECHNICAL ANALYSIS

The Technical Analysis supporting the proposed TS changes in Section 2.0 is included in Enclosure 3.

5.0 REGULATORY SAFETY ANALYSIS

This submittal is a request to amend Operating License DPR-22 for the Monticello Nuclear Generating Plant. Pursuant to the requirements of 10 CFR 50.90 and 10 CFR 50.67, Nuclear Management Company, LLC (NMC) hereby proposes to amend Appendix A of Facility Operating License, DPR-22, Technical Specifications. This request incorporates a revision to the licensing basis of the Monticello Nuclear Generating Plant (MNGP) that supports a full scope application of an Alternative Source Term (AST) methodology. Proposed Technical Specification (TS) changes, which are supported by the AST Design Basis Accident (DBA) radiological consequence analyses, are included in this application for a license amendment.

5.1 No Significant Hazards Considerations

NMC has evaluated whether or not a significant hazards consideration is involved with the proposed amendment by focusing on the three standards set forth in 10 CFR 50.92, "Issuance of amendment," as discussed below:

1. *Does the proposed license amendment involve a significant increase in the probability or consequences of an accident previously evaluated?*

Response: No.

The proposed changes do not involve a significant increase in the probability of an accident previously evaluated.

The proposed changes are analytical in nature and do not involve modifications to plant equipment or changes to plant operating conditions. The proposed changes involve a change to the licensing basis due to the adoption and implementation of the AST methodology at the MNGP. This methodology is used to analyze the radiological consequences of hypothesized accident sequences included in Chapter 14 of the MNGP Updated Safety Analysis Report (USAR). The AST methodology is an analytical tool that does not affect plant design or operation.

The proposed changes do not affect the design or mode of operation of systems, structures, or components (SSCs) at MNGP that function to prevent an accident. The proposed changes do not affect equipment failure modes or conditions that are assumed to initiate a previously evaluated accident. Therefore, the proposed changes do not involve a significant increase in the probability of an accident previously evaluated in the MNGP USAR.

The proposed changes do not involve a significant increase in the consequences of an accident previously evaluated.

The proposed changes do not change the likelihood of malfunction of safety related SSCs that are assumed to mitigate the consequences of accidents. The changes do

not affect the process or accident conditions in which safety related SSCs are assumed to function. The proposed changes are made to align TS values and system operating conditions with AST analytical assumptions. The assumptions have been used in the AST analysis to demonstrate that the resulting dose is within the applicable regulatory acceptance criteria.

The MNGP AST analysis has demonstrated that the consequences of the proposed changes result in control room (CR) operator and offsite doses within the regulatory acceptance criteria of 10 CFR 50.67 and that doses are within the guidance of Regulatory Guide 1.183.

Therefore, the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. *Does the proposed license amendment create the possibility of a new or different kind of accident from any accident previously evaluated?*

Response: No.

The proposed changes involve changes to the methodology used to evaluate the radiological consequences of postulated accidents and are analytical in nature. Plant operation is not affected and no new failure mechanisms, malfunctions, or accident initiators are created that could lead to a new or different kind of accident from any previously evaluated.

Therefore, the proposed change does not create the possibility of a new or different kind of accident from any previously evaluated.

3. *Does the proposed license amendment involve a significant reduction in a margin of safety?*

Response: No.

The changes involve adoption and implementation of an AST methodology for evaluating the radiological consequences for postulated design basis accidents. The methodology has been conservatively applied and is in accordance with the attributes for an acceptable AST as specified in Regulatory Guide 1.183.

The safety margin associated with radiological consequences of DBAs is derived from meeting the regulatory acceptance criteria for dose. The proposed changes do not involve a significant reduction in the margin of safety because all the applicable regulatory acceptance criteria for dose continue to be met. The results of the DBA radiological consequences from AST are subject to the dose acceptance criteria that have been previously approved by the NRC staff and specified by 10 CFR 50.67(b)(2). The MNGP AST analysis demonstrates that all the dose criteria for this

section are met. In addition, the analysis demonstrates that all applicable dose guidance of Regulatory Guide 1.183 is met.

Therefore, the proposed change does not involve a significant reduction in a margin of safety.

Based on the above, NMC concludes that the proposed license amendment presents no significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and, accordingly, a finding of “no significant hazards consideration” is justified.

5.2 Applicable Regulatory Requirements/Criteria

The applicable regulatory requirements are included in Enclosure 5, “Regulatory Guide 1.183 Versus NMC Analysis Comparison Matrix.”

6.0 Environmental Impact Consideration

A review has determined that the proposed amendment would change a requirement with respect to installation or use of a facility component located within the protected area, as defined in 10 CFR 20, or would change an inspection or surveillance requirement. However, the proposed amendment does not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluent that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure.

Accordingly, the proposed amendment meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed amendment.

ENCLOSURE 2

PROPOSED EXEMPTION TO 10 CFR 50 APPENDIX J

1.0 INTRODUCTION

10 CFR 50.54(o) requires that primary reactor containments be subject to the requirements of Appendix J to 10 CFR Part 50. Appendix J specifies the leakage rate test requirements, schedules, and acceptance criteria for tests of the leak-tight integrity of the primary reactor containment and systems and components that penetrate the containment. Option B, Paragraph III.A requires that the overall integrated leakage rate must not exceed the allowable leakage (L_a) with margin, as specified in the TS. The overall integrated leakage rate, as specified in the 10 CFR 50, Appendix J definitions, includes the contribution from main steam pathway leakage. (Main steam pathway leakage includes leakage through four main steam lines and the main steam drain line). 10 CFR 50, Appendix J, Option B, Paragraph III.B requires that the sum of the leakage rates of Type B and Type C local leakage rate tests be less than the performance criterion (L_a) with margin, as specified in the TS. Concurrent with the request for license amendment, NMC hereby requests an exemption from 10 CFR 50.54(o) and the requirements of 10 CFR 50, Appendix J, Option B, Paragraphs III.A and III.B for MNGP to permit exclusion of the main steam pathway leakage contribution from the overall integrated leakage rate Type A test measurement and from the sum of the leakage rates from Type B and Type C tests. This request for exemption is similar to an exemption granted from the requirements of Paragraphs III.A and III.B of Option B for the Browns Ferry Nuclear Plant (Units 2 and 3), on March 14, 2000 (ADAMS Accession Number ML003691985).

2.0 10 CFR 50.12 - SPECIFIC EXEMPTIONS

10 CFR 50.12 states that the Commission will not consider granting an exemption unless special circumstances are present. NMC believes this request meets the criterion of a special circumstance as defined in 50.12(a)(2)(ii), which states: "Application of the regulation in the particular circumstances would not serve the underlying purpose of the rule or is not necessary to achieve the underlying purpose of the rule."

I. Applicable Rule

The pertinent rule is 10 CFR 50, Appendix J, Option B, Paragraphs III.A and III.B, which state in part:

A. Type A Test

The leakage rate must not exceed the allowable leakage rate (L_a) with margin, as specified in the Technical Specifications.

And

B. Type B and C Tests

The tests must demonstrate that the sum of the leakage rates at accident pressure of Type B tests, and pathway leakage rates from Type C tests, is less than the performance criterion (L_a) with margin, as specified in the Technical Specifications.

II. Requested Exemption

NMC requests an exemption: 1) from the requirements of 10 CFR 50, Appendix J, Option B, Paragraph III.A, to allow exclusion of the main steam pathway leakage from the overall integrated leakage rate measured when performing a Type A test, and 2) from the requirements of 10 CFR 50, Appendix J, Option B, Paragraph III.B, to allow exclusion of the main steam pathway leakage from the combined leakage rate of all penetrations and valves subject to Type B and C tests.

III. Justification

Under the pre-AST design basis accident radiological consequence analyses, MSIV leakage was added to the overall containment integrated leakage rate, local leakage rates across pressure retaining, leakage limiting boundaries, and containment isolation valve leakage rates as measured by the Type A and Type B and C test specified in 10 CFR 50, Appendix J, Option B. By Reference 1 MNGP was authorized to use the Option B provisions of 10 CFR Part 50, Appendix J, for Type A tests and by Reference 2, MNGP was authorized to use the Option B provisions of 10 CFR Part 50, Appendix J, for Type B and C tests.

Under the AST design basis accident radiological consequence analyses, MSIV and main steam pathway leakage has been accounted for separately from the overall containment integrated leakage, local leakage across pressure retaining, leakage limiting boundaries, and containment isolation valve leakage. Specifically, the AST design basis accident analyses use the main steam piping, main steam drain lines, and main condenser as an alternate means for MSIV and main steam pathway leakage treatment. Under the pre-AST design basis, certain main steam and main steam line drain piping, as well as the main condenser, were not classified as seismic category I components, however, during MNGP's power re-rate they had been demonstrated to be seismically rugged and thus capable of performing as an MSIV leakage treatment system.

MSIV and main steam pathway leakage has been accounted for separately from the overall containment integrated leakage, local leakage and containment isolation valve leakage. As such, the requirement of 10 CFR 50, Appendix J, Option B, Paragraphs III.A and III.B, that MSIV and main steam

pathway leakage be included as part of the Type A and Type B and C test results, is not necessary to achieve the underlying purpose of the rule; that is, ensuring the actual radiological consequences of design basis accidents remain below those analyzed as demonstrated through the measured containment leakage, local leakage and containment isolation valve leakage test.

In this manner, the MNGP containment leakage testing program will be made more consistent with the limiting assumptions used in the associated accident consequence analyses. Corresponding changes to the TS, which implement the requested exemption, are also proposed.

It is anticipated that the revised limits on main steam isolation valve and main steam pathway leakage will potentially result in a reduction of unnecessary maintenance on these valves simply to maintain the low leakage rate and as a result will support reducing worker exposure to as low as reasonably achievable.

IV. Authorized By Law

The proposed exemption is authorized by law, and has been previously granted to other licensees. For example, Reference 3 from the NRC granted this exemption to the Tennessee Valley Authority for the Browns Ferry Nuclear Plant, Units 2 and 3.

V. No Undue Risk to Public Health and Safety

The proposed exemption presents no undue risk to public health and safety. MSIV and main steam pathway leakage for the MNGP design basis accident analyses has been accounted for separately from the overall leakage associated with the primary containment boundary, local leakage and containment isolation valve leakage. As such, the inclusion of MSIV and main steam pathway leakage as part of the Type A and Type B and C test results is not necessary to ensure the actual radiological consequences of design basis accidents remain below those previously evaluated and accepted. The exemption will not result in any change to the previously evaluated consequences associated with design basis accidents. As such, the proposed exemption presents no undue risk to public health and safety.

VI. Consistent with Common Defense and Security

With regard to the "common defense and security" standard, the granting of the requested exemption is consistent with the common defense and security of the United States. The Commission's Statement of Considerations in support of the exemption rule note with approval the explanation of this standard as set forth in Long Island Lighting Company (Shoreham Nuclear

Power Station, Unit 1), LBP-84-45, 20 NRC 1343, 1400 (October 29, 1984). There, the term "common defense and security" refers principally to the safeguarding of special nuclear material, the absence of foreign control over the applicant, the protection of Restricted Data, and the availability of special nuclear material for defense needs. The granting of the requested exemption will not affect any of these matters and, thus, such grants are consistent with the common defense and security.

VII. Special Circumstances Are Present

Special circumstances are present which warrant issuance of this requested exemption. These special circumstances are discussed in accordance with the classification contained in 10 CFR 50.12(a)(2):

- (ii) Application of the regulation in the particular circumstances would not serve the underlying purpose of the rule or is not necessary to achieve the underlying purpose of the rule.

The underlying purpose of the rule is to ensure the actual radiological consequences of design basis accidents remain below those previously evaluated and accepted, as demonstrated by the actual, periodic measurement of containment leakage, local leakage and containment isolation valve leakage. Although Type A and Type B and C leakage test are defined as a measurement of the overall primary containment leak rate, local leakage and containment isolation valve leakage, the continued inclusion of the MSIV and main steam pathway leakage measurements in the Type A and Type B and C test leakage results would result in the double counting of the MSIV leakage in assessing the actual integrated leakage of the containment and containment isolation valve leakage. As such, this exemption addresses a special circumstance in which application of the regulation requiring the inclusion of MSIV and main steam pathway leakage in the Type A and Type B and C leakage testing results is not necessary to achieve the underlying purpose of the regulation.

VIII. Environmental Impact

The proposed exemption has been analyzed and determined not to cause additional construction or operational activities which may significantly affect the environment.

The proposed exemption does not result in an increase in any adverse environmental impact previously evaluated, does not result in a change in effluents or power levels, and does not affect any matter not previously reviewed by the NRC which may have a significant adverse environmental impact.

The proposed exemption does not alter the land use for the plant; any water uses or impacts on water quality; or, air or ambient air quality. The proposed exemption does not affect the ecology of the site and vicinity and does not affect the noise emitted by the station. Therefore, the proposed exemption does not affect the analysis of environmental impacts described in the environmental report.

References:

1. Letter from Tae Kim (U.S. NRC) to Roger O. Anderson (Northern States Power Company), "Monticello Nuclear Generating Plant – Issuance of Amendment Re: Main Steam Isolation Valve and 10 CFR Part 50, Appendix J, Leak Test Requirement (TAC NO. M93332)," April 3, 1996, ADAMS Accession Number ML020930018.
2. Letter from Darl S. Hood (U.S. NRC) to Jeffrey S. Forbes (Nuclear Management Company, LLC), "Monticello Nuclear Generating Plant – Issuance of Amendment Re: License Amendment Request for Conversion to Option B for Containment Leak Rate Testing (TAC NO. MB4975)," February 4, 2003, ADAMS Accession Number ML023300295.
3. Letter from William O. Long (U.S. NRC) to J. A. Scalice (Tennessee Valley Authority), "Browns Ferry Nuclear Plant, Units 2 and 3 - Issuance of Exemption from 10 CFR Part 50, Appendix J (TAC Nos. MA6815 and MA6816)," ADAMS Accession Number ML003691985.

ENCLOSURE 3

MONTICELLO NUCLEAR GENERATING PLANT

**APPLICATION FOR LICENSE AMENDMENT
ALTERNATIVE SOURCE TERM**

TECHNICAL ANALYSIS

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1.0 DESCRIPTION

In accordance with 10 CFR 50.67, "Accident Source Term", a licensee may voluntarily revise its current accident source term used in design basis radiological consequence analyses by applying for a license amendment in accordance with 10 CFR 50.90, "Application for amendment of license or construction permit". Paragraph 50.67(b) requires that applications under this section contain an evaluation of the consequences of applicable design basis accidents (DBAs) previously analyzed in the plant safety analysis report (Monticello Nuclear Generating Plant Updated Safety Analysis Report). Regulatory Guide (RG) 1.183, "Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors", provides guidance to licensees on performing evaluations and reanalysis, as required, to adopt an alternative source term (AST).

The AST is characterized by updated radionuclide composition and magnitude, chemical and physical form of the radionuclides, and the timing of the release of these radionuclides. An accident source term is a fundamental assumption upon which a portion of the plant design is based.

Nuclear Management Company, LLC (NMC) has performed radiological consequence analyses of the four applicable boiling water reactor (BWR) DBAs identified in RG 1.183 for the Monticello Nuclear Generating Plant (MNGP). These DBAs are the Loss of Coolant Accident (LOCA), Main Steam Line Break Accident (MSLBA), Control Rod Drop Accident (CRDA) and Fuel Handling Accident (FHA). The analyses of these same DBAs are contained in the MNGP Updated Safety Analysis Report (USAR) and are part of the Current Licensing Basis (CLB).

The radiological consequence analyses were performed using the guidance of RG 1.183. A number of radiological consequence analyses (cases) were developed that are contained in the calculations. Cases prepared in direct support of this License Amendment Request (LAR), termed Licensing Basis Cases, are described below.

A technical summary highlighting the key assumptions, design inputs, methods, and results of the four DBA AST calculations is provided below (Section 2.0). System testing, design, and operating considerations relied upon in the calculations and how these considerations support the 10 CFR 50.92, "Issuance of Amendment" determination are described in Sections 4.0 to 7.0. The proposed use of these results concurrent with the CLB use of TID-14844, "Calculation of Distance Factors for Power and Test Reactor Sites" source term assumptions in support of regulatory requirements is described in Section 8.0. A listing of the computer codes, code version, and summary of code use is provided in Section 9.0.

On April 29, 2004 NMC submitted a selective scope LAR to apply AST methodology for the re-evaluation of the DBA FHA. A comparison of this LAR to

the prior submittal and its subsequent supplements and RAI responses is provided in Section 3.0. Though a revised FHA analysis has been included in this full scope LAR, none of the changes to the analysis impact the prior LAR. However, some of the Technical Specification (TS) changes requested in this LAR as described in Enclosure 1, also affect TS pages included in the prior submittal.

2.0 TECHNICAL SUMMARY OF AST CALCULATIONS

The approach to preparing AST DBA calculations included the following steps:

- Develop new atmospheric dispersion factors based on more recent meteorological data and in accordance with methods specified in regulatory guidance documents,
- Determine the AST based on plant-specific analysis of the fission product inventory,
- Apply the applicable release fractions per RG 1.183 for the four BWR DBAs,
- Include appropriate radioiodine deposition and removal mechanisms in the release pathways, and
- Calculate the offsite and Control Room (CR) personnel Total Effective Dose Equivalent (TEDE) doses.

The results of applying this approach to the four BWR DBAs are described below.

2.1 Atmospheric Dispersion Factors

2.1.1 Introduction and Background

Atmospheric dispersion of radiological releases consists of two components: (1) atmospheric transport due to organized or mean airflow within the atmosphere, and (2) atmospheric diffusion due to disorganized or random air motions. Atmospheric dispersion factors (χ/Q) account for these two components and provide values, based on accepted modeling techniques, that represent the relative dispersion occurring between a source release location and a receptor location. The relative dispersion can then be used to determine the expected atmospheric radionuclide concentration at some defined distance from the source for a known quantity of released effluent.

In order to be representative of site dispersion characteristics, the χ/Q s used in this LAR were calculated using plant specific meteorological data and the ARCON96 and PAVAN computer codes. The ARCON96 computer code, which was developed for the NRC, is used for calculating χ/Q values in evaluations such as control complex habitability assessments. In the MNGP analyses, ARCON96 is used to develop χ/Q s for ground level releases. PAVAN is used in the MNGP analyses to provide χ/Q values to the CR from the offgas stack, to the offsite and low population zone areas.

2.1.2 Meteorological Data

Meteorological data from the years 1998-2002 were used to calculate atmospheric dispersion factors to support this LAR. These five years of data were selected based on quality of the data, the quantity (i.e., recovery rate) of the data, and the representation of long-term meteorological conditions and seasonal trends. The data set selected is consistent with RG 1.194, "Atmospheric Relative Concentrations for Control Room Radiological Habitability Assessments at Nuclear Power Plants", that states five years of hourly observations are considered representative of long-term trends at most sites and that one year including all four seasons is the minimum acceptable. The five-year data set used by NMC includes all four seasons for the five consecutive years in the data set and provides a representative long-term trend.

The MNGP onsite meteorological measurement program, as described below, met the recommendations of RG 1.23, "Onsite Meteorological Programs", from 1998 through 2002 with one exception. NMC calibrates the meteorological monitoring instrumentation at an annual frequency rather than the semi-annual calibration interval recommended by RG 1.23. Though NMC is not committed to RG 1.23 at MNGP, the meteorological program is consistent with RG 1.23 for measured parameters, instrument siting, data recording, data reduction, instrument accuracy and maintenance.

The meteorological measurements program at MNGP consists of monitoring wind direction, wind speed, temperature, and precipitation. Recorded data are used to generate joint frequency distributions of wind direction, wind speed, and atmospheric stability class used to provide estimates of airborne concentrations of gaseous effluents and projected offsite radiation dose. The primary meteorological tower facility is located on the plant site; the surrounding area is maintained free of obstructions to preclude micro-scale influences. Thus, the meteorological data is representative of the overall site area.

2.1.3 Calculation of Control Room χ/Qs

The ARCON96 computer code is used to calculate the ground level release χ/Qs to the CR. PAVAN is used to calculate the χ/Q values to the CR from the Offgas Stack.

For the purpose of DBA radiological consequence analysis, four release (source) points to the environment were modeled, they are:

1. Closest Reactor Building (RB) wall to the CR,
2. RB exhaust vent,

3. Turbine Building vent, and
4. Offgas Stack.

Additionally, two intake (receptor) locations with the potential for introducing outside air into the CR were modeled, they are:

1. Control Room outside air intake, and
2. Administration Building (Admin Building) outside air intake.

Consistent with the guidance of RG 1.194, the meteorological data collection location closest to the release point is utilized, i.e., data collected at the 100 m height is used for the calculation of elevated releases (PAVAN) and data collected at 43 m and 10 m is used to develop the meteorological inputs for the ground level release locations (ARCON96).

The ground level release χ/Q s for each source point, taken directly from ARCON96 results, are shown in Tables 2.1-1 and 2.1-2, respectively, for the two CR receptor locations. In the radiological DBA analyses, the bounding source-receptor χ/Q values were selected as input to the dose calculations. Elevated release χ/Q s for the Control Room dose evaluations are shown in Table 2.1-3.

Table 2.1-1			
χ/Q (sec/m³) for Ground Level Releases to Control Room Intake			
Time Period	RB Nearest Wall	RB Vent	Turbine Building Vent
0 - 2 hrs	1.00E-02	2.48E-03	2.51E-03
2 - 8 hrs	7.09E-03	1.81E-03	1.73E-03
8 - 24 hrs	2.75E-03	6.58E-04	6.86E-04
1 - 4 days	1.90E-03	4.67E-04	4.70E-04
4 - 30 days	1.42E-03	3.49E-04	3.52E-04

Table 2.1-2			
χ/Q (sec/m³) for Ground Level Releases to CR via Admin Building Intake			
Time Period	RB Nearest Wall	RB Vent	Turbine Building Vent
0 - 2 hrs	1.43E-02	2.47E-03	2.58E-03
2 - 8 hrs	9.69E-03	1.76E-03	1.85E-03
8 - 24 hrs	3.82E-03	6.31E-04	7.37E-04
1 - 4 days	2.65E-03	4.57E-04	4.90E-04
4 - 30 days	1.98E-03	3.41E-04	3.84E-04

Table 2.1-3		
χ/Q (sec/m³) for Elevated Releases to CR		
Time Period	Control Room Intake	Admin Building Intake
Fumigation	3.37E-04	3.59E-04
0 – 2 hours	3.73E-06	4.02E-06
0 - 8 hours	5.62E-07	5.63E-07
8 - 24 hours	2.20E-07	2.13E-07
1 - 4 days	2.88E-08	2.58E-08
4 - 30 days	1.56E-09	1.25E-09

2.1.4 Calculation of EAB and LPZ χ/Q s

The PAVAN computer code is used to calculate the χ/Q values for the Exclusion Area Boundary (EAB) and Low Population Zone (LPZ). This methodology is consistent with RG 1.145, "Atmospheric Dispersion Models for Potential Accident Consequence Assessments at Nuclear Power Plants".

The following data were used as input to PAVAN:

1. χ/Q values were calculated for ground level releases from the vicinity of the Turbine Building and Reactor Building. χ/Q values for elevated releases were calculated from the Offgas Stack.

2. Minimum distance to the EAB is 500 meters (m).
3. Distance to the LPZ is 1609 m.
4. Reactor Building height is 43.6 m.
5. Reactor Building cross sectional area is 1829 m² calculated using the smallest width of the wall.
6. Joint frequency data binning was done consistent with the guidance of RG 1.21, "Measuring, Evaluating, and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials in Liquid and Gaseous Effluents from Light-Water-Cooled Nuclear Power Plants". An alternate set of joint frequency data (JFD) is also provided with non-RG 1.21-type binning. χ/Q s are generally conservative with the use of the RG 1.21 formatted input for elevated releases and at the EAB. Thus, the RG 1.21 input JFD data is utilized for these χ/Q calculations. The alternate (non-RG 1.21) binning produced bounding χ/Q s at the EAB for a ground level release; therefore, the non-RG 1.21 JFDs were utilized in the ground level EAB calculations.
7. The calm wind category is distributed separately from the other six wind speed categories.
8. The default terrain adjustment factor is used.

In addition to the above EAB considerations for determining worst case dispersion values, per Section 1.2 of RG 1.145, "... χ/Q calculations should be made in each sector at each minimum boundary distance and at various distances beyond the exclusion area boundary distance to determine the maximum relative concentration for consideration in subsequent calculations." Consistent with RG 1.145, sensitivity studies were performed for distances beyond the EAB. Bounding values were selected which included some distances beyond 500 meters. Table 2.1-4 summarizes the results of χ/Q values calculated with the PAVAN computer code.

Table 2.1-4				
χ/Q (sec/m³) PAVAN Analysis				
Time Period	Elevated Release		Ground Level Release	
	EAB	LPZ	EAB	LPZ
Fumigation	1.11E-4	3.86E-05	--	--
0 - 2 hrs	4.22E-6	3.79E-06	7.86E-4	1.53E-04
0 - 8 hrs	2.20E-6 LOCA: 2.23E-6	2.14E-06	5.08E-4	8.83E-05
8 - 24 hrs	1.59E-6 LOCA: 1.67E-6	1.61E-06	4.08E-4	6.71E-05
1 - 4 days	7.88E-7	8.64E-07	2.54E-4	3.70E-05
4 - 30 days	3.11E-7	3.54E-07	1.29E-4	1.57E-05

2.2 Loss of Coolant Accident (LOCA)

2.2.1 Introduction and Background

The MNGP is a BWR/3 with a Mark I containment. The licensed rerate power is 1775 MWt. Consistent with prior MNGP rerate analyses, a power of 1880 MWt was used throughout this LAR for determining radiological consequences. This value is further increased by 2% to 1918 MWt, consistent with RG 1.183, to account for power measurement uncertainties. Though not summarized herein, an additional LOCA case is analyzed at an extended power level that does not pertain to this LAR.

The core inventory used for the source term for the LOCA analysis is developed using ORIGEN 2.1. The core inventory calculation assumed operation at 1918 MWt and operation at the total average burnup expected for a 24-month fuel cycle. Fuel data input parameters for the isotopic inventory are summarized in Table 2.2-1.

Table 2.2-1	
Fuel Data	
Initial Fuel Assembly Mass of Uranium (MTU)	0.183
Total Number of Assemblies in Core	484
Average Core Power Level Over Cycle	1918 MWt
Average exposure for fuel cycle (GWd/MTU)	33.96
Maximum assumed exposure for fuel cycle (GWd/MTU) (confirmed as bounding)	54.0
Maximum actual exposure for representative fuel cycle (GWd/MTU)	47.03
Average days of continuous irradiation	1568.25
Maximum days of continuous irradiation	2493.68

The MNGP Mark I containment (primary containment) consists of a drywell and pressure suppression chamber, with a connecting vent system. Primary containment leakage is limited by Technical Specification (TS) to 1.2% of primary containment air weight per day at a peak pressure (P_a) of 42 psig. Because of post-accident containment depressurization, this leakage rate will decrease with time. Consistent with the guidance in Section 3.7 of Appendix A of RG 1.183, credit is taken for reduced leakage from the primary containment following the first 24 hours post-LOCA and then a further reduction at 72 hours post-LOCA. The MNGP analysis includes a conservative post-LOCA primary containment pressure profile to determine reduced leakage rates. Primary containment leakage is assumed to be at 100% for the first 24 hours, at 61% for the next 48 hours (out to hour 72), and at 50% for the remainder of the accident.

The primary containment is enclosed in the secondary containment portion of the Reactor Building. Under accident conditions, leakage from the primary containment that enters the secondary containment is ultimately processed by the standby gas treatment (SBGT) system and released from an elevated stack. The Reactor Building exhaust fans, which normally maintain the building at a negative pressure, trip at accident initiation. A brief period of time may exist prior to the SBGT system establishing a negative pressure condition in the secondary

containment. Prior to the end of this positive pressure period (PPP), the primary to secondary containment leakage is assumed to go directly to the environment. After the PPP, filtration of this leakage by the SGBT system is credited; however, no credit is taken for holdup in secondary containment. Consistent with Table 4 of R.G. 1.183, the onset of early in-vessel release does not occur until 2 minutes into the accident and the PPP duration is 5 minutes (see Table 2.2-2). Therefore, direct release of this primary containment leakage to the environment is 3 minutes.

In addition to primary to secondary containment leakage, a second source of leakage is assumed to enter the secondary containment from operation of post accident Engineered Safety Features (ESFs). Even though different ESFs will operate for different durations over the course of the accident, a total combined leakage rate is conservatively assumed to remain constant for the entire accident duration.

Two sources of primary containment leakage are assumed to bypass secondary containment, Main Steam Isolation Valve (MSIV) leakage and secondary containment bypass (SCB) leakage. Both sources are assumed to drain to the main condenser. For MSIV leakage, the proposed total Technical Specification limit of 200 scfh at P_a is assumed. For secondary containment bypass leakage, the analysis assumed 35.2 scfh. These leakage rates are reduced over the course of the accident in the manner similar to that described above for primary containment leakage.

All MSIV leakage is assumed to transport through two of the four main steam lines at 100 scfh each with the further assumption that the inboard MSIV has failed open on one of the two lines. This assumed failure limits the piping surface area credited for natural deposition. Natural deposition of radioactive particulates is credited for the piping between the inboard and outboard MSIV on one steam line (the one of shortest distance) and in the drain lines from two of the main steam lines to the main condenser (in the two shortest drain line paths). Since a single failure of an inboard MSIV in one steam line is assumed, natural deposition is not credited between the MSIVs in this line. Natural deposition of SCB leakage in the shortest drain line path to the main condenser is also assumed.

Following a LOCA, the water in the suppression pool is assumed to be acidic ($\text{pH} < 7$) and will remain so unless a buffering solution is added to the pool following the initiation of the LOCA. Maintaining the suppression pool pH above 7.0 serves to minimize re-evolution of elemental iodine and thus reduces the amount of radioactive iodine available for release in the design basis LOCA. Standby liquid control system (SBLC) boron injection provides sufficient buffering of the suppression pool to establish and maintain the pH of the suppression pool above 7.0 within 24 hours and for the remainder of the 30 day accident. The initiation of SBLC is a manual action assumed to occur within the first hour of the accident.

The radiological dose to the CR operators during the postulated design basis LOCA is minimized by the integrity of the Control Room Envelope (CRE) and operation of the control room ventilation emergency filtration train (CRV-EFT) system. The doses calculated in this AST evaluation are based on a combination of unfiltered in-leakage and filtered intake flow, determined through studies. The unfiltered inleakage assumption is verified as conservative by CRE inleakage tests (see Section 4.0).

Key inputs and assumptions used in the AST LOCA licensing basis case are listed in Table 2.2-2 and discussed further in subsequent subsections.

Table 2.2-2	
Key LOCA Analysis Inputs and Assumptions	
Input/Assumption	Value
Core Power	1918 MWt
Fuel Data	See Table 2.2-1
Core Fission Products Inventory	See Table 2.2-3
Core Fission Products Inventory Release Fractions, Timing, and Release Durations (for core releases to the Drywell air volume)	Per Tables 1 and 4 of RG 1.183. Releases modeled in a linear fashion.
Isotopic half life and significant daughter isotope generation parameters.	Per Table 1.4.3.2-3 of NUREG/CR-6604 (RADTRAD).
Radionuclide Groups Considered in Analysis	Per Table 5 of RG 1.183.
Chemical Form of Released Iodine	Per Section 3.5 of RG 1.183.
Primary Containment Volume	0 to 2 hours: Drywell free air volume only. 2 hours to 30 days: Drywell free air volume and minimum torus free air volume.

Table 2.2-2	
Key LOCA Analysis Inputs and Assumptions	
Input/Assumption	Value
Use of Drywell and Torus Sprays	No credit is assumed for drywell or torus spray operation. Further, no credit for suppression pool scrubbing or holdup/removal using Drywell HVAC is assumed.
SBLC Operation	SBLC credited for pH control, iodine re-evolution is not significant.
Primary Containment Natural Deposition	Powers 10 th Percentile Natural Deposition Model
Primary Containment Leakage Rate (leakage into secondary containment)	0 to 24 hours: Design Value of 1.2 % containment air weight per day (includes SCB leakage and excludes MSIV leakage). 24 to 72 hours: 61% of the Design Value. 72 hours to 30 days: 50% of the Design Value.
Secondary Containment Bypass (SCB) Leakage Rate (leakage into the main condenser)	0 to 24 hours: 35.2 scfh. 24 to 72 hours: 61% of 35.2 scfh. 72 hours to 30 days: 50% of 35.2 scfh.
ESF Leakage Flash Fraction for Radioiodines	10% per Section 5.5 of Appendix A of R.G. 1.183. Maximum suppression pool temperature is < 212°F.
ESFs Leakage Rate (leakage into secondary containment)	0 to 30 days: 2.62 gpm (twice the design leakage value)
MSIV and SCB Leakage Radioiodine Deposition	Well-Mixed Flow Model per Section 6.3 of Appendix A of R.G. 1.183 and AEB 98-03

Table 2.2-2	
Key LOCA Analysis Inputs and Assumptions	
Input/Assumption	Value
MSIV Leakage Rate (leakage into the main condenser)	0 to 24 hours: 200 scfh. 24 to 72 hours: 61% of 200 scfh. 72 hours to 30 days: 50% of 200 scfh. All flow modeled through 2 of 4 steam lines split evenly between the 2 lines.
Main Condenser Radioiodine Deposition	0 to 24 hours: 98.62% 24 to 72 hours: 99.15%
Elemental & Particulate Filter Efficiency	72 hours to 30 days: 99.31%
Secondary Containment PPP	5 minutes (primary to secondary containment leakage and ESF leakage directly to the environment) Also, no holdup or dilution in secondary containment is credited
SGBT Filter Efficiency	Aerosols = 98% Elemental = 85% Organic = 85%
Ground and Elevated Release Dispersion Coefficients	For CR operator, maximum of CR Intake or Admin Building Intake χ/Qs for RB nearest wall, TB vent, and Offgas Stack release sources. For EAB and LPZ, ground level release χ/Qs during PPP then elevated release χ/Qs after PPP - all from Table 2.1-4.
CR Emergency Filtration System Initiation	Full emergency mode operation prior to radiological release at 2 minutes post LOCA (CRV-EFT system initiates on LOCA signal)

Table 2.2-2	
Key LOCA Analysis Inputs and Assumptions	
Input/Assumption	Value
CR Filtered Air Intake Flow	900 cfm (minimum flow provides conservative results)
CR Filter Iodine Removal Efficiencies	Aerosols = 98% Elemental = 98% Organic = 98%
CR Unfiltered In-Leakage Rate	500 cfm
CR Breathing Rates and Occupancy Factors	Per Section 4.2.6 of RG 1.183
Offsite (EAB and LPZ) Breathing Rates	Per Section 4.1.3 of RG 1.183
Dose Conversion Factors	Per Table 1.4.3.3-2 of NUREG/CR-6604 (RADTRAD) Based on Federal Guidance Report (FGR) 11 and 12

2.2.2 Source Term

The source term used for the design basis LOCA analysis is defined by the quantity, type, and timing of the release of radioactivity from a damaged reactor core to the containment. The core inventory is provided in Table 2.2-3 and includes the 60 isotopes tabulated in Table 1.4.3.2-3 of NUREG/CR-6604 (RADTRAD). Isotopic concentrations are calculated using ORIGEN 2.1 with the fuel data summarized in Table 2.2-1. The rerate analysis power level, increased by 2% to account for power measurement uncertainties, is used consistent with Footnote 8 to Section 3.1 of RG 1.183.

Releases are modeled in a linear fashion using release fractions, timing, and chemical compositions consistent with Tables 1 and 4 and Section 3.5 of R.G. 1.183. The onset of core inventory release begins 2 minutes into the accident. The fuel gap activity is then released over 0.5 hours, followed by a 1.5 hour early in-vessel (EIV) release.

Table 2.2-3

Fission Product Inventory at Time t=0

Isotope	Activity (Ci/MWt)	Isotope	Activity (Ci/MWt)	Isotope	Activity (Ci/MWt)
Co-58	1.53E+02	Ru-103	4.14E+04	Cs-136	2.19E+03
Co-60	1.83E+02	Ru-105	2.86E+04	Cs-137	4.84E+03
Kr-85	4.35E+02	Ru-106	1.79E+04	Ba-139	4.72E+04
Kr-85m	6.64E+03	Rh-105	2.74E+04	Ba-140	4.54E+04
Kr-87	1.27E+04	Sb-127	2.88E+03	La-140	4.68E+04
Kr-88	1.78E+04	Sb-129	8.53E+03	La-141	4.30E+04
Rb-86	6.36E+01	Te-127	2.87E+03	La-142	4.15E+04
Sr-89	2.41E+04	Te-127m	3.95E+02	Ce-141	4.30E+04
Sr-90	3.51E+03	Te-129	8.40E+03	Ce-143	3.97E+04
Sr-91	3.02E+04	Te-129m	1.26E+03	Ce-144	3.72E+04
Sr-92	3.29E+04	Te-131m	3.80E+03	Pr-143	3.96E+04
Y-90	3.60E+03	Te-132	3.71E+04	Nd-147	1.73E+04
Y-91	3.13E+04	I-131	2.62E+04	Np-239	5.40E+05
Y-92	3.30E+04	I-132	3.77E+04	Pu-238	1.48E+02
Y-93	3.84E+04	I-133	5.31E+04	Pu-239	1.59E+01
Zr-95	4.37E+04	I-134	5.82E+04	Pu-240	2.10E+01
Zr-97	4.35E+04	I-135	4.97E+04	Pu-241	6.63E+03
Nb-95	4.47E+04	Xe-133	5.32E+04	Am-241	1.03E+01
Mo-99	4.91E+04	Xe-135	2.20E+04	Cm-242	2.09E+03
Tc-99m	4.30E+04	Cs-134	7.17E+03	Cm-244	1.08E+02

2.2.3 Mitigation

The radiological consequences of the LOCA are actively mitigated by several systems. The safety related CRV-EFT system is credited for the mitigation of the dose to the CR operator. The isolation of the CR and the initiation of the emergency mode of CRV-EFT system operation will occur automatically in response to a LOCA event on High Drywell Pressure or Low Low Reactor Water Level.

For the licensing basis case, one train of CRV-EFT system emergency filtered air intake is credited. Based on studies performed to develop the licensing basis case, the minimum flow rate of 900 cfm is credited from operation of a single train. As supported by CRE test results (see Section 4.0), a value of 500 cfm unfiltered air leakage is conservatively assumed concurrent with emergency mode operation. CRV-EFT system filter efficiencies are shown in Table 2.2-2.

The SBGT system is credited for the mitigation of the radiological release into secondary containment. Credit for secondary containment is delayed for the first 5 minutes until a sufficient negative pressure is developed by the SBGT system. Releases into the reactor building during the first 5 minutes are assumed to be directly exhausted to the environment as ground level releases with no filtration or hold-up. After 5 minutes, releases are filtered by the SBGT system and discharged through the stack elevated release point. The system is assumed to operate for the remainder of the accident. Filter efficiencies are shown in Table 2.2-2. No holdup in secondary containment is credited [Table 2.2-2].

The manual injection of boron via the SBLC system is credited for suppression pool pH control. The maintenance of suppression pool pH level above 7.0 is necessary to prevent re-evolution of elemental radioiodine from the suppression pool water. The use of the SBLC system is consistent with several other BWR AST submittals. This is a new design basis requirement for the SBLC system. No hardware changes or new operating requirements are necessary to implement this requirement. The initiation of SBLC is performed from the CR and is not a new manual action. Current design and performance of the SBLC system support its credit for performing this function (see Section 5). *In addition to existing requirements to initiate on low reactor vessel water level, new procedural guidance will be established to initiate the SBLC system on high containment radiation and to note reliance on the SBLC system for pH control.* The MSIV leakage pathway includes the main steam piping from the reactor vessel to the outboard isolation valve up to the turbine stop valve, the main steam drain lines up to the condenser, and the main condenser. By Safety Evaluation dated September 16, 1998, this pathway was previously evaluated by the NRC. Portions of this pathway have

been credited for radioiodine deposition using the well-mixed flow models for gaseous iodine removal of AEB-98-03, "Assessment of Radiological Consequences for the Perry Pilot Plant Application using the Revised (NUREG-1465) Source Term". For conservatism, all MSIV leakage is assumed to transport to the main condenser through the two shortest pathways of the four main steam line drain paths. All SCB leakage is assumed to transport through the shortest ESF steam line drain path. Further, it is assumed that the inboard MSIV in the pathway of longer distance between MSIVs of the two steam lines selected fails open and no credit for radioiodine deposition between the MSIVs in that line is assumed. Gravity effects are a key consideration in radioiodine deposition. Therefore, total surface area credited for deposition is limited to the projected horizontal (not total) surface area. These assumptions minimized the total surface area credited for deposition and total volume credited for holdup.

2.2.4 Radiological Transport Modeling

The combined radiological release model developed to calculate LOCA doses is shown in Figure 2.2-1. Separate portions of this combined model were evaluated using RADTRAD to address the various leakage pathways. Results for the various pathways were summed together to determine CR operator and offsite doses. Evaluation in this fashion allowed comparison of dose contributions from the various pathways and also introduced conservatisms, as the primary containment source term is generally not diminished to account for leakage to different pathways. The composite model includes the following eight control volumes:

- Volume 1 Free air volume of the Drywell portion of Primary Containment
- Volume 2 Main steam line holdup volume between closed MSIVs
- Volume 3 Artificial mixing volume for combining main steam line and SCB leakages
- Volume 4 Main Condenser volume credited for radioiodine deposition
- Volume 5 Environment (using elevated and ground level χ/Q_s as appropriate)
- Volume 6 Control Room
- Volume 7 Artificial Reactor Building (for combining primary containment and ESF leakages with no holdup)
- Volume 8 Minimum free air volume of the Torus portion of Primary Containment

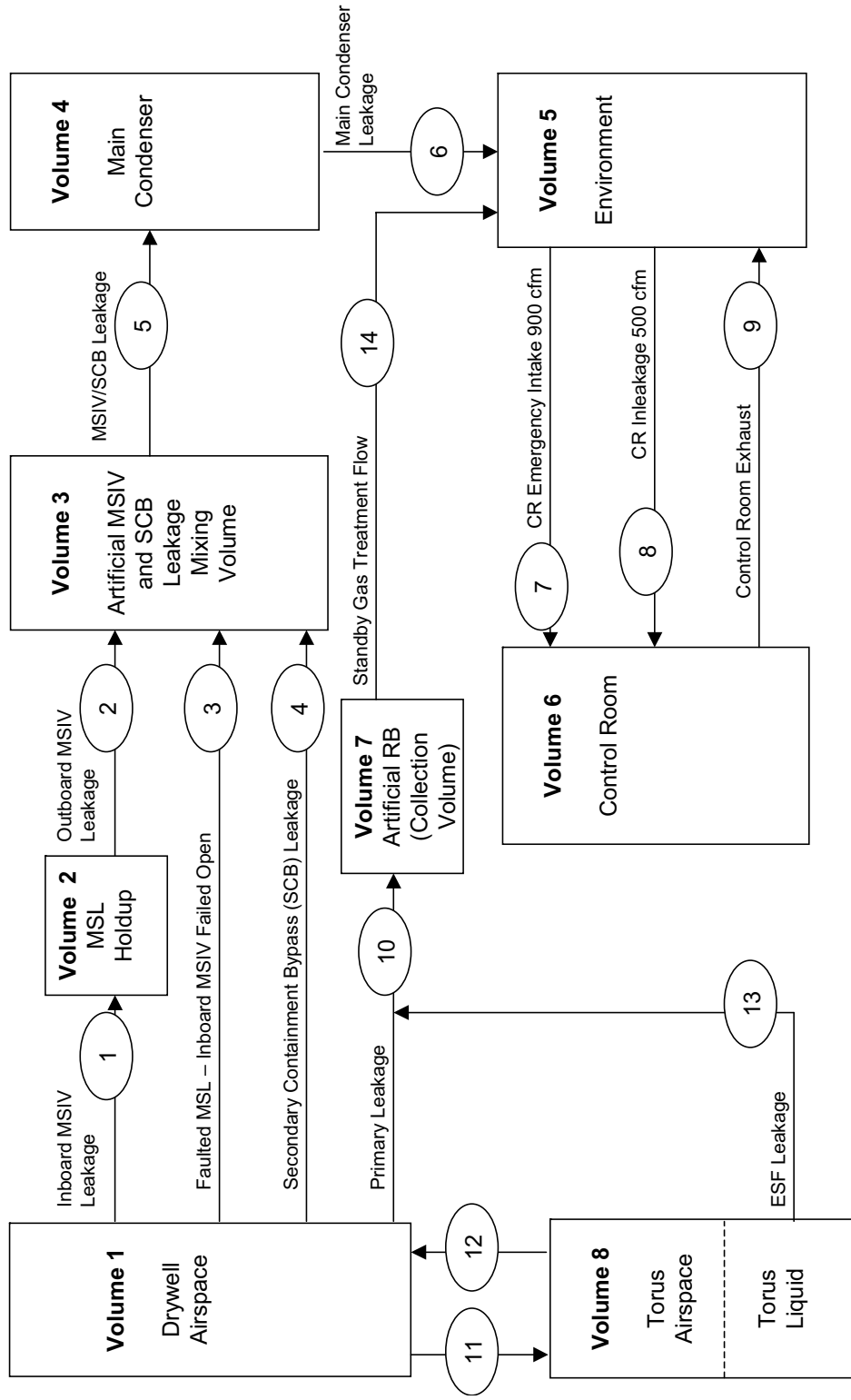
A discussion of the pertinent aspects of these volumes and associated release pathways is provided below.

Primary Containment (Volumes 1 and 8) – includes Drywell Airspace Volume, Torus Airspace, and Torus Liquid Volume

The total core source term (100%) is released directly into the Drywell airspace from the reactor vessel using the isotope types, concentrations, release fractions and timing as described in Section 2.2.2. As shown in Table 2.2-2, natural deposition is assumed. This source term is then released through primary containment leakage, MSIV leakage, and SCB leakage. At 2 hours into the event, the primary containment airspace is increased to include both the Drywell airspace and the minimum torus airspace. From this point forward in the accident, the airborne source term concentration inside the primary containment is based on this combined volume.

To account for ESF Leakage the total core source term (100%), with the exception of noble gases, is assumed to release directly into the torus liquid volume (suppression pool). The release from the core is assumed to occur over a 2 hour period and, as released, instantaneously and homogeneously mix in the suppression pool volume. A minimum torus water volume is conservatively assumed. No credit for reactor vessel or recirculation system piping volumes is assumed to further dilute the ESF source term. Consistent with Sections 5.1, 5.3, 5.5, and 5.6 of Appendix A of RG 1.183, all radioactive material with the exception of noble gases and radioiodine is assumed to be retained in the liquid, 10% of the total radioiodine in the leakage is assumed to become airborne, and the radioiodine available for release is assumed to be 97% elemental and 3% organic.

Figure 2.2-1 – Release Model



Leakage from the Drywell/Primary Containment airspace is modeled as primary leakage (Pathway 10), MSIV leakage (Pathways 1 and 3), and SCB leakage (Pathway 4). The TS limit of 1.2% per day by weight, at a peak pressure of (P_a) of 42 psig, is used to determine the combined primary and SCB leakages. An initial SCB leakage rate of 35.2 scfh is established, leaving the remainder to be modeled as primary leakage.

The MSIVs are assumed to leak at a combined rate of 200 scfh through two of four steam lines, consistent with proposed changes to MSIV leakage requirements. Consistent with Section 3.7 of Appendix A of RG 1.183, all leakage from the Drywell/Primary Containment is reduced over time as noted in Table 2.2-2 to account for expected reductions in primary containment pressure.

During the PPP, consistent with Section 4.2 of Appendix A of RG 1.183, leakage from the Drywell free air volume to secondary containment is released directly to the environment. After the PPP, this leakage is filtered by the SBT system (Pathway 14) prior to being released to the environment.

Leakage from the suppression pool (torus liquid) source is modeled as ESF Leakage (Pathway 13) and released into secondary containment. A constant leakage rate is conservatively assumed for the duration of the accident and, during the PPP, released directly to the environment. As noted in Table 2.2-2, 10% of the radioiodine inventory is assumed to flash and become an airborne release.

Main Steam Line Holdup Volume (Volume 2)

Of the four main steam lines, the line with the smallest total volume between the inboard and outboard MSIVs is selected and modeled as a hold-up volume for 50% of the total MSIV leakage (100 scfh). Projected horizontal surface area in this volume is credited for iodine deposition as part of Pathway 5. Volume 2 is only used to delay the release based on volume size and maximum MSIV leakage rate. Use of a maximum leakage rate and minimum volume minimizes the credit for holdup assumed for radioactive decay.

MSIV and SCB Leakages - Mixing Volume (Volume 3)

In order to model iodine deposition in the steam line drains, all leakages through these pathways are combined into one volume with no credit for holdup or deposition in the volume. This artificial volume is used as a collection point from which to model pipe deposition as a filtered pathway through Pathway 5. Previous studies demonstrate that the various steam line drain paths could be collected and modeled as one composite line.

Main Condenser Volume (Volume 4)

The main condenser volume is credited for radioiodine deposition. Deposition is modeled in filtered Pathway 6 to the Environment. Only the free air volume in main condenser above the drain inlets is credited.

Environment (Volume 5)

Consistent with R.G. 1.183, Appendix A, Section 4.2, during the PPP all releases to the environment are modeled as ground level releases (via Pathways 6 and 14). Subsequent to establishing a negative pressure in secondary containment, all ESF (Pathway 13) and Primary Leakage (Pathway 10) is processed by the SBT system (Pathway 14) and released from an elevated release point. Bounding χ/Q_s are selected for each release point as described in Table 2.2-2.

Control Room (Volume 6)

The CR volume models the intake of activity from the environment for the purpose of calculating the dose to the CR operators. For the licensing basis case, one CRV-EFT system train is assumed to operate at a minimum flow of 900 cfm with 98% efficient filters (Pathway 7). An unfiltered inleakage of 500 cfm (Pathway 8) is assumed. CR exit flow rate (Pathway 9) is the sum of filtered and unfiltered incoming flow rates. Studies were performed at various filtered and unfiltered intake flow rates to conservatively establish the licensing basis case presented in Table 2.2-2.

Secondary Containment (Volume 7)

The secondary containment has a large airspace, however, no credit for holdup or dilution is assumed. Source term released to secondary containment is modeled as immediately released to the environment through filtered Pathway 14. Filter efficiencies of 98%

for aerosols and 85% for elemental and organic radioiodine are assumed.

2.2.5 Results - Control Room Dose

The RADTRAD computer code is used to determine the CR operator dose. Dose Conversion Factors (DCFs) from Federal Guidance Report (FGR) 11 and 12 (defaults for RADTRAD) are used.

Consistent with Section 4.2.1 of RG 1.183, all sources of radiation that can cause exposure to the control room operators are considered. A separate calculation assesses the external shine dose to CR operators from sources confined in the reactor building airspace; contained in the external airborne cloud (plume outside the control room); deposited on the SBT system, CRV-EFT system, and technical support center emergency ventilation system (TSC-EVS) filters; and, contained in emergency core cooling system (ECCS) piping recirculating reactor water inside the reactor building. Total dose contribution from both internal and external sources is summarized in Table 2.2-4.

Table 2.2-4		
LOCA CR Operator Dose		
Source	TEDE	Regulatory Limit* (TEDE)
Internal (Inhalation) Dose	2.74 rem	---
External (Shine) Dose	0.66 rem	---
Total Dose:	3.40 rem	5 rem

*Per RG 1.183 and 10 CFR 50.67.

2.2.6 Results - Offsite Doses

The RADTRAD computer code is used to determine the offsite dose. DCFs from FGR 11 and 12 are used. Results are summarized in Table 2.2-5.

Table 2.2-5		
LOCA Doses at EAB and LPZ Locations		
Location	TEDE	Regulatory Limit** (TEDE)
EAB Dose*	1.31 rem	25 rem
LPZ Dose	1.72 rem	25 rem

* The EAB dose represents the maximum 2-hour TEDE over the accident period.

**Per RG 1.183 and 10 CFR 50.67.

2.2.7 Conclusion

The LOCA CR operator dose is below the 5 rem TEDE regulatory limit and the offsite doses, both EAB and LPZ locations, are a small fraction of the 25 rem TEDE regulatory limit.

2.3 Main Steam Line Break Accident (MSLBA)

2.3.1 Introduction and Background

The postulated MSLBA assumes a double-ended break of one main steam line outside the primary containment. There is no fuel damage as a consequence of this accident; therefore, the only activity released to the environment is that associated with the steam and liquid discharged from the break. Initially, only steam will issue from the broken end of the steam line. Subsequently, rapid depressurization due to the break causes the reactor pressure vessel water level to rise, resulting in a steam-water mixture flowing from the break (blowdown) until the main steam isolation valves are closed.

It is assumed that the accident occurs at hot standby conditions. At these conditions, steam generation from the decay heat in the core is very low and cannot make up the steam loss through the break. This results in a high rate of vessel depressurization and a rapid rising of the water level to the main steam line inlet. By minimizing the steam generation from the core, hot standby conditions maximize the level swell in the vessel, thus maximizing the mass and energy release from the break.

Consistent with Section 4 of Appendix D of R.G. 1.183, the mass of coolant released is the amount of mass in the steam line and connecting lines at the time of the break plus the amount passing through the MSIVs prior to closure. The mass released from the break is scaled upward for added conservatism. The quantity of blowdown is calculated based upon the thermal-hydraulic transient analysis of the MSLBA as described in the MNGP USAR, and is not affected by the application of the AST methodology to the calculation of the radiological consequences of the event.

Consistent with Section 4.3 of Appendix D of R.G. 1.183, radioactivity associated with the discharged coolant is assumed to be instantaneously released into the atmosphere (environment) with no credit for plateout, holdup or dilution in the turbine building where the break occurs. Two radioiodine source term cases, consistent with Section 2 of Appendix D of R.G. 1.183 are evaluated. One is a pre-accident spike case of 2.0 $\mu\text{Ci/gm}$ dose equivalent (DE) I-131 and the second is a maximum equilibrium case of 0.2 $\mu\text{Ci/gm}$ DE I-131. Proposed Technical Specification changes to adopt these limits are included in this LAR.

Key inputs and assumptions used in the AST MSLBA licensing basis case are listed in Table 2.3-1 and discussed further in subsequent subsections.

Table 2.3-1	
Key MSLBA Analysis Inputs and Assumptions	
Input/Assumption	Value
MSIV closure time	10.5 sec
Total Mass from MSLBA	91,834 lbm
Liquid Release from MSLBA	76,295 lbm
Steam Release from MSLBA	15,540 lbm
Maximum equilibrium iodine concentration	0.2 $\mu\text{Ci/gm}$ DE I-131
Pre-accident spike iodine concentration	2.0 $\mu\text{Ci/gm}$ DE I-131

Table 2.3-1		
Key MSLBA Analysis Inputs and Assumptions		
Input/Assumption	Value	
Radioactivity release rate to environment	Instantaneous	
CR Airspace (Free Volume)	27,000 ft ³	
CRV-EFT System Operation	Not credited, outside air to CR all unfiltered	
CR Occupancy Factor (Per Section 4.2.6 of RG 1.183)	0-24 hrs	1.0
	1-4 days	0.6
	4-30 days	0.4
CR Outside Air Intake (Normal Mode) (unfiltered air)	7440 cfm	
CR Envelope Unfiltered In-Leakage Rate	1000 cfm	
Breathing Rate, CR (Per Section 4.2.6 of RG 1.183)	3.5E-4 m ³ /sec	
Breathing Rate, offsite (EAB & LPZ) (Per Section 4.1.3 of RG 1.183)	0-8 hrs	3.5E-4 m ³ /sec
	8-24 hrs	1.8E-4 m ³ /sec
	1-30 days	2.3E-4 m ³ /sec
χ/Q , Ground Level Release, Turbine Building Release to CR (Administrative Building Intake)	0-2 hrs	2.58E-3 sec/m ³
	2-8 hrs	1.85E-3 sec/m ³
	8-24 hrs	7.37E-4 sec/m ³
	1-4 days	4.90E-4 sec/m ³
	4-30 days	3.84E-4 sec/m ³

Table 2.3-1 Key MSLBA Analysis Inputs and Assumptions		
Input/Assumption	Value	
χ/Q , EAB, Offsite Ground Level Release	0-2 hrs	7.86E-4 sec/m ³
	2-8 hrs	5.08E-4 sec/m ³
	8-24 hrs	4.08E-4 sec/m ³
	1-4 days	2.54E-4 sec/m ³
	4-30 days	1.29E-4 sec/m ³
χ/Q , LPZ, Offsite Ground Level Release	0-2 hrs	1.53E-4 sec/m ³
	2-8 hrs	8.83E-5 sec/m ³
	8-24 hrs	6.71E-5 sec/m ³
	1-4 days	3.70E-5 sec/m ³
	4-30 days	1.57E-5 sec/m ³
Dose Conversion Factors	Based on FGR 11 and FGR 12 defaults for RADTRAD	

2.3.2 Source Term

There is no fuel damage as a consequence of this accident; therefore, the only activity released to the environment is that associated with the steam and liquid discharged from the break. Two source term cases for the iodine concentration in the released reactor coolant are considered. In the first case, fission product inventory available for release is based on the maximum equilibrium reactor coolant DE I-131 concentration of 0.2 $\mu\text{Ci/gm}$. The second case assumes the maximum iodine concentration value that reflects a pre-accident iodine spike. For this case the analysis uses a concentration of 2.0 $\mu\text{Ci/gm}$, which is the maximum permitted by plant technical specifications. Radioiodine is assumed to be released consistent with the composition specified in Section

4.4 of Appendix D of RG 1.183, i.e., 95% aerosol, 4.85% elemental, and 0.15% organic.

The MNGP design basis offgas release rate of 300,000 $\mu\text{Ci}/\text{sec}$ after 30 minutes of decay is used to calculate the undecayed noble gas emission rate for the MSLBA coolant release. This value exceeds the technical specification allowable limit for gross gamma activity by approximately 15%. For conservatism it is assumed that the offgas release rate remained constant at the $t=0$ sec decay adjusted value throughout the entire mass release period.

All of the reactivity in the released coolant is released to the atmosphere as an instantaneous ground level release. No credit is assumed for plateout, holdup, or dilution within the turbine building.

2.3.3 Mitigation

The only mitigative action credited for the MSLBA is the termination of the release upon the automatic closure of the MSIVs. Consistent with the current licensing basis, a closure time of 10.5 seconds is assumed to allow for a maximum valve closure of 9.9 seconds and instrument response time (to detect the break and signal valve closure).

The administrative building air intake represents the limiting CR receptor location for analyzing dispersion. CR ventilation is assumed to remain in the normal operating mode throughout the event and no credit for emergency mode filtration or isolation is assumed. In addition to assuming 7,440 cfm of normal mode air intake to the control room, an additional 1,000 cfm of unfiltered in-leakage is also conservatively assumed (see Table 2.3-1. No credit is taken for operator action.

2.3.4 Radiological Transport Modeling

Two activity release cases, corresponding to a maximum pre-accident radioiodine spike and a maximum equilibrium radioiodine reactor coolant concentration, are analyzed. Noble gases are assumed to enter the steam phase instantaneously. The total mass of coolant released, prior to MSIV closure, is the amount in the steam line and connecting lines at the time of the break plus the amount that passes through the valves prior to closure. All the radioactivity in the released coolant is assumed to release instantaneously to the atmosphere as a ground level release. No credit for plateout, holdup, or dilution within the turbine building is assumed.

The dispersion path assumed in the analysis is the turbine building release point (source location) to the administrative building air intake (receptor location). This path provides higher dispersion coefficients than the turbine building to CR air intake release path. As described above, normal HVAC operation at maximum outside air intake with additional unfiltered air inleakage is assumed and no credit is taken for operator actions to mitigate the radiological consequences of the accident.

2.3.5 Results - Control Room Dose

The RADTRAD computer code is used to determine the CR operator doses, which are shown in Table 2.3-2.

Table 2.3-2		
MSLBA CR Operator Doses		
Source Term Case	TEDE	Regulatory Limit* (TEDE)
Dose with maximum equilibrium radioiodine	0.33 rem	5 rem
Dose with pre-accident radioiodine spiking	3.25 rem	5 rem

* Per RG 1.183 and 10 CFR 50.67.

2.3.6 Results - Offsite Doses

The RADTRAD computer code is used to determine the offsite doses, which are shown in Tables 2.3-3 and 2.3-4.

Table 2.3-3		
MSLBA Doses at EAB and LPZ Locations (Doses with maximum equilibrium radioiodine)		
Location	TEDE	Regulatory Limit* (TEDE)
EAB Dose	0.11 rem	2.5 rem
LPZ Dose	0.02 rem	2.5 rem

*Per RG 1.183

Table 2.3-4		
MSLBA Doses at EAB and LPZ Locations (Doses with pre-accident radioiodine spiking)		
Location	TEDE	Regulatory Limit* (TEDE)
EAB Dose	1.05 rem	25 rem
LPZ Dose	0.20 rem	25 rem

*Per RG1.183 and 10 CFR 50.67

2.3.7 Conclusions

The MSLBA CR operator dose for the maximum equilibrium case is a small fraction of the 5 rem TEDE regulatory limit. The dose for the pre-accident iodine spike case is below the 5 rem TEDE regulatory limit.

The MSLBA offsite doses for the maximum equilibrium case, for both EAB and LPZ locations, are a small fraction of the 2.5 rem TEDE regulatory limit. The doses for the pre-accident iodine spike case, for both EAB and LPZ locations, are a small fraction of the 25 rem TEDE regulatory limit.

2.4 Control Rod Drop Accident (CRDA)

2.4.1 Introduction and Background

The postulated CRDA involves the rapid removal (drop) of the highest worth control rod resulting in a reactivity excursion. Core performance analyses show the energy deposition that results from this event is below the threshold postulated to damage fuel pellets or cladding. However, consistent with the CLB, approximately 2.9% of the fuel rods in the full core are conservatively assumed to be damaged (850 fuel rods, based on assemblies composed of 60 rods per assembly, 484 assemblies), with melting occurring in 1.06% (9 of 850) of the damaged rods. A radial peaking factor of 1.7 is assumed in the analysis.

The CRDA is terminated by the average power range monitors (APRMs) high flux scram signal or by the intermediate range monitors (IRMs) during startup if the APRMs are not operable. The activity released from the damaged fuel is assumed to reach the main condenser in the Turbine Building instantaneously. No credit is assumed for CR ventilation emergency mode of operation or operator actions.

Two separate licensing basis cases were required to model the main condenser release and its impact on CR operator and offsite doses. The first (Case 1) provides the bounding (highest) doses and models the release from the main condenser through operating steam jet air ejectors (SJAEs) to the offgas stack. This case covers those operating power levels when the SJAEs are operating prior to the accident. The SJAEs are assumed to operate for the entire duration of the accident (24 hours). No other release paths are assumed.

The second licensing basis case (Case 2) was developed to evaluate the impact of mechanical vacuum pump (MVP) operation on dose during early stages of the accident. MVP operation occurs at low reactor power conditions. Main steam line radiation monitors detect high radiation causing MVP trip and isolation. The MVP release point is through the offgas stack. After the MVP is isolated, the main condenser is assumed to leak at 1% per day as a ground level release.

The analysis assumptions for the transport, reduction, and release of the radioactive material from the fuel and the reactor coolant are consistent with RG 1.183 as discussed below.

Key inputs and assumptions used in the CRDA licensing basis cases are listed in Table 2.4-1.

Table 2.4-1		
Key CRDA Analysis Inputs and Assumptions		
Input/Assumption	Value	
Core Power (for establishing isotopic inventory)	1918 MWth	
Radial Peaking Factor	1.7	
Percentage of Fuel Rods Damaged	2.9% (850 fuel rods of 29,040 fuel rods, i.e., 60 rods per assembly for 484 assemblies)	
Fraction of Damaged Fuel Rods Melted	1.06% (9 of 850 fuel rods)	
Main Condenser Leak Rate	1% for first 24 hours then no leakage	
CR Airspace (Free Volume)	27,000 ft ³	
CRV-EFT System Operation	Not credited, outside air to CR all unfiltered	
CR Occupancy Factor (Per Section 4.2.6 of RG 1.183)	0-24 hrs	1.0
	1-4 days	0.6
	4-30 days	0.4
CR Outside Air Intake (Normal Mode)	7440 cfm	
CR Envelope Unfiltered In-Leakage Rate	1000 cfm	
Breathing Rate, CR Operator (Per Section 4.2.6 of RG 1.183)	3.5E-4 m ³ /sec	
Steam Jet Air Ejector Flow Rate	360.5 scfm	
SJAE Release Holdup Time	17 minutes	

Table 2.4-1		
Key CRDA Analysis Inputs and Assumptions		
Input/Assumption	Value	
Mechanical Vacuum Pump Flow Rate	2,300 scfm	
Main Steam Line Radiation Monitor Analytical Setpoint	9 Rem/Hour	
MVP Isolation Time (time to valve closure)	10 seconds	
MVP Release Holdup Time	0.38 minutes	
Breathing Rate, offsite (EAB & LPZ) (Per Section 4.1.3 of RG 1.183)	0-8 hrs	3.5E-4 m ³ /sec
	8-24 hrs	1.8E-4 m ³ /sec
	1-30 days	2.3E-4 m ³ /sec
Licensing Basis Case 1, SJAE Operation χ /Q - Elevated Release – Offgas Stack to CR or Admin Intake (bounding receptor)	Fumigation	3.59E-4 sec/m ³
	0-2 hrs	4.02E-6 sec/m ³
	2-8 hrs	5.63E-7 sec/m ³
	8-24 hrs	2.20E-7 sec/m ³
Licensing Basis Case 1, SJAE Operation χ /Q - Elevated Release – Offsite Elevated Release to EAB	Fumigation	1.11E-4 sec/m ³
	0-2 hrs	4.22E-6 sec/m ³
	2-8 hrs	2.23E-6 sec/m ³
	8-24 hrs	1.67E-6 sec/m ³
Licensing Basis Case 1, SJAE Operation χ /Q - Elevated Release – Offsite Elevated Release to LPZ	Fumigation	3.86E-5 sec/m ³
	0-2 hrs	3.79E-6 sec/m ³
	2-8 hrs	2.14E-6 sec/m ³
	8-24 hrs	1.61E-6 sec/m ³

Table 2.4-1		
Key CRDA Analysis Inputs and Assumptions		
Input/Assumption	Value	
Licensing Basis Case 2, MVP Isolation (pre-trip) χ/Q - Elevated Release – Offgas Stack to Admin Intake (bounding receptor for CR)	Fumigation	3.59E-4 sec/m ³
Licensing Basis Case 2, MVP Isolation (post-trip) χ/Q - Ground Level Release – Turbine Building to Admin Intake (bounding receptor for CR)	0-2 hrs	2.58E-3 sec/m ³
	2-8 hrs	1.85E-3 sec/m ³
	8-24 hrs	7.37E-4 sec/m ³
Licensing Basis Case 2, MVP Isolation (MVP pre-trip) χ/Q - Elevated Release – Offgas Stack to EAB	Fumigation	1.11E-4 sec/m ³
Licensing Basis Case 2, MVP Isolation (MVP post-trip) χ/Q - Ground Level Release to EAB	0-2 hrs	7.86E-4 sec/m ³
	2-8 hrs	5.08E-4 sec/m ³
	8-24 hrs	4.08E-4 sec/m ³
Licensing Basis Case 2, MVP Isolation (MVP pre-trip) χ/Q - Elevated Release – Offgas Stack to LPZ	Fumigation	3.86E-5 sec/m ³
Licensing Basis Case 2, MVP Isolation (MVP post-trip) χ/Q - Ground Level Release to LPZ	0-2 hrs	1.53E-4 sec/m ³
	2-8 hrs	8.83E-5 sec/m ³
	8-24 hrs	6.71E-5 sec/m ³
Dose Conversion Factors	Based on FGR 11 and FGR 12 defaults for RADTRAD	

2.4.2 Source Term

The source term used for the CRDA analysis is composed of releases from melted fuel and the gap activity from the fuel pins postulated to be damaged. Consistent with Section 1 of Appendix C of RG 1.183, the release from the breached fuel (damaged fuel) is based on the estimate of the number of fuel rods breached and the assumption that 10% of the core inventory of noble gases and iodines are in the fuel gap and are released into the reactor coolant. The release attributed to fuel melting is based on the fraction of fuel that reaches or exceeds the fuel initiation temperature for fuel melting (subset of the damaged fuel) and on the assumption that 100% of the noble gases and 50% of the iodines contained in that fraction of the damaged fuel are released to the reactor coolant. This initial amount of activity is released into the reactor coolant at time zero and, consistent with RG 1.183, is assumed to mix instantaneously in the reactor coolant within the reactor vessel. No credit is assumed for partitioning in the reactor vessel or for removal by the steam separators.

Although not specified in Appendix C of RG 1.183, alkali metals (Cs and Rb) are assumed to be released consistent with Table 3 of RG 1.183. For damaged fuel a release fraction of 0.12 is assumed and, for melted fuel, a higher release fraction of 0.25 is assumed (consistent with the BWR LOCA table, Table 1, of RG 1.183). The iodine species released to the reactor coolant is assumed to be 95% aerosol, 4.85% elemental, and 0.15% organic. The iodine species released from the main condenser to the environment is assumed to be 97% elemental iodine and 3% organic iodine.

Activity in the reactor coolant available for release to the environment is calculated by applying transport fractions. Of the activity released to the reactor coolant within the reactor vessel, 100% of the noble gases, 10% of the iodines, and 1% of the remaining nuclides are assumed to reach the main condenser. Of the activity that reaches the main condenser, 100% of the noble gases, 10% of the iodines, and 1% of the remaining nuclides are available for release to the environment.

2.4.3 Mitigation

The CRDA reactivity excursion is terminated by the APRM high flux scram or by the IRMs during startup if the APRMs are not operable. Reduction of the initial activity released during its transport from the reactor coolant system (RCS) to the main condenser and, ultimately to the environment is credited as described above. As noted in Section 2.2.3, the main condenser is previously

determined to be seismically rugged and has been evaluated by the NRC.

For the first licensing basis case, no credit for main condenser isolation is assumed and the release is modeled through operating SJAEs to the Offgas Stack elevated release point.

In the second licensing basis case, the mechanical vacuum pump must isolate on high steam line radiation. The release is modeled through the MVP until isolated. Main Steam Line Tunnel Radiation Monitor Technical Specification requirements are included in this LAR.

No other systems are credited with providing mitigation. No credit for dilution or holdup in the Turbine Building is assumed. CR ventilation is assumed to operate in its normal mode with maximum unfiltered air intake to the CR. Unfiltered air inleakage from other sources is also assumed. No accident signal to start emergency operation is credited and no operator actions are assumed.

2.4.4 Radiological Transport Modeling

The radiological release model for the CRDA is developed consistent with RG 1.183. The main condenser is assumed to leak to the environment at a ground-level release rate of 1% per day for the first 24 hours, at which time the leakage is assumed to terminate. No credit for dilution or holdup within the Turbine Building is assumed. Ground level release dispersion coefficients for the most conservative release point to receptor locations are assumed as presented in Table 2.4-1. For elevated releases from the Offgas Stack, the MVP and SJAEs are assumed to conservatively operate at maximum flows. Elevated release dispersion coefficients, including fumigation, are assumed.

No credit for emergency mode operation of the CR ventilation is assumed. In addition to assuming 7,440 cfm of normal mode air intake to the control room, an additional 1,000 cfm of unfiltered inleakage is also conservatively assumed (see Table 2.4-1). Some studies at other, lesser, flow combinations were performed but this combination provided bounding (worst case) results.

2.4.5 Results – Control Room Dose

The RADTRAD computer code is used to determine the CR operator dose, which is shown in Table 2.4-3.

Table 2.4-3		
CRDA CR Operator Dose		
Location	TEDE	Regulatory Limit* (TEDE)
CR Operator Dose (SJAE Operation)	1.70 rem	5 rem
CR Operator Dose (MVP Isolation)	0.56 rem	5 rem

*Per RG 1.183 and 10 CFR 50.67

2.4.6 Results – Offsite Doses

The RADTRAD computer code is used to determine the offsite doses, which are shown in Table 2.4-4.

Table 2.4-4		
CRDA Doses at EAB and LPZ Locations		
Location	TEDE	Regulatory Limit* (TEDE)
EAB Dose (SJAE Operation)	1.73 rem	6.3 rem
EAB Dose (MVP Isolation)	0.18 rem	6.3 rem
LPZ Dose (SJAE Operation)	0.79 rem	6.3 rem
LPZ Dose (MVP Isolation)	0.08 rem	6.3 rem

*Per RG 1.183

2.4.7 Conclusions

The CRDA CR operator dose is well below the 5 rem TEDE regulatory limit for the SJAE Operation Case and the MVP Isolation Case. The CRDA offsite doses, for both the EAB and LPZ

locations, are well below the TEDE regulatory limit for the SJAE Operation Case. The CRDA offsite doses, for both EAB and LPZ locations, are a small fraction of the TEDE regulatory limit for the MVP Isolation Case.

2.5 Fuel Handling Accident (FHA)

2.5.1 Introduction and Background

For the licensing basis case, the postulated Fuel Handling Accident (FHA) involves the drop of a fuel assembly in the reactor vessel cavity over the reactor core during refueling operations. At this location, the maximum drop is approximately 27 ft. and fuel pin damage is postulated to occur to both the dropped assembly and to a portion of those assemblies impacted in the reactor core.

The extent of damage is calculated based on the free fall distance and the resulting kinetic energy of the dropped assembly. In accordance with the current licensing basis, this drop is conservatively postulated to damage 125 fuel pins.

The gap activity from the damaged pins is the radioactive source term for this event. A radial peaking factor of 1.7 is assumed in the analysis. A 24-hour decay time after plant shutdown is also assumed.

An overall decontamination factor (DF) of 200 for the released iodines is assumed based on a minimum water depth of 23 feet. The nominal water depth (i.e., the distance from the top of the water in the vessel to the point of impact for the dropped assembly) for the postulated drop onto the reactor core would be approximately 46' (well in excess of the credited 23 ft.).

The analysis assumed a ground level release via the normal Reactor Building ventilation over a 2-hour period. No credit is taken for radiation monitors, isolation of secondary containment, filtering or elevated release from the SBT system, or operation of the CRV-EFT system. The normal mode of CR ventilation is assumed with additional unfiltered outside air in-leakage.

Dropping a fuel assembly at other locations during fuel movement has also been considered. For a drop in the fuel transfer area, between the reactor vessel and the spent fuel pool, or over the spent fuel pool, the resulting maximum credible drop height would be less than that assumed in the postulated FHA.

For a drop in the spent fuel pool or fuel transfer area, see Figure 2.5-1, the postulated activity released would be lower. In both these areas the minimum water depth covering the damaged fuel would be less than that available over the reactor core, resulting in less iodine removal by the water. However, in both these areas the drop height and number of impacted fuel rods is less thus resulting in a lower source term. Analyses have determined that the reduction in source term sufficiently compensates for the reduction in water DF such that the postulated fuel assembly drop over the reactor core remains, consistent with the current licensing basis, the bounding FHA.

Key inputs and assumptions used in the AST FHA licensing basis case are listed in Table 2.5-1.

NOTE: An earlier FHA analysis is submitted as part of a separate LAR that requested various changes to secondary containment and SBGT system requirements. The previous LAR included proposed Technical Specification changes, such as fuel pool water level requirements. None of the design inputs, assumptions or results of the FHA analysis described in this LAR impact the prior submittal, its analysis basis, or the proposed license changes contained therein. A comparison of this current analysis to the prior analysis and how this current analysis is also supportive of the previous LAR is provided in Section 3.0.

Table 2.5-1	
Key FHA Analysis Inputs and Assumptions	
Input/Assumption	Value
Core Power (for establishing isotopic inventory)	1918 MWt
Radial Peaking factor	1.7
Decay time	24 hrs
Fraction of total core damaged in drop	0.43% (based on 125 fuel rods of 484 assemblies, 60 rods per assembly)
Water depth (licensing basis case)	> 23 ft.
Overall Iodine DF	200

Table 2.5-1		
Key FHA Analysis Inputs and Assumptions		
Input/Assumption	Value	
Radioactivity release rate to environment	Radioactivity is released to the environment as a ground-level release over a period of 2 hours	
SBGT System Operation	Not credited, secondary containment and SBGT system operation not assumed	
CRV-EFT System Operation	Not credited, outside air to CR all unfiltered	
CR Outside Air Intake (Normal Mode)	7440 cfm	
CR Envelope Unfiltered In-Leakage Rate	1000 cfm	
CR Airspace (Free Volume)	27,000 ft ³	
CR Occupancy Factor (Per Section 4.2.6 of RG 1.183)	0-24 hr	1.0
	1-4 days	0.6
	4-30 days	0.4
Breathing Rate, CR Operator (Per Section 4.2.6 of RG 1.183)	3.5E-4 m ³ /sec, duration of accident	
Breathing Rate, Offsite (EAB & LPZ) (Per Section 4.1.3 of RG 1.183)	0-8 hr	3.5E-4 m ³ /sec
	8-24 hr	1.8E-4 m ³ /sec
	1-30 days	2.3E-4 m ³ /sec
χ/Q , Ground Level Release, RB Vent to CR Intake (0 to 2 Hours)	2.48E-3 sec/m ³ (RB vent to CR air intake)	
χ/Q , EAB, Offsite Ground Level Release (0 to 2 Hours)	7.86E-4 sec/m ³	

Table 2.5-1	
Key FHA Analysis Inputs and Assumptions	
Input/Assumption	Value
χ/Q , LPZ, Offsite Ground Level Release (0 to 2 Hours)	1.53E-4 sec/m ³
Dose Conversion Factors	Based on FGR 11 and FGR 12 defaults for RADTRAD

2.5.2 Source Term

The fission product inventory that constitutes the source term for this event is the gap activity in the 125 fuel rods assumed damaged as a result of the postulated design basis FHA. This number of fuel pins equals approximately 0.43% of the total number of fuel rods in the reactor core (see Table 2.5-1). The total fuel rod gap activity available for release from the reactor core, of which 0.43% is assumed to be released, is based on a core power level of 1918 MWth with a 24 hour decay period. Reactor core isotopes considered in the FHA (source inventory) are limited to those in the fuel gap, per Table 3 of RG 1.183, that are released during a FHA per Sections 1 and 3 of Appendix B of RG 1.183. The fraction of radionuclides in the fuel gap assumed available for release are shown in Table 2.5-2 and are consistent with Table 3 of RG 1.183.

Of the gap activity released from the damaged fuel rods, 100% of the noble gases and a fraction of the iodines are assumed available for release. Consistent with Sections 2 and 3 of Appendix B of RG 1.183, an overall DF of 200 is assumed for radioiodine releases, a DF of 0 (no retention) is assumed for noble gases, and an infinite DF (complete retention) is assumed for particulates.

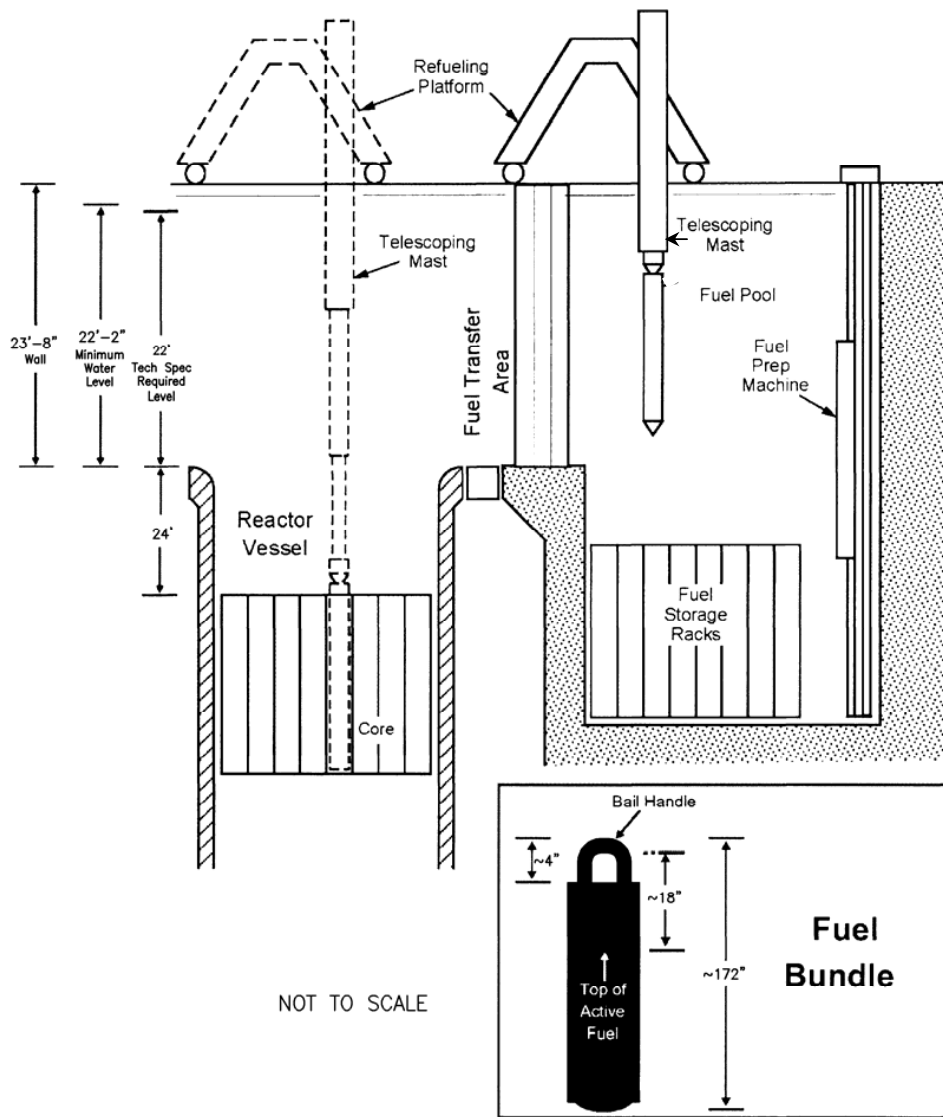
The chemical form of the radioiodine released from the fuel is 95% aerosol (CsI), 4.85% elemental and 0.15% organic. Due to the possibility of low pH in the pool, CsI is assumed to instantaneously disassociate and the iodine re-evolve as elemental. This results in 99.85% elemental and 0.15% organic iodine.

Table 2.5-2	
FHA Analysis Gap Activity (Fraction of Fission Product Inventory)	
Radionuclide Group	Fraction of Core Inventory
I-131	0.08
Kr-85	0.10
Other Noble Gases	0.05
Other Halogens	0.05
Alkali Metals	(Not released, not calculated)

2.5.3 Mitigation

A 24 hour decay period is assumed prior to fuel movement. Technical Specification controls on fuel movement for the first 24 hours after shutdown were proposed as part of a separate, previous, LAR and are not repeated herein. Decontamination of the radioiodine gap activity as it rises (bubbles) to the surface through the pool water above the dropped assembly in the reactor vessel is credited. For a DF of 200 the minimum required water level for a drop of the fuel assembly over the reactor core is 23 ft., which is exceeded by normal refueling water level requirements (see Table 2.5-1). Technical Specification limits on fuel pool water level, to ensure the fuel assembly drop over the reactor core remains the bounding FHA event, were proposed as part of a previous LAR and are not repeated herein. The proposed Technical Specification limits of the prior LAR are not impacted by this FHA analysis (see Section 3.0 for further details).

Figure 2.5-1
Fuel Handling Figure



No other mitigating actions are assumed. No credit for radiation monitor detection of the release or subsequent isolation of secondary containment and initiation of the SBT system are assumed. The CR ventilation is assumed to be in its normal operating mode with maximum unfiltered fresh air intake. The analysis demonstrates acceptable radiological consequences are achievable without crediting these systems. A TS change is included to limit CRV operability during refueling to the movement of recently irradiated fuel (See Table 2.5-1).

2.5.4 Radiological Transport Modeling

Radiological transport modeling is consistent with the guidance of RG 1.183 for source term generation and release from the fuel pool (see Section 2.5.2). The release of the gap activity from the damaged fuel rods is assumed to occur instantaneously, consistent with Section 1.2 of Appendix B of RG 1.183. Radioactivity that escapes from the fuel pool is assumed released to the environment over a period of 2 hours, consistent with Section 5.3 of Appendix B of RG 1.183.

The CR χ/Q for the worst-case release path from the reactor building vent to the CR air intake is assumed and modeled as a ground level release. No credit for secondary containment, SBT system operation, or for the emergency mode of CR ventilation is assumed. No credit for CR operator actions is assumed.

2.5.5 Results – Control Room Dose

The RADTRAD computer code is used to determine the CR operator dose, which is shown in Table 2.5-3.

Table 2.5-3		
FHA CR Operator Dose		
Location	TEDE	Regulatory Limit* (TEDE)
CR Operator Dose	4.29 rem	5 rem

* Per RG 1.183 and 10 CFR 50.67

2.5.6 Results – Offsite Doses

The RADTRAD computer code is used to determine the offsite doses, which are shown in Table 2.5-4.

Table 2.5-4		
FHA Offsite Dose		
Location	TEDE	Regulatory Limit* (TEDE)
EAB Dose	1.61 rem	6.3 rem
LPZ Dose	0.31 rem	6.3 rem

* Per RG 1.183.

2.5.7 Conclusions

The FHA CR operator dose is below the 5 rem TEDE regulatory limit. The EAB offsite does is well below the 6.3 rem TEDE regulatory limit and the LPZ offsite dose is a small fraction of the 6.3 rem TEDE regulatory limit.

3.0 FHA ANALYSIS COMPARISON TO PRIOR LAR

By letter dated April 29, 2004, NMC requested a License Amendment for MNGP to support a Selective Scope Application of an Alternative Source Term Methodology for Re-evaluation of the Fuel Handling Accident. This submittal for a Full Scope AST assumes the approval of the April 29, 2004, MNGP License Amendment Request, therefore the changes associated with the previous submittal are not included in this submittal. However, several of the input criteria associated with the previous submittal have been re-evaluated for this submittal and some of the TS changes proposed in the prior submittal have been superseded as described in Enclosure 1 of this LAR. The April 29, 2004 submittal included:

- FHA analyses based on AST methodology consistent with RG 1.183,
- Proposed Technical Specification changes supportive of analysis assumptions, and
- A request to modify requirements associated with secondary containment and the standby gas treatment system.

None of the information contained in the April 29, 2004 LAR, its later supplements or responses to NRC Requests for Additional Information (RAI) has been impacted by this current FHA analysis. However, some of the TS changes requested in the prior LAR have been modified in this submittal as described in Enclosure 1. This new LAR requests a full scope application of the AST methodology and includes additional proposed license changes (in addition to those previously proposed). The FHA analysis is revised as part of this submittal in support of these additional changes and to address through calculation revision those RAI responses previously provided which required calculation changes (e.g., use of revised dispersion coefficients).

Though a revised FHA analysis has been included in this full scope LAR, none of the changes to the analysis impacts the prior April 29, 2004 LAR request. This conclusion was reached by performing a comparison of the current FHA analysis (described in Section 2.5) to the previous FHA analysis, proposed Technical Specification and license changes, and response to NRC RAIs contained in the following:

- NMC selective scope application of AST methodology for re-evaluation of the FHA, dated April 29, 2004.
- NMC Supplement 1 to the LAR, dated November 23, 2004.

- NMC response to NRC RAIs, dated January 20, 2005.
- NMC response to NRC 2nd set of RAIs, dated February 28, 2005.
- NMC Supplement 2 to the LAR, dated April 12, 2005.

The following is noted relative to a comparison of the current and previous FHA analyses:

- Inputs and assumptions listed in Table 2.5-1 are unchanged with the exception of core isotopic inventory and the EAB χ/Q dispersion coefficient. Overall, core isotopic inventory decreased slightly due to a more realistic modeling of a typical two year fuel cycle using ORIGEN 2.1 (see Section 2.2.1). Further, the EAB χ/Q dispersion coefficient increased from 7.51 E-04 to 7.86 E-04 to account for the maximum wind speed associated with the corresponding meteorological data at the same elevation in the PAVAN χ/Q determination. The net effect is a reduction in both CR Operator and offsite doses.
- Transport release fractions, release timings, accident duration, systems credited for mitigation are unchanged.
- Calculated CR operator and offsite doses remain below regulatory limits. Only minor changes resulted as summarized below.

FHA Calculated Dose Changes			
Location	Prior FHA Analysis	Current FHA Analysis	Change
CR Operator	4.71 rem	4.29 rem	0.42 rem (decrease)
EAB Dose	1.81 rem	1.61 rem	0.20 rem (decrease)
LPZ Dose	0.37 rem	0.31 rem	0.06 rem (decrease)

The following is noted relative to a comparison of the current FHA analysis, contained in this LAR, to prior requested changes to Technical Specifications and mitigating system requirements submitted in the prior LAR and its supplements;

- All Technical Specification changes requested in the LAR from NMC to the NRC dated April 29, 2004 description of proposed changes, technical evaluation, safety analysis and no significant hazards determination, environmental considerations, and comparison to RG 1.183 guidance remain unchanged by the current FHA analysis except for the following two minor differences: (1) the total calculated doses in the safety analysis used to justify the change request are lower, as summarized above, and (2) the RG 1.183 comparison matrix description of fission product inventory development is different, though still in compliance.
- The current FHA analysis does not impact Supplement 1 provided to the NRC in NMC letter dated November 23, 2004. All technical information and proposed system operating guidance remain unchanged.
- The current FHA analysis does not impact additional Technical Specification changes requested in NMC letter to the NRC dated April 12, 2005. All changes to reliance on system operation, movement of irradiated fuel, and spent fuel storage pool water level requirements contained therein remain unchanged and justified by both the prior and current FHA analysis.

Finally, the following is noted relative to a comparison of the current FHA analysis to NMC responses to NRC RAIs:

- The current FHA analysis does not impact prior NMC responses, commitments, or proposed Technical Specification changes contained in the first response to NRC RAIs (NMC to NRC letter dated January 20, 2005).
- The current FHA analysis impacts NMC response to the second set of NRC RAIs (NMC letter to NRC dated February 28, 2005) in one area as previously described above. The core isotopic inventory and EAB χ/Q dispersion coefficient changed resulting in lower CR Operator and offsite doses than those provided in response to RAI 5 of this letter. Both sets of results and a comparison are tabularized above.

Though the current FHA analysis does not impact TS changes requested in the prior LAR submittal, some of those TS changes have been revised as part of this submittal to be consistent with other changes requested as supported by the full scope AST analysis.

4.0 CONTROL ROOM ENVELOPE IN-LEAKAGE TESTING

Information on Control Room Envelope (CRE) in-leakage testing was previously provided to the NRC in Enclosure 1 of Supplement 1 to the LAR on selective scope application of AST for re-evaluation of the FHA. Additional testing details and, their correlation to the previously provided FHA analysis, were also provided. Due to the importance of CRE in-leakage test results as a basis for assumed unfiltered in-leakage assumptions in DBA analyses, NMC response dated January 20, 2005 to the NRC RAI on CRE inleakage has been re-printed below in its entirety.

These test results demonstrate assumed unfiltered air inleakage rates to the CRE in the DBA analyses are conservative.

Quote:

[“There are two normal modes of Control Room Ventilation Emergency Filtration System (CRV-EFT) System operation, differentiated by whether an EFT System train is running to provide fresh air makeup to the CRE or in standby. In both of these normal modes one CRV train is in operation for air circulation and conditioning.

a. Normal Mode with a CRV Train and an EFT Train in Operation

With one EFT train running the CRE configuration is the same as that tested in the worst-case tracer gas test. The simulated multiple equipment failures in this test alignment included the applicable CRE components in their normal mode of operation. In this mode one EFT Train is running providing a nominal 1000 cubic feet per minute (cfm) of filtered makeup flow. Inleakage in this configuration is measured during tracer gas testing as 100 ± 25 cfm. The CRV-EFT System is operated in this configuration approximately 85 percent of the time.

b. Normal Mode with only a CRV Train in Operation

With the EFT trains in standby, there is no forced makeup flow to balance the forced exhaust flows so the CRE is generally at a negative pressure⁽¹⁾ with respect to adjacent areas. The low inleakage results obtained by tracer gas testing demonstrate that the CRE has good integrity. Significant outleakage would not be expected from a negative envelope with good integrity; therefore, inleakage in this configuration may effectively be determined by measuring the forced exhaust fan flows from the envelope. Field measurements were performed with each train in operation and

determined an inleakage of 404 and 278 cfm for the "A" and "B" CRV train respectively.

The inleakage in the normal mode with a CRV and an EFT train in operation (used approximately 85 percent of the time) was determined to be 100 ± 25 cfm during tracer gas testing. The maximum measured inleakage in the normal mode with only a CRV train in operation was 404 cfm.

Therefore, the maximum inleakage for the normal modes is less than 500 cfm, which is half the 1000 cfm inleakage assumed in the AST FHA radiological consequence analyses. The total flows (makeup plus unfiltered inleakage) discussed above are considerably less than the total flow of 8440 cfm (7440 cfm unfiltered air intake plus 1000 cfm inleakage) assumed in the AST FHA radiological consequence analyses.

- (1) For example, the Reactor Building is maintained at a significant negative pressure during plant operation. Thus the CRE is normally positive with respect to the Reactor Building.”]

Reference: NMC Letter to NRC dated January 20, 2005, ADAMS Accession Number ML050210043)

As shown by the above quotation, the maximum inleakage for the normal mode is less than 500 cfm. In the AST FHA, MSLBA, and CRDA radiological consequence analyses, an unfiltered inleakage rate of 1,000 cfm was conservatively assumed (see Tables 2.3-1, 2.4-1 and 2.5-1). These analyses assume no operation of the EFT system.

For the normal mode with one EFT system train operating, the inleakage was approximately 100 cfm. For the AST LOCA radiological consequence analysis, which models one EFT system train running, an unfiltered inleakage of 500 cfm was conservatively assumed.

Comparison of the CRE inleakage test results with the AST DBA analysis assumptions for unfiltered inleakage shows that the assumed unfiltered air inleakage rates to the CRE in the DBA analyses are conservative.

5.0 USE OF THE STANDBY LIQUID CONTROL SYSTEM

This section provides the basis for crediting boron injection from the SBLC system for suppression pool pH control. The maintenance of a suppression pool pH level above 7.0 is necessary to prevent re-evolution of iodine from the suppression pool water. This use of SBLC is consistent with several other BWR submittals using AST methods. No hardware or operational changes are necessary to use the SBLC system in this new functional mode.

The SBLC system is categorized in the USAR as an Engineered Safeguard with a design function to bring the reactor to a subcritical condition and is further credited as part of the Anticipated Transient Without Scram (ATWS) event per 10 CFR 50.62.

The SBLC system includes a heated storage tank containing a low temperature sodium pentaborate solution, two positive-displacement pumps connected in parallel, two explosive actuated discharge valves, a test tank with its network of injection and recirculation pipes, and the necessary piping, valves and instrumentation needed to inject the boron solution into the reactor vessel. System components, valves and piping are comprised of stainless steel. The SBLC system is manually initiated from the CR by use of a keylock switch. Upon initiation a flow path is established for the boron solution from the storage tank into the reactor vessel. Each positive displacement pump is sized to inject the contents of the storage tank solution into the reactor in approximately 1 hour.

The NRC has previously asked a number of questions related to the safety class, design, maintenance, and testing of the SBLC system in order to evaluate its ability to perform the suppression pool pH control function. These questions have appeared in a number of RAIs and been included in other applicant submittals. NMC has evaluated the MNGP SBLC system against these questions and provides the results of this evaluation below. In summary, evaluation results demonstrate the system is fully capable of supporting the proposed pH control function post-LOCA.

1. ***The SLC system should be classified as ESF grade in accordance with 10 CFR 50.34(b) or as a safety-related system as defined in 10 CFR 50.2, and satisfy the regulatory requirements for such systems. There may be plants with an SLC system which is not classified as safety-related or as ESF grade. In such instances, the staff reviewer will determine whether the SLC system is comparable to a system classified as safety-related or ESF. A SLC system meeting items (a)-(e) below would result in its acceptance in support of a 10 CFR 50.67 request even if the system is not classified as safety-related or as ESF grade.***

The SBLC system is an original plant system that has always been designated as an engineered safeguard (ESF) system at the MNGP.

The process portions of MNGP SBLC system are classified as safety-related in accordance with the MNGP Quality Assurance Plan. This equipment is designed to satisfy the regulatory requirements for safety related components. Process portions include all the piping, equipment, and controls necessary to assure successful injection into the reactor vessel from the control room and do not include non-process ancillary system equipment such as test tanks. This ancillary equipment is not required to support boron injection following a DBA LOCA.

Electrical equipment required to perform a safety-related function in a harsh environment is required to be environmentally qualified in accordance with 10CFR50.49, "Environmental qualification of electrical equipment important to safety for nuclear power plants ". The SBLC system had not previously been required to perform a safety-related function within a harsh environment and, therefore, was excluded from the scope of the MNGP Environmental Qualification (EQ) Program. The SBLC systems will be credited with performing a safety-related pH control function as a result of AST. The environment to which the system is exposed is discussed below.

Regarding service life environmental conditions, the SBLC equipment is located in a controlled environment that is devoid of harsh temperatures or external corrosive environments and no accelerated aging is expected.

The post-LOCA environmental variable of concern for the safety-related electrical portions of the SBLC system is radiation. Other environmental variables, such as temperature, remain mild for the postulated two-hour operating period. The MNGP environmental specification for the area where the SBLC pump is located shows that this area will become marginally harsh by crossing the 1E5 rad Total Integrated Dose threshold at the very end of the two-hour operating period. The MNGP environmental radiation specification for this area is conservative and based on contact dose with piping that is assumed to circulate suppression pool water. A detailed inspection of the dose at the affected SBLC equipment, when conservative distance and shielding factors are included, shows that the radiation environment will likely remain mild for the duration of the operating period with significant margin.

Given the above, reliance on an alternative form of qualification by an evaluation of sections a) through e) below is not necessary.

- a) ***The SLC system should be provided with standby AC power supplemented by the emergency diesel generators.***

Based upon the response to Item 1 above, an evaluation of Section a) is not necessary.

- b) ***The SLC system should be seismically qualified in accordance with RG 1.29 and Appendix A to 10 CFR Part 100.***

Based upon the response to Item 1 above, an evaluation of Section b) is not necessary.

- c) ***The SLC system should be incorporated into the plant's ASME Code ISI and IST Programs based upon the plant's code of record (10 CFR 50.55a).***

Based upon the response to Item 1 above, an evaluation of Section c) is not necessary.

- d) ***The SLC system should be incorporated into the plant's Maintenance Rule program consistent with 10 CFR 50.65.***

Based upon the response to Item 1 above, an evaluation of Section d) is not necessary.

- e) ***The SLC system should meet 10 CFR 50.49 and Appendix A (GDC 4) to 10 CFR 50.***

Based upon the response to Item 1 above, an evaluation of Section e) is not necessary.

2. ***The licensee should have plant procedures for injecting the sodium pentaborate using the SLC system. This information would be reviewed by the appropriate technical review branch, as requested by the lead SPSB reviewer.***

- (a) ***A review of the procedures may be appropriate if a reliability approach is taken (4(a) below) due to timing considerations for the injection of chemicals.***

NMC has taken a reliability approach and therefore, responses to items 2(b) through (f) are provided.

- (b) ***The SLC activation steps are placed in a safety-related plant procedure.***

The operator determines the need for SBLC system usage. Manual initiation of the SBLC system is currently directed by the Emergency Operating Procedures (EOPs) for inventory control as an alternate injection path and for ATWS usage. In the Severe Accident Management Guidelines (SAMGs) the SBLC system is currently utilized for inventory maintenance or reactivity control. The EOPs and SAMGs are safety-related.

The AST LOCA analysis is based on a loss of reactor water inventory without ECCS injection (inadequate core cooling) in order to generate the source term. Inadequate core cooling requires entry into the SAMGs, which require SBLC injection. It is also expected that the

containment high radiation monitors would alarm in response to the release conditions modeled in the AST LOCA analysis. Receipt of the containment high radiation monitor alarm, when high drywell pressure and/or inadequate core cooling conditions are also indicated, signals the LOCA conditions where SBLC injection will be required based on the new design function of the SBLC system.

The SAMG Technical Support Guidelines (TSGs) will be revised to: (1) add a functional requirement for utilization of SBLC for suppression pool pH control, (2) require manual initiation of the SBLC System in response to a high containment radiation, concurrent with loss of inventory or high DW pressure, and (3) to continue injection until the SBLC tank low level alarm is received. This task will be accomplished as part of the implementation of the approved AST changes.

(c) Steps are activated by parameters that are symptoms of imminent or actual core damage.

The inability to maintain adequate core cooling, as indicated by low reactor vessel water level, and containment high radiation are symptoms of imminent and actual core damage, respectively.

(d) The instrumentation relied upon to provide this indication meets the quality requirements for a Type E variable as defined in RG 1.97 Tables 1 and 2.

Reactor vessel water level instrumentation is required to be operable in accordance with TS. As described in the MNGP USAR, water level is identified as a Type A variable, and the instrumentation meets the quality requirements of RG 1.97, "Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident", Category 1.

The containment radiation instrumentation is also required to be operable in accordance with the MNGP TS 3.14, and meets the quality requirements for a Type E variable as defined for RG 1.97 Category 1.

(e) Personnel receive initial and periodic refresher training in the procedure.

Licensed operators receive initial and periodic training on use of the EOPs and SAMGs.

The procedure changes implemented to reflect the new SBLC system functional requirement will be included in operator re-qualification training as part of the implementation of the approved AST changes. In addition, appropriate Technical Support Center (TSC) personnel will receive training on the TSG revisions as part of the implementation of the approved AST changes.

- (f) Other plant procedures (e.g., ERGs/SAGs) that call for termination of SLC as a reactivity control measure are appropriately revised to enable SLC injection for pH control.**

The MNGP SAMGs do not call for or provide any instruction for termination of the SBLC system prior to the SBLC tank being emptied. Current procedures allow for termination of other injection sources, but maintain boron injection from the SBLC system. For reactivity control, the SAMGs also require injection of SBLC until the SBLC tank water level drops to 0 gallons. In addition as noted above, the changes to the TSGs for high containment radiation will instruct the operators to inject until the SBLC tank low level alarm is received.

- 3. A sufficient concentration and quantity of sodium pentaborate should be available for injection into the reactor vessel to control pH in the suppression pool. The source term analysis is tied to the plant's design basis accident, which is the large break LOCA, a break of a recirculation pipe. The licensee needs to demonstrate that within 24 hours there is adequate recirculation between the suppression pool and the reactor vessel through flow out the break to provide transport and mixing, consistent with the assumptions in the chemical analyses.**

A sufficient concentration and quantity of sodium pentaborate is available for injection into the reactor vessel during the design basis LOCA in accordance with the analytical assumptions used to calculate the suppression pool pH.

A post-LOCA pH calculation was prepared. The calculation included a variety of conservative assumptions for acid production and buffering. The calculation demonstrates that one tank of sodium pentaborate solution injected from the SBLC system into the reactor vessel results in a suppression pool pH of 8.59.

Assuming a conservative system flow rate, the contents of the SBLC tank can be injected into the reactor vessel and reach the suppression pool within 2 hours, which is in accordance with the timing and concentration assumptions of the pH calculation. The concentration and volume of sodium pentaborate assumed to mix in the water volume by the pH calculation are the minimum values required by the TS.

MNGP is a GE BWR with a Mark I containment design. The drywell and suppression pool are connected by means of a vent system with downcomers that terminate below the level of the suppression pool water.

Following a design basis LOCA, an entire division of the ECCS, two RHR pumps and one CS pump, will inject suppression pool water into the depressurized reactor vessel and quickly reflood within a few minutes.

Adequate core cooling will be automatically established without operator action within 10 minutes of LOCA initiation. ECCS water introduced into the reactor from the core spray sparger and the intact recirculation loop will be forced from the reactor vessel through the break at the recirculation pump suction into the drywell. The break flow will pool in the drywell and overflow through the vent system to the suppression pool within 10 minutes.

Within 1 hour it is assumed SBLC injection will begin to enter the suppression pool and all injection will be complete within 2 hours. The injection path from the reactor vessel bottom head is into the integrated water volume that includes the ECCS piping, the reactor vessel, some recirculation system piping, and the suppression pool. This volume is conservatively calculated to be 84655 ft³.

The MNGP containment analysis includes a post-DBA LOCA case where RHR flow from one pump is diverted from injection to provide for direct suppression pool cooling at 10 minutes post-LOCA. This action results in one RHR pump recirculating, and therefore mixing, the suppression pool inventory through a heat exchanger while one Core Spray pump continues to inject suppression pool water into the reactor vessel. This deterministic outcome can be applied to the DBA LOCA, for analysis purposes, to conservatively reduce the available mixing flow to the integrated water volume. Other post-LOCA ECCS pump configurations that do not assume the need for suppression pool cooling will result in increased mixing flow into the reactor vessel.

In the above case, the resultant mixing flow is approximately 7,020 gpm assuming rated pump flows. Therefore, the integrated water volume that includes the sodium pentaborate in the suppression pool recirculates approximately every 1.5 hours [84,655 ft³ / (7,020 gpm * 60 min./hr. * 0.134 ft.³/gal.)]. In the 22 hours following the completion of boron injection, approximately 14.7 complete recirculation cycles will have been completed within 24 hours of the LOCA initiation. Therefore, this demonstrates that within 24 hours there is adequate recirculation between the suppression pool and the reactor vessel through flow out the break to provide transport and mixing, consistent with assumptions in the pH calculation.

4. ***The SLC system should not be rendered incapable of performing its AST function due to a single failure of an active component. For this purpose the check valve is considered an active device for AST since the check valve must open to inject sodium pentaborate for suppression pool pH control.***

If the SLC system can not be considered redundant with respect to its active components, this lack of redundancy may be offset if the licensee can satisfy (a) or (b) or (c) below:

The SBLC system has two potential single active failure points. Although each of these failures is improbable, there are various equipment design and testing features and compensatory actions that serve to reduce the probability of failure.

The failure of the control room SBLC initiation switch to close contacts is a single active failure point. In addition, the failure of the SBLC primary containment isolation check valves (XP-6 or XP-7) is also a single active failure point. If either of these valves fails to open, SBLC injection would be prevented. An active failure of a check valve is not part of the CLB, but will be deemed an active failure for the purposes of this particular failure analysis.

NMC has chosen to offset this lack of redundancy by addressing and satisfying the requirements of item 4(a) below.

(a) Acceptable quality and reliability of the non-redundant active components and/or compensatory actions in the event of failure of the non-redundant active components.

Under this approach, the licensee should provide the following information in justifying the lack of redundancy of active components in the SLC system:

(1) The licensee should identify the non-redundant active components in the SLC system and provide their make, manufacturer, and model number. The staff reviewer will compare this information with performance data for the component from industry databases and other sources.

The two SBLC containment isolation check valves are installed in series in the SBLC injection line. The current SBLC containment isolation valves, installed in 1978, are 1.5" forged stainless steel piston check valves manufactured by Rockwell Edward (Part No. 3674F316).

The SBLC initiation switch is used to initiate either train of the SBLC system. The SBLC Initiation Switch (11A-S1) is a GE Type SB1.

Note: The NRC has previously evaluated the use of these check valves and initiation switch types, for AST purposes, at the Vermont Yankee plant in a Safety Evaluation dated March 29, 2005.

(2) The licensee should provide the design-basis conditions for the component and the environmental and seismic conditions under which the component may be required to operate during a design-basis accident. Environmental conditions include design-basis pressure, temperature, relative humidity and radiation fields. The staff reviewer will compare the environmental and seismic conditions associated with the design-basis accident to the conditions for which the component was designed to determine whether the component is capable of performing its intended function.

The design basis environmental conditions for the SBLC initiation switch, which is located in the MNGP control room, are mild for the duration on the postulated SBLC operating window. One containment isolation check valve is located in the primary containment and one is located in the Reactor Building. The valves are expected to operate in their post LOCA environment. The valves are comprised of ASTM A-182 Gr. F316 with Stellite seating surfaces. The valves are design rated to 1500 psi at 1250°F and 3600 psi at 100°F, in excess of expected system operating conditions during a LOCA. It is very unlikely that the check valves in question would fail to open in the event of a SBLC initiation during a DBA LOCA. The valve design includes a piston disk seated in a tube that seats with spring force. The inner containment isolation valve is held shut in part by normal reactor pressure.

During a LOCA the pressure differential across the inner isolation valve would be primarily due to the pressure head from the positive displacement pump and the reactor pressure which will have substantially decreased (to the containment pressure of < 56 psig). A failure of the valve spring (spring rate 1 lb/in) within the tube is very unlikely to prevent the force generated by the positive displacement pump head (1275 psig nominal) from successfully moving the piston off the seat and up through the tube, and thereby fully opening the

valve.

The switch and the check valves are designated as Class I components at MNGP, which includes seismic requirements for the design basis earthquake.

(3) The licensee should indicate whether the component was purchased in accordance with Appendix B to 10 CFR Part 50. If the component was not purchased in accordance with Appendix B, the licensee should provide information on the quality standards under which it was purchased. For the latter situation, information on the component would be reviewed by the appropriate technical review branch responsible for the component, as requested by the lead SPSB reviewer.

The SBLC initiation switch is original plant equipment. The injection line check valves were pulled from plant spare part equipment and installed in 1978. This equipment was purchased under the quality requirements for nuclear safety related equipment that predate the requirements for Appendix B to 10 CFR Part 50. This equipment is maintained as safety related in the MNGP 10 CFR 50 Appendix B QA Program.

(4) The licensee should provide the performance history of the component both at the licensee's facility and in industry databases such as EPIX and NPRDS. The staff reviewer will use this information to evaluate the reliability of the component relative to other components used in safety-related applications.

An NMC EPIX search of the Rockwell MNGP valves did not identify any failures of these valves to open. An LIS Survey (July 15, 2004) of the check valves installed at MNGP and the EPIX search above indicated that these valves are not in wide use at BWRs and that there has been one failure to seat in the closed direction due to loss of spring compression.

The Vermont Yankee (VY) AST submittal dated July 20, 2004 contains failure search data that is pertinent to the MNGP. The VY search data shows that these valves have been very reliable.

There have been no failures of the initiation switch to initiate the SBLC system during testing at the MNGP. The check valves have shown reliable performance with no failures to open, consistent with the industry experience noted above.

(5) The licensee should provide a description of its inspection and testing program including standards, frequency, and acceptance criteria. The staff reviewer will use this information to evaluate

the licensee's activities to monitor the component's performance at the facility. The information on the component would be reviewed by the appropriate technical review branch responsible for the component, as requested by the lead SPSB reviewer.

Initiation Switch

The SBLC initiation switch is actuated each cycle consistent with the manual initiation test performed in accordance with Section 4.4.A.2.a of the MNGP Technical Specifications. There have been no recorded failures of this switch to function during this test at the MNGP.

Check Valves

The SBLC system is included in the scope of the MNGP Maintenance Rule Program. The SBLC system availability and functional failures are tracked. The SBLC system components in the flow path, including the check valves, necessary to support the pH control function are in the program.

Periodic testing of these valves provides assurance that the valves will open. At MNGP, these valves are demonstrated to open once per cycle per TS surveillances. The Inservice Testing (IST) Program verifies the valves open and pass a rated flow of ≥ 24 gpm. These valves have been successfully tested periodically since 1978.

Both valves are in the MNGP Check Valve Program. This program includes formal trending of wear and degradation and examination of maintenance records.

These check valves are leak tested per MNGP 10 CFR 50 Appendix J procedures and functionally tested per IST Program procedures.

(6) The licensee should also indicate potential compensating actions that could be taken within an acceptable time period to address the failure of the component. An example of a compensating action might be the ability to jumper a switch in the control room to overcome its failure. The staff reviewer will consider the availability of compensating actions and the likelihood of successful injection of the sodium pentaborate where non-redundant active components fail to perform their intended functions.

The SBLC initiation switch is normally in the OFF position. A control room operator manually initiates the SBLC system by placing the switch in the SYS.1 or SYS.2 position. This action closes contacts that complete the circuits that start the pump and fire the explosive valve in the associated subsystem. If the SYS.1 position fails to make up the

contacts and initiate the SBLC subsystem, the operator can switch to the SYS.2 position without going through the SYS.1 position and conversely if the SYS.2 fails at the first attempt, the operator can switch to the SYS.1 position without going through the SYS.2 position. This operator action is expressly included in the SBLC manual initiation procedure.

In the unlikely event both SBLC subsystems fail to actuate, CR operators will be procedurally directed to take compensatory actions.

Compensatory actions are not proposed for the check valves as failure to open is considered very unlikely as discussed above.

(b) *An alternative success path for injecting chemicals into the suppression pool.*

If the licensee chooses to address the SLC system's susceptibility to single failure by selecting an alternative injection path, the alternative path must be capable of performing the AST function noted above and all components which make up the alternative path should meet the same quality characteristics required of the SLC system (described in Items 1(a)-1(e), 2 and 3 above). When the staff determines that an alternative path is acceptable, the staff's safety evaluation should address the manner in which the SLC system and the alternative path met Items 1(a)-1(e), 2 and 3 above.

NMC has responded to part (a) above and part (b) is not applicable for how the SBLC system has been credited in this full scope AST LAR.

(c) *10 CFR 50.67 and Appendix A, General Design Criterion (GDC) 19 doses are met even if pH is not controlled.*

The licensee may demonstrate, through dose calculations, that 10 CFR 50.67 and GDC 19 doses are met even if pH is not controlled. The re-evolution of iodine in the particulate form from the water in the suppression pool to the elemental form for airborne iodine must be incorporated into the calculation. The calculation may take credit for the mitigating capabilities of other equipment, for example the SGT system, if such equipment would be available. The staff will perform calculations to confirm the licensee's conclusions. If the acceptability of the facility's dose calculations was based on the utilization of certain ESF equipment, for example the SGT system, then the staff's safety evaluation should reflect this. Such a citation is necessary to assure that it is recognized and documented that there is a link between the particular ESF component's performance and the SLC system's susceptibility to single failure.

NMC has responded to part (a) above and part (c) is not applicable for how the SBLC system has been credited in this full scope AST LAR.

6.0 OPERATOR ACTIONS

No new operator actions are proposed as part of this LAR. As noted in Section 2.0, no credit for operator action is assumed in the mitigation of the radiological consequences of the MSLBA, CRDA, and FHA. For the DBA LOCA, the manual injection of boron via the SBLC system is credited for suppression pool pH control. Manual initiation of the SBLC system is not considered a new operator action and is already required by plant procedure when adequate core cooling is not assured. However, credit for this action to provide pH control for a LOCA represents a new licensing basis requirement for an existing action. Additionally, a new action will be proceduralized to initiate the SBLC system on containment high radiation (concurrent with inadequate core cooling or high drywell pressure) as described in Section 5.0.

Plant severe accident procedures require the initiation of the SBLC system when adequate core cooling is not assured and require its continued use for reactor vessel inventory make-up after sufficient level is restored. As long as ECCS is operating and sufficient reactor vessel inventory is provided, fuel damage and source term release will not occur. Under severely degraded vessel level conditions, however, when the potential for fuel failure exists, the operator is directed to initiate the SBLC system and other systems to provide makeup.

7.0 MITIGATING SYSTEM ANALYSIS ASSUMPTIONS

As noted in Section 6.0, a new function has been identified for the SBLC system in support of a LOCA where fuel damage occurs. The SBLC system is capable of performing this function without any required modifications to the system (see Section 5.0). All other systems, structures, and components (SSCs) credited to provide a mitigation function for the LOCA, MSLBA, CRDA, and FHA are assumed to function in accordance with their current design and licensing basis for these events. In some cases, SSCs were not credited for added conservatism. A summary of key radioiodine reduction system assumptions used in the DBA radiological consequence analyses is provided in Table 7-1.

Table 7-1			
Radioiodine Reduction Systems Modeled in Dose Analyses			
DBA Dose Analysis	Secondary Containment	CRV-EFT	SBGT
LOCA	Credited	Credited	Credited
Main Steam Line Break Accident	Not Credited	Not Credited	Not Credited
Control Rod Drop Accident	Not Credited	Not Credited	Not Credited
Fuel Handling Accident	Not Credited	Not Credited	Not Credited

8.0 AST IMPACT ON REGULATORY REQUIREMENTS

Consistent with Section 1.3 of RG 1.183, there are several regulatory requirements for which compliance is demonstrated, in part, by the evaluation of the radiological consequences of design basis accidents. These regulatory requirements were reviewed as part of preparing this full-scope AST LAR. Resulting impacts of AST implementation are summarized below.

Environmental Qualification of Equipment (10 CFR 50.49)

The source term associated with environmental qualification of electrical equipment will remain consistent with previous commitments under 10 CFR 50.49 and is not changed or modified by this LAR. TID-14844, "Calculation of Distance Factors for Power and Test Reactor Sites" source term assumptions will continue to apply for evaluating equipment qualification under this program.

Facility Siting (10 CFR 100.11)

No changes to facility siting or the CLB for establishing site boundaries are proposed as part of AST implementation. Existing site boundaries were used in AST analyses to calculate offsite doses.

Post-Accident Sampling Capability (NUREG-0737 Item II.B.3)

Requirements to maintain a post-accident sampling system (PASS) were removed from the CLB by License Amendment 136. The staff found that the information provided by PASS is either unnecessary or is effectively provided by other indications of process parameters or measurement of radiation levels. Commitments were made as part of the license amendment to include sampling in contingency (emergency) procedures. Samples that may be required post LOCA can be obtained from the PASS or obtained via local grab samples depending on actual dose rates. This licensing action removes the PASS from calculated dose consideration as described in Item II.B.2. Actions to obtain samples post DBA LOCA and prior commitments of License Amendment 136 are not impacted by this full scope AST LAR.

Leakage Control (NUREG-0737 Item III.D.1.1)

Leakage rates for the ESF were previously reported to the NRC. Consistent with Appendix A of Section 5.2 of RG 1.183, these rates were totaled, doubled, and assumed to remain constant in the LOCA DBA AST analysis. A long-term leakage reduction program, contained in Technical Specifications, satisfied the requirements for this NUREG item.

Emergency Response Facilities (NUREG-0737, Item III.A.1.2)

On March 11, 2004, NMC provided a voluntary report involving potential Technical Support Center (TSC) unavailability during a Design Basis Accident (DBA) LOCA. This Event Report (Event Number 40585) provided information concerning a non-conformance of the MNGP TSC. The TSC project is ongoing at the time of this submittal with a resolution tentatively scheduled for 2006. Therefore, a TSC 30-day dose analysis is not being provided with this transmittal, but the analysis results will be reported after project completion.

The primary Emergency Operations Facility (EOF) is located in the MNGP Training Building approximately one mile from the primary containment. The backup EOF is located approximately 45 miles from the plant at the Headquarters Emergency Center in downtown Minneapolis. Offsite doses at the LPZ have been recalculated as part of this LAR. All revised doses are within regulatory limits and EOF habitability is not impacted.

Post-Accident Access Shielding (NUREG-0737 Item II.B.2)

The MNGP shielding study determined the dose consequences from contained sources in response to NUREG-0737, "Clarification of TMI Action Plan Requirements," Item II.B.2. The shielding study is used in dose evaluations that support the environmental qualification of electrical equipment under 10 CFR 50.49 (see above). The study is based on TID-14844 source term assumptions. As the shielding study is part of the CLB and integral to 10 CFR 50.49 requirements, no changes to the CLB are proposed. Consistent with Sections 4.3 and 4.4 of RG 1.183, the source term has been updated for those areas that support DBA mitigation and have been evaluated as part of this LAR as described below.

Three areas involve post-accident missions that are necessary to support DBA mitigation. These areas are the: 1) Control Room, 2) TSC, and 3) PASS. The CR operator doses for DBAs have been evaluated and the results are contained in this LAR. All calculated doses are below regulatory limits. Operator dose resulting from TSC habitability is not included in this LAR as described above. Calculation of dose during operation of the PASS is no longer required due to License Amendment 136 as described above.

Control Room Habitability (NUREG-0737, Item III.D.3.4)

The dose analyses contained in this LAR demonstrate that MNGP meets the radiological requirements of 10 CFR 50.67 and 10 CFR Part 50, GDC-19 with respect to the limiting dose to the most exposed CR operator. Under the conditions imposed by the DBA event for CR habitability, the most exposed CR operator would not be subjected to radiation exposure resulting in doses in excess of 5 Rem whole body or its equivalent to any part of the body for the duration of the accident (i.e., 5 Rem TEDE as established by 10 CFR 50.67 and

GDC-19). By demonstrating compliance with GDC-19, NUREG-0737 Item III.D.3.4, is also satisfied.

9.0 AST DBA ANALYSIS COMPUTER CODES

DBA radiological consequence analyses were prepared through simulation of radionuclide release, transport, removal, and dose impact. Computer codes and analysis methods are consistent with applicable regulatory guidance as summarized in Table 9-1.

<p align="center">Table 9-1 Computer Codes Used in AST Design Basis Radiological Analyses</p>			
Task Summary	Computer Code	Version or Revision	Comments
Calculate Elevated χ /Qs	PAVAN-PC	1.0	Per NUREG/CR-2858
Calculate Ground Level χ /Qs	ARCON96	N/A	Per NUREG/CR-6331, Revision 1
Calculate Radiation Dose Field Surrounding Main Steam Line Radiation Detectors	MicroShield	5.05	Performs gamma shielding calculations for radioactive sources, including attenuation and buildup factors (licensed computer code available through Grove Engineering)
Calculate Reactor Core Fission Product Inventories	ORIGEN	ORIGEN2.1 model BWRUE	Consistent with Section 3.1 of RG 1.183
CR Operator and Offsite Dose Calculations and Radiological Transport	RADTRAD	3.03	Per NUREG/CR-6604, Supplement 1 and Supplement 2

**Table 9-1
Computer Codes Used in AST
Design Basis Radiological Analyses**

Task Summary	Computer Code	Version or Revision	Comments
<p style="text-align: center;">CR Operator External Direct Dose Post DBA LOCA</p>	<p style="text-align: center;">RUNT-PC</p>	<p style="text-align: center;">N/A</p>	<p>Calculates gamma dose rates using gaussian quadrature integration of point and line kernel dose rate equations (Sargent & Lundy, LLC proprietary computer code).</p>

10.0 REFERENCES

1. Title 10, Code of Federal Regulations, Part 50.67, "Accident source term".
2. U.S. Nuclear Regulatory Commission, Regulatory Guide 1.183, "Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors," July 2000.
3. Monticello Nuclear Generating Plant Updated Safety Analysis Report.
4. NUREG-0800, Standard Review Plan (SRP) Section 15.0.1, "Radiological Consequence Analyses Using Alternative Source Terms", Revision 0, July 2000.
5. NUREG-0737, "Clarification of TMI Action Plan Requirements," November 1980.
6. U.S. Nuclear Regulatory Commission, Regulatory Guide 1.145, "Atmospheric Dispersion Models for Potential Accident Consequence Assessments at Nuclear Power Plants," Revision 1, November 1982.
7. NUREG/CR-6331 (PNNL-10521), "Atmospheric Relative Concentrations in Building Wakes," Rev. 1, May 1997.
8. NUREG/CR-2858 (PNL-4413), "PAVAN: An Atmospheric Dispersion Program for Evaluating Design Bases Accidental Releases of Radioactive Materials from Nuclear Power Stations," November 1982.
9. U.S. Nuclear Regulatory Commission, Regulatory Guide 1.194, "Atmospheric Relative Concentrations for Control Room Radiological Habitability Assessments at Nuclear Power Plants," June 2003.
10. U.S. Nuclear Regulatory Commission, Safety Guide 1.23, "Onsite Meteorological Programs," 2/17/72.
11. Nuclear Management Company Letter to the NRC, subject: "Response to Second Request for Additional Information Related to Technical Specifications Change Request to Apply Alternative Source Term (AST) Methodology to Re-Evaluate the Fuel-Handling Accident (TAC No. MC3299), dated January 31, 2005," dated February 28, 2005, L-MT-05-011, ADAMS Accession Number ML050140063.
12. U.S. Nuclear Regulatory Commission, Regulatory Guide 1.21, "Measuring, Evaluating, and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials in Liquid and Gaseous Effluents from Light-Water-Cooled Nuclear Power Plants," Revision 1, June 1974.
13. Technical Specifications and Bases for Monticello Nuclear Generating Plant.

14. NUREG/CR-6604, "RADTRAD: A Simplified Model for RADionuclide Transport and Removal And Dose Estimation," December 1997 and Supplement 1, June 8, 1999 and Supplement 2, October 2002.
15. AEB-98-03, "Assessment of Radiological Consequences for the Perry Pilot Plant Application using the Revised (NUREG-1465) Source Term," December 9, 1998.
16. NEDC-31858P (Proprietary GE Topical Report), "BWROG Report for Increasing MSIV Leakage Limits and Elimination of Leakage Control Systems," Revision 2, September 1993.
17. Federal Guidance Report No. 11, "Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion, and Ingestion," EPA 520/1-88-020, September 1988, U.S. Environmental Protection Agency.
18. Federal Guidance Report No. 12, "External Exposure to Radionuclides in Air, Water and Soil," EPA 420-R-93-081, September 1993, U.S. Environmental Protection Agency.
19. NMC Letter to the NRC, Subject: "Response to Request for Additional Information Related to Technical Specifications Change Request to Apply Alternative Source Term (AST) Methodology to Re-Evaluate the Fuel-Handling Accident, dated January 11, 2005 (TAC No. MC3299)", letter dated January 20, 2005, L-MT-05-001, ADAMS Accession Number ML050110207.
20. Bechtel Job 10040-048, Calculation 100, "Shielding Review Bases," September 15, 1981.
21. Letter from Exelon to the NRC, Subject: "Request for License Amendments Related to Application of Alternative Source Term," dated: February 27, 2004, NRC Docket Nos. 50-352 and 50-353, ADAMS Accession Number ML040980153.
22. Letter from CP&L (Progress Energy) to the NRC, Subject: "Brunswick Steam Electric Plant, Unit Nos. 1 and 2 Docket Nos. 50-325 and 50-324/License Nos. DPR-71 and DPR-62 Request for License Amendments Alternative Radiological Source Term," dated: August 1, 2001, ADAMS Accession Number ML012180234.
23. Letter from Entergy to the NRC, Subject: "Vermont Yankee Nuclear Power Station License No. DPR-28 (Docket No. 50-271) Technical Specification Proposed Change No. 262 Alternative Source Term," dated: July 31, 2003, ADAMS Accession Number ML032190646.
24. Monticello Nuclear Generating Plant, Amendment No. 102 to Facility Operating License No. DPR-22, Power Uprate Program, transmitted under

NRC cover letter dated September 16, 1998, ADAMS Accession Number ML020920138.

25. Northern States Power Letter to the NRC, Subject: "Seismic Verification of the MSIV Leakage Path at Monticello (TAC No. 96238)," dated: June 15, 1998.
26. Nuclear Management Company Letter to the NRC, Subject: "License Amendment Request: Selective Scope Application of an Alternative Source Term Methodology for Re-evaluation of the Fuel Handling Accident," dated April 29, 2004, L-MT-04-023, ADAMS Accession Number ML041450022.
27. Nuclear Management Company Letter to the NRC, Subject: "Supplement 1 to License Amendment Request: Selective Scope Application of an Alternative Source Term Methodology for Re-evaluation of the Fuel Handling Accident," dated November 23, 2004, L-MT-04-064, ADAMS Accession Number ML043280574.
28. Nuclear Management Company Letter to the NRC, Subject: "Response to Request for Additional Information Related to Technical Specifications Change Request to Apply Alternative Source Term (AST) Methodology to Re-Evaluate the Fuel Handling Accident, dated January 11, 2005 (TAC No. MC3299)," dated: January 20, 2005, L-MT-05-001, ADAMS Accession Number ML050210043.
29. Nuclear Management Company Letter to the NRC, Subject: "Response to Second Request for Additional Information Related to Technical Specifications Change Request to Apply Alternative Source Term (AST) Methodology to Re-Evaluate the Fuel Handling Accident (TAC No. MC3299)," dated January 31, 2005," dated February 28, 2005, L-MT-05-011, ADAMS Accession Number ML050610234.
30. Nuclear Management Company Letter to the NRC, Subject: "Additional Technical Specification Changes for the Monticello Nuclear Generating Plant Regarding Application of Alternative Source Term Methodology to Re-Evaluate the Fuel Handling Accident (TAC No. MC3299)," dated April 12, 2005, L-MT-05-013, ADAMS Accession Number ML051080481.
31. Energy Northwest Letter to the NRC, Subject: "Columbia Generating Station Docket No. 50-397 License Amendment Request – Alternative Source Term," dated September 30, 2004, GO2-04-170, ADAMS Accession Number ML042930374.
32. U.S. Nuclear Regulatory Commission, Regulatory Guide 1.97, "Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident," Revision 2, December 1980.

33. Title 10, Code of Federal Regulations, Part 50.90, "Application for amendment of license or construction permit."
34. Title 10, Code of Federal Regulations, Part 50.92, "Issuance of amendment."
35. TID 14844, "Calculation of Distance Factors for Power and Test Reactor Sites," March 23, 1962.
36. Title 10, Code of Federal Regulations, Part 50.59, "Changes, tests and experiments."
37. Title 10, Code of Federal Regulations, Part 50.49, "Environmental qualification of electrical equipment important to safety for nuclear power plants."
38. Vermont Yankee Nuclear Power Station Amendment to Facility Operating License No. 223, Docket No. 50-271, issued under NRC Letter to Entergy dated March 29, 2005, ADAMS Accession Number ML041280490.
39. Entergy Letter to the NRC, Subject: "Vermont Yankee Nuclear Power Station Technical specification Proposed Change No. 262 – Supplement No. 13 Alternative Source Term – Standby Liquid Control System Check Valves," dated: July 20, 2004, Docket No. 50-271, BNY 04-069, ADAMS Accession Number ML042160007.
40. Event Number 40585, Voluntary Report Involving Potential TSC Unavailability During a DBD LOCA, event date 3/11/2004.
41. Northern States Power letter to the NRC, Subject: "Lessons Learned Implementation," dated December 31, 1979.
42. Nuclear Management Company, LLC Docket No. 50-263 Monticello Nuclear Generating Plant Amendment to Facility Operating License, Amendment No. 136, transmitted to NMC by the NRC under cover letter dated June 17, 2003, ADAMS Accession Number ML031180093.
43. Safety Evaluation by the Office of Nuclear Reactor Regulation Supporting Amendment No. 2 to License No. DPR-22, Northern States Power Company, Docket No. 50-263, Monticello Nuclear Generating Plant.
44. Technical Support Document, "Potential Recycling of Scrap Metal from Nuclear Facilities, Part I: Radiological Assessment of Exposed Individuals," prepared for the U.S. Environmental Protection Agency under Contract No. 1W-2603-LTNX, September 2001 (Section 6.3.1).
45. 10 CFR 50.62 Requirements for reduction of risk from anticipated transients without scram (ATWS) events for light-water-cooled nuclear power plants.

46. Title 10, Code of Federal Regulations, Part 100.11, "Determination of exclusion area, low population zone, and population center distance."
47. U.S. Nuclear Regulatory Commission, Regulatory Guide 1.89, "Environmental Qualification of Certain Electric Equipment Important to Safety for Nuclear Power Plants," Revision 1, June 1984.

ENCLOSURE 4

TABLE OF COMMITMENTS MADE IN THIS SUBMITTAL

Commitment	Committed Date or Outage
NMC will provide a TSC 30-day dose analysis	After TSC project completion
In addition to existing requirements to initiate SBLC when adequate core cooling is not assured, new procedural guidance will be established to initiate the SBLC system on high containment radiation and to note reliance on the SBLC system for pH control.	This task will be accomplished as part of the implementation of the approved AST changes.
The Technical Support Guidelines (TSGs) will be revised to: (1) add a functional requirement for utilization of SBLC for suppression pool pH control, (2) require manual initiation of the SBLC system in response to a high containment radiation, concurrent with loss of inventory or high drywell pressure, and (3) to continue injection until the SBLC tank low level alarm is received.	This task will be accomplished as part of the implementation of the approved AST changes.
The procedure changes implemented to reflect the new SBLC system functional requirement will be included in operator re-qualification training. In addition, appropriate Technical Support Center (TSC) personnel will receive training on the TSG revisions.	This task will be accomplished as part of the implementation of the approved AST changes.

ENCLOSURE 5

MONTICELLO NUCLEAR GENERATING PLANT

APPLICATION FOR LICENSE AMENDMENT

ALTERNATIVE SOURCE TERM

**REGULATORY GUIDE 1.183 VERSUS NMC ANALYSIS COMPARISON
MATRIX**

(40 pages follow)

Regulatory Guide 1.183 Versus NMC Analysis Comparison Matrix

<u>Regulatory Guidance</u>	<u>Basis of Conformance</u>
3. ACCIDENT SOURCE TERM	
<p>3.1 Fission Product Inventory</p> <p>The inventory of fission products in the reactor core and available for release to the containment should be based on the maximum full power operation of the core with, as a minimum, current licensed values for fuel enrichment, fuel burnup, and an assumed core power equal to the current licensed rated thermal power times the ECCS evaluation uncertainty⁸. The period of irradiation should be of sufficient duration to allow the activity of dose-significant radionuclides to reach equilibrium or to reach maximum values⁹. The core inventory should be determined using an appropriate isotope generation and depletion computer code such as ORIGEN 2 (Ref. 17) or ORIGEN-ARP (Ref. 18). Core inventory factors (Ci/MWt) provided in TID14844 and used in some analysis computer codes were derived for low burnup, low enrichment fuel and should not be used with higher burnup and higher enrichment fuels.</p> <p>⁸The uncertainty factor used in determining the core inventory should be that value provided in Appendix K to 10 CFR Part 50, typically 1.02.</p> <p>⁹Note that for some radionuclides, such as Cs-137, equilibrium will not be reached prior to fuel offload. Thus, the maximum inventory at the end of life should be used.</p>	<p>Conforms.</p> <p>Current licensed thermal power is 1775 MWth. Analysis uses thermal power of 1880 MWth and Appendix K uncertainty factor of 1.02 (1918 MWth). The period of irradiation was of sufficient duration to achieve isotopic concentrations for a representative two-year operating cycle. Core inventory was determined using ORIGEN 2.1 model BWRUE.</p>

<u>Regulatory Guidance</u>	<u>Basis of Conformance</u>
<p>For the DBA LOCA, all fuel assemblies in the core are assumed to be affected and the core average inventory should be used. For DBA events that do not involve the entire core, the fission product inventory of each of the damaged fuel rods is determined by dividing the total core inventory by the number of fuel rods in the core. To account for differences in power level across the core, radial peaking factors from the facility's core operating limits report (COLR) or technical specifications should be applied in determining the inventory of the damaged rods.</p>	<p>For the LOCA, the core average inventory was used.</p> <p>For the FHA and CRDA, the fission product inventory of each rod was determined by dividing the total core inventory by the number of fuel rods in a representative core. A radial peaking factor of 1.7 was used.</p>
<p>No adjustment to the fission product inventory should be made for events postulated to occur during power operations at less than full rated power or those postulated to occur at the beginning of core life. For events postulated to occur while the facility is shutdown, e.g., a fuel handling accident, radioactive decay from the time of shutdown may be modeled.</p>	<p>No adjustments for less than full power were made. For the FHA, a decay time of 24 hours from time of shutdown was assumed.</p>

<u>Regulatory Guidance</u>	<u>Basis of Conformance</u>
<p data-bbox="254 310 590 337">3.2 Release Fractions^{10, 11}</p> <p data-bbox="254 375 1329 493">The core inventory release fractions, by radionuclide groups, for the gap release and early in-vessel damage phases for DBA LOCAs are listed in Table 1 for BWRs and Table 2 for PWRs. These fractions are applied to the equilibrium core inventory described in Regulatory Position 3.1.</p> <p data-bbox="254 529 1329 647">For non-LOCA events, the fractions of the core inventory assumed to be in the gap for the various radionuclides are given in Table 3. The release fractions from Table 3 are used in conjunction with the fission product inventory calculated with the maximum core radial peaking factor.</p> <p data-bbox="254 683 1329 756">¹⁰The release fractions listed here have been determined to be acceptable for use with currently approved LWR fuel with a peak burnup up to 62,000 MWD/MTU. The data in this section may not be applicable to cores containing mixed oxide (MOX) fuel.</p> <p data-bbox="254 784 1329 959">¹¹The release fractions listed here have been determined to be acceptable for use with currently approved LWR fuel with a peak burnup up to 62,000 MWD/MTU provided that the maximum linear heat generation rate does not exceed 6.3 kw/ft peak rod average power for burnups exceeding 54 GWD/MTU. As an alternative, fission gas release calculations performed using NRC-approved methodologies may be considered on a case-by-case basis. To be acceptable, these calculations must use a projected power history that will bound the limiting projected plant-specific power history for the specific fuel load. For the BWR rod drop accident and the PWR rod ejection accident, the gap fractions are assumed to be 10% for iodines and noble gases.</p>	<p data-bbox="1356 310 1482 337">Conforms.</p> <p data-bbox="1356 358 1822 477">For the LOCA, release fractions are as given in Table 1 of RG 1.183 and are applied to the core inventory described in Section 3.1 above.</p> <p data-bbox="1356 513 1806 602">For the MSLBA, no fuel damage is assumed. See Appendix D Section 2 below for MSLBA source term.</p> <p data-bbox="1356 638 1839 878">For the CRDA, gap release fractions of Table 3 as modified by Footnote 11, of RG 1.183 are used. Melted fuel release fractions are as given in Appendix C, Section 1 of RG 1.183. For Rb and Cs the higher total release fractions of Table 1 for Alkali Metals were assumed for melted fuel.</p> <p data-bbox="1356 914 1835 1003">For the FHA, the release fractions given in Table 3 of RG 1.183 were used for gap release.</p> <p data-bbox="1356 1039 1745 1094">Fuel burnup dose not exceed 54 GWD/MTU.</p> <p data-bbox="1356 1130 1806 1185">MNGP core contains uranium dioxide fuel.</p>

<u>Regulatory Guidance</u>	<u>Basis of Conformance</u>
<p data-bbox="254 313 638 337">3.3 Timing of Release Phases</p> <p data-bbox="254 375 1329 586">Table 4 tabulates the onset and duration of each sequential release phase for DBA LOCAs at PWRs and BWRs. The specified onset is the time following the initiation of the accident (i.e., time = 0). The early in-vessel phase immediately follows the gap release phase. The activity released from the core during each release phase should be modeled as increasing in a linear fashion over the duration of the phase.¹² For non-LOCA DBAs in which fuel damage is projected, the release from the fuel gap and the fuel pellet should be assumed to occur instantaneously with the onset of the projected damage.</p> <p data-bbox="254 623 1318 802">For facilities licensed with leak-before-break methodology, the onset of the gap release phase may be assumed to be 10 minutes. A licensee may propose an alternative time for the onset of the gap release phase, based on facility-specific calculations using suitable analysis codes or on an accepted topical report shown to be applicable to the specific facility. In the absence of approved alternatives, the gap release phase onsets in Table 4 should be used.</p> <p data-bbox="254 834 1310 883">¹²In lieu of treating the release in a linear ramp manner, the activity for each phase can be modeled as being released instantaneously at the start of that release phase, i.e., in step increases.</p>	<p data-bbox="1356 313 1482 337">Conforms.</p> <p data-bbox="1356 375 1835 493">The onset and duration of releases from Table 4 were used. For the LOCA, the releases were modeled in a linear fashion.</p> <p data-bbox="1356 531 1835 680">For the CRDA and FHA, the activity released from the damaged fuel is assumed to be instantaneously mixed in the reactor coolant and fuel pool, respectively.</p> <p data-bbox="1356 717 1835 802">For the MSLBA, the activity is released from the reactor coolant and not the fuel gap.</p>
<p data-bbox="254 919 638 943">3.4 Radionuclide Composition</p> <p data-bbox="254 980 1310 1005">Table 5 lists the elements in each radionuclide group that should be considered in DBAs.</p>	<p data-bbox="1356 919 1482 943">Conforms.</p> <p data-bbox="1356 980 1822 1099">Radionuclides considered in the DBA analyses include the 60 isotopes of the RADTRAD Code, which encompasses those of RG 1.183, Table 5.</p>

<u>Regulatory Guidance</u>	<u>Basis of Conformance</u>
<p>3.5 Chemical Form</p> <p>Of the radioiodine released from the reactor coolant system (RCS) to the containment in a postulated accident, 95 percent of the iodine released should be assumed to be cesium iodide (CsI), 4.85 percent elemental iodine, and 0.15 percent organic iodide. This includes releases from the gap and the fuel pellets. With the exception of elemental and organic iodine and noble gases, fission products should be assumed to be in particulate form. The same chemical form is assumed in releases from fuel pins in FHAs and from releases from the fuel pins through the RCS in DBAs other than FHAs or LOCAs. However, the transport of these iodine species following release from the fuel may affect these assumed fractions. The accident-specific appendices to this regulatory guide provide additional details.</p>	<p>Conforms.</p> <p>For the DBA analyses, 95% CsI, 4.85% elemental iodine, and 0.15% organic iodide are assumed.</p>
<p>3.6 Fuel Damage in Non-LOCA DBAs</p> <p>The amount of fuel damage caused by non-LOCA design basis events should be analyzed to determine, for the case resulting in the highest radioactivity release, the fraction of the fuel that reaches or exceeds the initiation temperature of fuel melt and the fraction of fuel elements for which the fuel clad is breached. Although the NRC staff has traditionally relied upon the departure from nucleate boiling ratio (DNBR) as a fuel damage criterion, licensees may propose other methods to the NRC staff, such as those based upon enthalpy deposition, for estimating fuel damage for the purpose of establishing radioactivity releases.</p> <p>The amount of fuel damage caused by a FHA is addressed in Appendix B of this guide.</p>	<p>Conforms.</p> <p>For the FHA and CRDA, fuel damage assumptions are based on the current licensing base cases that result in conservative radioactivity releases.</p> <p>FHA fuel damage assumptions are further described in Appendix B responses.</p>
<p>4. DOSE CALCULATIONAL METHODOLOGY</p>	
<p>4.1 Offsite Dose Consequences</p> <p>The following assumptions should be used in determining the TEDE for persons located at or beyond the boundary of the exclusion area (EAB):</p>	

<u>Regulatory Guidance</u>	<u>Basis of Conformance</u>
<p>4.1.1 The dose calculations should determine the TEDE. TEDE is the sum of the committed effective dose equivalent (CEDE) from inhalation and the deep dose equivalent (DDE) from external exposure. The calculation of these two components of the TEDE should consider all radionuclides, including progeny from the decay of parent radionuclides that are significant with regard to dose consequences and the released radioactivity.¹³</p> <p>¹³The prior practice of basing inhalation exposure on only radioiodine and not including radioiodine in external exposure calculations is not consistent with the definition of TEDE and the characteristics of the revised source term.</p>	<p>Conforms.</p> <p>For the DBA analyses TEDE doses were determined. RADTRAD Version 3.03 was utilized to model the DBAs. RADTRAD contains a default table of 60 isotopes based on NUREG-1465 data.</p>
<p>4.1.2 The exposure-to-CEDE factors for inhalation of radioactive material should be derived from the data provided in ICRP Publication 30, "Limits for Intakes of Radionuclides by Workers" (Ref. 19). Table 2.1 of Federal Guidance Report 11, "Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion, and Ingestion" (Ref. 20), provides tables of conversion factors acceptable to the NRC staff. The factors in the column headed "effective" yield doses corresponding to the CEDE.</p>	<p>Conforms.</p> <p>RADTRAD Version 3.03 was utilized to model the DBAs. RADTRAD uses dose conversion factors from Federal Guidance Report 11.</p>
<p>4.1.3 For the first 8 hours, the breathing rate of persons offsite should be assumed to be 3.5×10^{-4} cubic meters per second. From 8 to 24 hours following the accident, the breathing rate should be assumed to be 1.8×10^{-4} cubic meters per second. After that and until the end of the accident, the rate should be assumed to be 2.3×10^{-4} cubic meters per second.</p>	<p>Conforms.</p> <p>This guidance was applied in the DBA analyses.</p>
<p>4.1.4 The DDE should be calculated assuming submergence in semi-infinite cloud assumptions with appropriate credit for attenuation by body tissue. The DDE is nominally equivalent to the effective dose equivalent (EDE) from external exposure if the whole body is irradiated uniformly. Since this is a reasonable assumption for submergence exposure situations, EDE may be used in lieu of DDE in determining the contribution of external dose to the TEDE. Table III.1 of Federal Guidance Report 12, "External Exposure to Radionuclides in Air, Water, and Soil" (Ref. 21), provides external EDE conversion factors acceptable to the NRC staff. The factors in the column headed "effective" yield doses corresponding to the EDE.</p>	<p>Conforms.</p> <p>RADTRAD Version 3.03 was utilized to model the DBAs. RADTRAD uses dose conversion factors from Federal Guidance Report 12.</p>

<u>Regulatory Guidance</u>	<u>Basis of Conformance</u>
<p>4.1.5 The TEDE should be determined for the most limiting person at the EAB. The maximum EAB TEDE for any two-hour period following the start of the radioactivity release should be determined and used in determining compliance with the dose criteria in 10 CFR 50.67.¹⁴ The maximum two-hour TEDE should be determined by calculating the postulated dose for a series of small time increments and performing a “sliding” sum over the increments for successive two-hour periods. The maximum TEDE obtained is submitted. The time increments should appropriately reflect the progression of the accident to capture the peak dose interval between the start of the event and the end of radioactivity release (see also Table 6).</p> <p>¹⁴With regard to the EAB TEDE, the maximum two-hour value is the basis for screening and evaluation under 10 CFR 50.59. Changes to doses outside of the two-hour window are only considered in the context of their impact on the maximum two-hour EAB TEDE.</p>	<p>Conforms.</p> <p>For the LOCA, the maximum two-hour EAB TEDE was determined for each pathway (at about 1.5 hours into the event for elevated releases, 6 hours for ground releases), then pathway doses were added together. For the other DBA analyses, the release period is of short duration and the maximum EAB TEDE occurs in the first two hours.</p>
<p>4.1.6 TEDE should be determined for the most limiting receptor at the outer boundary of the low population zone (LPZ) and should be used in determining compliance with the dose criteria in 10 CFR 50.67.</p>	<p>Conforms.</p> <p>For the DBA analyses, the maximum LPZ X/Qs were determined and used to calculate TEDE.</p>
<p>4.1.7 No correction should be made for depletion of the effluent plume by deposition on the ground.</p>	<p>Conforms.</p> <p>This guidance was applied in the DBA analyses.</p>
<p>4.2 Control Room Dose Consequences The following guidance should be used in determining the TEDE for persons located in the control room:</p>	

<u>Regulatory Guidance</u>	<u>Basis of Conformance</u>
<p>4.2.1 The TEDE analysis should consider all sources of radiation that will cause exposure to control room personnel. The applicable sources will vary from facility to facility, but typically will include:</p> <ul style="list-style-type: none"> • Contamination of the control room atmosphere by the intake or infiltration of the radioactive material contained in the radioactive plume released from the facility, • Contamination of the control room atmosphere by the intake or infiltration of airborne radioactive material from areas and structures adjacent to the control room envelope, • Radiation shine from the external radioactive plume released from the facility, • Radiation shine from radioactive material in the reactor containment, • Radiation shine from radioactive material in systems and components inside or external to the control room envelope, e.g., radioactive material buildup in recirculation filters. 	<p>Conforms.</p> <p>All appropriate sources of radiation were considered.</p>
<p>4.2.2 The radioactive material releases and radiation levels used in the control room dose analysis should be determined using the same source term, transport, and release assumptions used for determining the EAB and the LPZ TEDE values, unless these assumptions would result in nonconservative results for the control room.</p>	<p>Conforms.</p> <p>The same source term, transport model and release mechanisms were assumed for calculating CR operator and offsite doses due to immersion and inhalation. Total CR operator dose included a direct shine contribution calculated using a separate transport model with appropriate conservative assumptions</p>

<u>Regulatory Guidance</u>	<u>Basis of Conformance</u>
<p>4.2.3 The models used to transport radioactive material into and through the control room,¹⁵ and the shielding models used to determine radiation dose rates from external sources, should be structured to provide suitably conservative estimates of the exposure to control room personnel.</p> <p>¹⁵The iodine protection factor (IPF) methodology of Reference 22 may not be adequately conservative for all DBAs and control room arrangements since it models a steady-state control room condition. Since many analysis parameters change over the duration of the event, the IPF methodology should only be used with caution. The NRC computer codes HABIT (Ref. 23) and RADTRAD (Ref. 24) incorporate suitable methodologies.</p>	<p>Conforms.</p> <p>Conservative models were used to calculate CR operator dose due to immersion and inhalation for all DBA analyses using RADTRAD Version 3.03. Additionally, direct shine contribution for the LOCA DBA was calculated separately and included in the CR operator TEDE.</p>
<p>4.2.4 Credit for engineered safety features that mitigate airborne radioactive material within the control room may be assumed. Such features may include control room isolation or pressurization, or intake or recirculation filtration. Refer to Section 6.5.1, “ESF Atmospheric Cleanup System,” of the SRP (Ref. 3) and Regulatory Guide 1.52, “Design, Testing, and Maintenance Criteria for Postaccident Engineered-Safety-Feature Atmosphere Cleanup System Air Filtration and Adsorption Units of Light-Water-Cooled Nuclear Power Plants” (Ref. 25), for guidance. The control room design is often optimized for the DBA LOCA and the protection afforded for other accident sequences may not be as advantageous. In most designs, control room isolation is actuated by engineered safeguards feature (ESF) signals or radiation monitors (RMs). In some cases, the ESF signal is effective only for selected accidents, placing reliance on the RMs for the remaining accidents. Several aspects of RMs can delay the control room isolation, including the delay for activity to build up to concentrations equivalent to the alarm setpoint and the effects of different radionuclide accident isotopic mixes on monitor response.</p>	<p>Conforms.</p> <p>For the FHA, MSLBA and CRDA, no credit was taken for ESF filtration, control room isolation, or control room pressurization. For the LOCA, ESF operation was credited. ESF actuates on low reactor vessel level or high drywell pressure.</p>
<p>4.2.5 Credit should generally not be taken for the use of personal protective equipment or prophylactic drugs. Deviations may be considered on a case-by-case basis.</p>	<p>Conforms.</p> <p>No credit was assumed.</p>

<u>Regulatory Guidance</u>	<u>Basis of Conformance</u>
<p>4.2.6 The dose receptor for these analyses is the hypothetical maximum exposed individual who is present in the control room for 100% of the time during the first 24 hours after the event, 60% of the time between 1 and 4 days, and 40% of the time from 4 days to 30 days.¹⁶ For the duration of the event, the breathing rate of this individual should be assumed to be 3.5×10^{-4} cubic meters per second.</p> <p>¹⁶This occupancy is modeled in the X/Q values determined in Reference 22 and should not be credited twice. The ARCON96 Code (Ref. 26) does not incorporate these occupancy assumptions, making it necessary to apply this correction in the dose calculations.</p>	<p>Conforms.</p> <p>This guidance was applied in the DBA analyses.</p>
<p>4.2.7 Control room doses should be calculated using dose conversion factors identified in Regulatory Position 4.1 above for use in offsite dose analyses. The DDE from photons may be corrected for the difference between finite cloud geometry in the control room and the semi-infinite cloud assumption used in calculating the dose conversion factors. Equation 1 may be used to correct the semi-infinite cloud dose, $DDE_{infinite}$, to a finite cloud dose, DDE_{finite}, where the control room is modeled as a hemisphere that has a volume, V, in cubic feet, equivalent to that of the control room (Ref. 22).</p> $DDE_{finite} = DDE_{infinite} * V^{0.338} / 1173 \quad \text{Equation 1}$	<p>Conforms.</p> <p>RADTRAD Version 3.03 was utilized to model the accident. RADTRAD uses dose conversion factors from FGR 11 and FGR 12 as specified in Section 4.1 above, and the correction to finite cloud dose given in Equation 1.</p>
<p>4.3 Other Dose Consequences</p> <p>The guidance provided in Regulatory Positions 4.1 and 4.2 should be used, as applicable, in re-assessing the radiological analyses identified in Regulatory Position 1.3.1, such as those in NUREG-0737 (Ref. 2). Design envelope source terms provided in NUREG-0737 should be updated for consistency with the AST. In general, radiation exposures to plant personnel identified in Regulatory Position 1.3.1 should be expressed in terms of TEDE. Integrated radiation exposure of plant equipment should be determined using the guidance of Appendix I of this guide.</p>	<p>Conforms, with the exception that TID-14844 source term calculations will continue to be used in support of the current license basis for equipment qualification and radiation shielding analysis.</p>

<u>Regulatory Guidance</u>	<u>Basis of Conformance</u>
<p>4.4 Acceptance Criteria The radiological criteria for the EAB, the outer boundary of the LPZ, and for the control room are in 10 CFR 50.67. These criteria are stated for evaluating reactor accidents of exceedingly low probability of occurrence and low risk of public exposure to radiation, e.g., a large-break LOCA. The control room criterion applies to all accidents. For events with a higher probability of occurrence, postulated EAB and LPZ doses should not exceed the criteria tabulated in Table 6 of RG 1.183.</p> <p>The acceptance criteria for the various NUREG-0737 (Ref. 2) items generally reference General Design Criteria 19 (GDC 19) from Appendix A to 10 CFR Part 50 or specify criteria derived from GDC-19. These criteria are generally specified in terms of whole body dose, or its equivalent to any body organ. For facilities applying for, or having received, approval for the use of an AST, the applicable criteria should be updated for consistency with the TEDE criterion in 10 CFR 50.67(b)(2)(iii).</p>	<p>Conforms.</p> <p>The appropriate regulatory limits of 10 CFR 50.67 and RG 1.183 are used. DBA analyses demonstrate regulatory limits are not exceeded. Results are presented in terms of TEDE.</p>
5. ANALYSIS ASSUMPTIONS AND METHODOLOGY	
5.1 General Considerations	

<u>Regulatory Guidance</u>	<u>Basis of Conformance</u>
<p>5.1.1 Analysis Quality</p> <p>The evaluations required by 10 CFR 50.67 are re-analyses of the design basis safety analyses and evaluations required by 10 CFR 50.34; they are considered to be a significant input to the evaluations required by 10 CFR 50.92 or 10 CFR 50.59. These analyses should be prepared, reviewed, and maintained in accordance with quality assurance programs that comply with Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to 10 CFR Part 50.</p> <p>These design basis analyses were structured to provide a conservative set of assumptions to test the performance of one or more aspects of the facility design. Many physical processes and phenomena are represented by conservative, bounding assumptions rather than being modeled directly. The staff has selected assumptions and models that provide an appropriate and prudent safety margin against unpredicted events in the course of an accident and compensate for large uncertainties in facility parameters, accident progression, radioactive material transport, and atmospheric dispersion. Licensees should exercise caution in proposing deviations based upon data from a specific accident sequence since the DBAs were never intended to represent any specific accident sequence -- the proposed deviation may not be conservative for other accident sequences.</p>	<p>Conforms.</p> <p>DBA analyses were prepared as specified and in accordance with the applicable quality assurance requirements of 10 CFR 50, Appendix B. Models and assumptions are consistent with RG 1.183 and appropriately consider existing CLB DBA analyses.</p>
<p>5.1.2 Credit for Engineered Safeguard Features</p> <p>Credit may be taken for accident mitigation features that are classified as safety-related, are required to be operable by technical specifications, are powered by emergency power sources, and are either automatically actuated or, in limited cases, have actuation requirements explicitly addressed in emergency operating procedures. The single active component failure that results in the most limiting radiological consequences should be assumed. Assumptions regarding the occurrence and timing of a loss of offsite power should be selected with the objective of maximizing the postulated radiological consequences.</p>	<p>Conforms.</p> <p>Where credited, safety related mitigating structures, systems, and components were assumed to operate consistent with single failure, design basis, emergency power, and other requirements. A new safety related function was identified for the Standby Liquid Control System of pH control. As shown in this LAR, the system is capable of performing this post-LOCA function.</p>

<u>Regulatory Guidance</u>	<u>Basis of Conformance</u>
<p data-bbox="254 311 781 337">5.1.3 Assignment of Numeric Input Values</p> <p data-bbox="254 375 1325 894">The numeric values that are chosen as inputs to the analyses required by 10 CFR 50.67 should be selected with the objective of determining a conservative postulated dose. In some instances, a particular parameter may be conservative in one portion of an analysis but be nonconservative in another portion of the same analysis. For example, assuming minimum containment system spray flow is usually conservative for estimating iodine scrubbing, but in many cases may be nonconservative when determining sump pH. Sensitivity analyses may be needed to determine the appropriate value to use. As a conservative alternative, the limiting value applicable to each portion of the analysis may be used in the evaluation of that portion. A single value may not be applicable for a parameter for the duration of the event, particularly for parameters affected by changes in density. For parameters addressed by technical specifications, the value used in the analysis should be that specified in the technical specifications.¹⁸ If a range of values or a tolerance band is specified, the value that would result in a conservative postulated dose should be used. If the parameter is based on the results of less frequent surveillance testing, e.g., steam generator nondestructive testing (NDT), consideration should be given to the degradation that may occur between periodic tests in establishing the analysis value.</p> <p data-bbox="254 927 1325 1052">¹⁸Note that for some parameters, the technical specification value may be adjusted for analysis purposes by factors provided in other regulatory guidance. For example, ESF filter efficiencies are based on the guidance in Regulatory Guide 1.52 (Ref. 25) and in Generic Letter 99-02 (Ref. 27) rather than the surveillance test criteria in the technical specifications. Generally, these adjustments address potential changes in the parameter between scheduled surveillance tests.</p>	<p data-bbox="1354 311 1482 337">Conforms.</p> <p data-bbox="1354 375 1829 711">Appropriate system performance assumptions were used in the DBA analyses. For example, a maximum control room charcoal filter efficiency of 100% was conservatively assumed for calculating external direct shine dose to the Control Room operators. For inhalation dose, however, a filter efficiency of 98% was assumed to increase dose inside the control room envelope.</p>

<u>Regulatory Guidance</u>	<u>Basis of Conformance</u>
<p data-bbox="254 311 779 337">5.1.4 Applicability of Prior Licensing Basis</p> <p data-bbox="254 375 1331 773">The NRC staff considers the implementation of an AST to be a significant change to the design basis of the facility that is voluntarily initiated by the licensee. In order to issue a license amendment authorizing the use of an AST and the TEDE dose criteria, the NRC staff must make a current finding of compliance with regulations applicable to the amendment. The characteristics of the ASTs and the revised dose calculational methodology may be incompatible with many of the analysis assumptions and methods currently reflected in the facility's design basis analyses. The NRC staff may find that new or unreviewed issues are created by a particular site-specific implementation of the AST, warranting review of staff positions approved subsequent to the initial issuance of the license. This is not considered a backfit as defined by 10 CFR 50.109, "Backfitting." However, prior design bases that are unrelated to the use of the AST, or are unaffected by the AST, may continue as the facility's design basis. Licensees should ensure that analysis assumptions and methods are compatible with the ASTs and the TEDE criteria.</p>	<p data-bbox="1354 311 1482 337">Conforms.</p> <p data-bbox="1354 375 1829 678">Assumptions and inputs used in the AST DBA analyses are compatible with the MNGP CLB analyses. A new leakage requirement for MSIVs is proposed as part of this LAR. Additionally, a new function for the Standby Liquid Control System of pH control post-LOCA is proposed which the system is capable of performing post-LOCA.</p> <p data-bbox="1354 716 1829 773">Analysis assumptions and methods are compatible with AST and TEDE criteria.</p>

<u>Regulatory Guidance</u>	<u>Basis of Conformance</u>
<p data-bbox="254 313 716 337">5.2 Accident-Specific Assumptions</p> <p data-bbox="254 375 1304 646">The appendices to this regulatory guide provide accident-specific assumptions that are acceptable to the staff for performing analyses that are required by 10 CFR 50.67. The DBAs addressed in these attachments were selected from accidents that may involve damage to irradiated fuel. This guide does not address DBAs with radiological consequences based on technical specification reactor or secondary coolant-specific activities only. The inclusion or exclusion of a particular DBA in this guide should not be interpreted as indicating that an analysis of that DBA is required or not required. Licensees should analyze the DBAs that are affected by the specific proposed applications of an AST.</p> <p data-bbox="254 683 1318 987">The NRC staff has determined that the analysis assumptions in the appendices to this guide provide an integrated approach to performing the individual analyses and generally expects licensees to address each assumption or propose acceptable alternatives. Such alternatives may be justifiable on the basis of plant-specific considerations, updated technical analyses, or, in some cases, a previously approved licensing basis consideration. The assumptions in the appendices are deemed consistent with the AST identified in Regulatory Position 3 and internally consistent with each other. Although licensees are free to propose alternatives to these assumptions for consideration by the NRC staff, licensees should avoid use of previously approved staff positions that would adversely affect this consistency.</p> <p data-bbox="254 1024 1335 1263">The NRC is committed to using probabilistic risk analysis (PRA) insights in its regulatory activities and will consider licensee proposals for changes in analysis assumptions based upon risk insights. The staff will not approve proposals that would reduce the defense in depth deemed necessary to provide adequate protection for public health and safety. In some cases, this defense in depth compensates for uncertainties in the PRA analyses and addresses accident considerations not adequately addressed by the core damage frequency (CDF) and large early release frequency (LERF) surrogate indicators of overall risk.</p>	<p data-bbox="1356 313 1482 337">Conforms.</p> <p data-bbox="1356 375 1829 646">Consistent with the MNGP Updated Safety Analysis Report, the bounding DBAs for radiological dose consequence were evaluated and included in this LAR. Modeling and assumptions of each DBA are consistent with the respective guidance contained in the appendices of RG 1.183.</p> <p data-bbox="1356 683 1730 740">For the LOCA, see Appendix A discussion below.</p> <p data-bbox="1356 777 1709 834">For the FHA, see Appendix B discussion below.</p> <p data-bbox="1356 872 1734 928">For the CRDA, see Appendix C discussion below.</p> <p data-bbox="1356 966 1751 1023">For the MSLBA, see Appendix D discussion below.</p>

<u>Regulatory Guidance</u>	<u>Basis of Conformance</u>
<p>5.3 Meteorology Assumptions</p> <p>Atmospheric dispersion values (X/Q) for the EAB, the LPZ, and the control room that were approved by the staff during initial facility licensing or in subsequent licensing proceedings may be used in performing the radiological analyses identified by this guide. Methodologies that have been used for determining X/Q values are documented in Regulatory Guides 1.3 and 1.4, Regulatory Guide 1.145, "Atmospheric Dispersion Models for Potential Accident Consequence Assessments at Nuclear Power Plants," and the paper, "Nuclear Power Plant Control Room Ventilation System Design for Meeting General Criterion 19" (Refs. 6, 7, 22, and 28).</p> <p>References 22 and 28 should be used if the FSAR X/Q values are to be revised or if values are to be determined for new release points or receptor distances. Fumigation should be considered where applicable for the EAB and LPZ. For the EAB, the assumed fumigation period should be timed to be included in the worst 2-hour exposure period. The NRC computer code PAVAN (Ref. 29) implements Regulatory Guide 1.145 (Ref. 28) and its use is acceptable to the NRC staff. The methodology of the NRC computer code ARCON96 (Ref. 26) is generally acceptable to the NRC staff for use in determining control room X/Q values. Meteorological data collected in accordance with the site-specific meteorological measurements program described in the facility FSAR should be used in generating accident X/Q values. Additional guidance is provided in Regulatory Guide 1.23, "Onsite Meteorological Programs" (Ref. 30). All changes in X/Q analysis methodology should be reviewed by the NRC staff.</p>	<p>Conforms.</p> <p>New atmospheric dispersion values (X/Q) for the EAB, LPZ, and control room were developed, using meteorological data for the years 1998-2002, for the LOCA, CRDA, and MSLBA and are included in this LAR. Values for the FHA were previously calculated and submitted as part of a prior LAR dated April 29, 2004. Changes to FHA X/Q values are described in Section 3.0 of Enclosure 3. All X/Q values were calculated in accordance with the applicable guidance noted in Section 5.3 of R.G. 1.183.</p> <p>Fumigation was considered where applicable and included in the worst 2-hour exposure period for the EAB.</p>
6. ASSUMPTIONS FOR EVALUATING THE RADIATION DOSES FOR EQUIPMENT QUALIFICATION	

<u>Regulatory Guidance</u>	<u>Basis of Conformance</u>
<p>The assumptions in Appendix I to this guide are acceptable to the NRC staff for performing radiological assessments associated with equipment qualification. The assumptions in Appendix I will supersede Regulatory Positions 2.c(1) and 2.c(2) and Appendix D of Revision 1 of Regulatory Guide 1.89, "Environmental Qualification of Certain Electric Equipment Important to Safety for Nuclear Power Plants" (Ref. 11), for operating reactors that have amended their licensing basis to use an alternative source term. Except as stated in Appendix I, all other assumptions, methods, and provisions of Revision 1 of Regulatory Guide 1.89 remain effective.</p> <p>The NRC staff is assessing the effect of increased cesium releases on EQ doses to determine whether licensee action is warranted. Until such time as this generic issue is resolved, licensees may use either the AST or the TID14844 assumptions for performing the required EQ analyses. However, no plant modifications are required to address the impact of the difference in source term characteristics (i.e., AST vs TID14844) on EQ doses pending the outcome of the evaluation of the generic issue.</p>	<p>As noted in Section 8.0 of Enclosure 3 of this LAR, TID-14844 source term assumptions for environmental qualification of electrical equipment are not changed or modified by this LAR.</p>

**APPENDIX A
ASSUMPTIONS FOR EVALUATING THE RADIOLOGICAL CONSEQUENCES
OF A LWR LOSS-OF-COOLANT ACCIDENT**

<u>Regulatory Guidance</u>	<u>Basis of Conformance</u>
SOURCE TERM ASSUMPTIONS	
1. Acceptable assumptions regarding core inventory and the release of radionuclides from the fuel are provided in Regulatory Position 3 of this guide.	Conforms, see Section 3 above.
2. If the sump or suppression pool pH is controlled at values of 7 or greater, the chemical form of radioiodine released to the containment should be assumed to be 95% cesium iodide (CsI), 4.85 percent elemental iodine, and 0.15 percent organic iodide. Iodine species, including those from iodine re-evolution, for sump or suppression pool pH values less than 7 will be evaluated on a case-by-case basis. Evaluations of pH should consider the effect of acids and bases created during the LOCA event, e.g., radiolysis products. With the exception of elemental and organic iodine and noble gases, fission products should be assumed to be in particulate form.	SLC injection assumed completed within 2 hours post-LOCA, and suppression pool pH assumed controlled at value of 7 or greater within 24 hours post-LOCA. Calculation results indicate pH is maintained well above 7 from this point forward throughout the 30-day LOCA duration, assuming addition of sodium pentaborate from the Standby Liquid Control System. Evaluation of pH considered effect of acids and bases created during the LOCA, including radiolysis products (hydrochloric acid), cesium hydroxide, hydriodic acid, and nitric acid.
ASSUMPTIONS ON TRANSPORT IN PRIMARY CONTAINMENT	
3. Acceptable assumptions related to the transport, reduction, and release of radioactive material in and from the primary containment in PWRs or the drywell in BWRs are as follows:	

<u>Regulatory Guidance</u>	<u>Basis of Conformance</u>
<p>3.1 The radioactivity released from the fuel should be assumed to mix instantaneously and homogeneously throughout the free air volume of the primary containment in PWRs or the drywell in BWRs as it is released. This distribution should be adjusted if there are internal compartments that have limited ventilation exchange. The suppression pool free air volume may be included provided there is a mechanism to ensure mixing between the drywell to the wetwell. The release into the containment or drywell should be assumed to terminate at the end of the early in-vessel phase.</p>	<p>Conforms.</p> <p>The release from the core is assumed to occur over a 2 hour period in a linear fashion and, as released, instantaneously and homogeneously mix in the Drywell airspace. No credit for the added dilution of the torus airspace was assumed for the first two hours of the event.</p>
<p>3.2 Reduction in airborne radioactivity in the containment by natural deposition within the containment may be credited. Acceptable models for removal of iodine and aerosols are described in Chapter 6.5.2, "Containment Spray as a Fission Product Cleanup System," of the Standard Review Plan (SRP), NUREG-0800 (Ref. A-1) and in NUREG/CR-6189, "A Simplified Model of Aerosol Removal by Natural Processes in Reactor Containments" (Ref. A-2). The latter model is incorporated into the analysis code RADTRAD (Ref. A-3). The prior practice of deterministically assuming that a 50% plateout of iodine is released from the fuel is no longer acceptable to the NRC staff as it is inconsistent with the characteristics of the revised source terms.</p>	<p>Conforms.</p> <p>Radionuclide removal via natural deposition was assumed. The 10th percentile natural deposition model incorporated in RADTRAD was used. No credit for additional deposition through drywell or torus spray operation was assumed.</p>

<u>Regulatory Guidance</u>	<u>Basis of Conformance</u>
<p>3.3 Reduction in airborne radioactivity in the containment by containment spray systems that have been designed and are maintained in accordance with Chapter 6.5.2 of the SRP (Ref. A-1) may be credited. Acceptable models for the removal of iodine and aerosols are described in Chapter 6.5.2 of the SRP and NUREG/CR-5966, "A Simplified Model of Aerosol Removal by Containment Sprays"¹ (Ref. A-4). This simplified model is incorporated into the analysis code RADTRAD (Refs. A-1 to A-3).</p> <p>The evaluation of the containment sprays should address areas within the primary containment that are not covered by the spray drops. The mixing rate attributed to natural convection between sprayed and unsprayed regions of the containment building, provided that adequate flow exists between these regions, is assumed to be two turnovers of the unsprayed regions per hour, unless other rates are justified. The containment building atmosphere may be considered a single, well-mixed volume if the spray covers at least 90% of the volume and if adequate mixing of unsprayed compartments can be shown. The SRP sets forth a maximum decontamination factor (DF) for elemental iodine based on the maximum iodine activity in the primary containment atmosphere when the sprays actuate, divided by the activity of iodine remaining at some time after decontamination.</p> <p>The SRP also states that the particulate iodine removal rate should be reduced by a factor of 10 when a DF of 50 is reached. The reduction in the removal rate is not required if the removal rate is based on the calculated time-dependent airborne aerosol mass. There is no specified maximum DF for aerosol removal by sprays. The maximum activity to be used in determining the DF is defined as the iodine activity in the columns labeled "Total" in Tables 1 and 2 of this guide multiplied by 0.05 for elemental iodine and by 0.95 for particulate iodine (i.e., aerosol treated as particulate in SRP methodology).</p> <p>¹This document describes statistical formulations with differing levels of uncertainty. The removal rate constants selected for use in design basis calculations should be those that will maximize the dose consequences. For BWRs, the simplified model should be used only if the release from the core is not directed through the suppression pool. Iodine removal in the suppression pool affects the iodine species assumed by the model to be present initially.</p>	<p>Conforms.</p> <p>No credit for drywell or torus spray operation was assumed.</p>

<u>Regulatory Guidance</u>	<u>Basis of Conformance</u>
<p>3.4 Reduction in airborne radioactivity in the containment by in-containment recirculation filter systems may be credited if these systems meet the guidance of Regulatory Guide 1.52 and Generic Letter 99-02 (Refs. A-5 and A-6). The filter media loading caused by the increased aerosol release associated with the revised source term should be addressed.</p>	<p>Conforms.</p> <p>No in-containment recirculation ESF filtration system is installed or credited.</p>
<p>3.5 Reduction in airborne radioactivity in the containment by suppression pool scrubbing in BWRs should generally not be credited. However, the staff may consider such reduction on an individual case basis. The evaluation should consider the relative timing of the blowdown and the fission product release from the fuel, the force driving the release through the pool, and the potential for any bypass of the suppression pool (Ref. 7). Analyses should consider iodine re-evolution if the suppression pool liquid pH is not maintained greater than 7.</p>	<p>Conforms.</p> <p>No credit for suppression pool scrubbing was assumed. Iodine re-evolution was not considered based on suppression pool pH analysis (see Appendix A, Section 2)</p>
<p>3.6 Reduction in airborne radioactivity in the containment by retention in ice condensers, or other engineering safety features not addressed above, should be evaluated on an individual case basis. See Section 6.5.4 of the SRP (Ref. A-1).</p>	<p>Conforms.</p> <p>No ice condensers or other ESFs not previously discussed are installed or credited.</p>
<p>3.7 The primary containment (i.e., drywell for Mark I and II containment designs) should be assumed to leak at the peak pressure technical specification leak rate for the first 24 hours. For PWRs, the leak rate may be reduced after the first 24 hours to 50% of the technical specification leak rate. For BWRs, leakage may be reduced after the first 24 hours, if supported by plant configuration and analyses, to a value not less than 50% of the technical specification leak rate. Leakage from subatmospheric containments is assumed to terminate when the containment is brought to and maintained at a subatmospheric condition as defined by technical specifications.</p> <p>For BWRs with Mark III containments, the leakage from the drywell into the primary containment should be based on the steaming rate of the heated reactor core, with no credit for core debris relocation. This leakage should be assumed during the two-hour period between the initial blowdown and termination of the fuel radioactivity release (gap and early in-vessel release phases). After two hours, the radioactivity is assumed to be uniformly distributed throughout the drywell and the primary containment.</p>	<p>Conforms.</p> <p>MNGP has a Mark I containment. Primary containment leakage rate was established at technical specification limits for the first 24 hours and at reduced rates subsequent to 24 hours to a final value of 50%.</p>

<u>Regulatory Guidance</u>	<u>Basis of Conformance</u>
<p>3.8 If the primary containment is routinely purged during power operations, releases via the purge system prior to containment isolation should be analyzed and the resulting doses summed with the postulated doses from other release paths. The purge release evaluation should assume that 100% of the radionuclide inventory in the reactor coolant system liquid is released to the containment at the initiation of the LOCA. This inventory should be based on the technical specification reactor coolant system equilibrium activity. Iodine spikes need not be considered. If the purge system is not isolated before the onset of the gap release phase, the release fractions associated with the gap release and early in-vessel phases should be considered as applicable.</p>	<p>Conforms.</p> <p>The primary containment is not routinely purged during power operations and is pressurized with a nitrogen inerted atmosphere.</p>
ASSUMPTIONS ON DUAL CONTAINMENTS	
<p>4. For facilities with dual containment systems, the acceptable assumptions related to the transport, reduction, and release of radioactive material in and from the secondary containment or enclosure buildings are as follows.</p>	
<p>4.1 Leakage from the primary containment should be considered to be collected, processed by engineered safety feature (ESF) filters, if any, and released to the environment via the secondary containment exhaust system during periods in which the secondary containment has a negative pressure as defined in technical specifications. Credit for an elevated release should be assumed only if the point of physical release is more than two and one-half times the height of any adjacent structure.</p>	<p>Conforms.</p> <p>This guidance was applied in the LOCA DBA analysis. A positive pressure period was modeled at the beginning of the accident during which a ground level release without credit for secondary containment or filtration was assumed. Following the positive pressure period, the release was modeled as an elevated release through the Standby Gas Treatment System and Offgas Stack.</p>
<p>4.2 Leakage from the primary containment is assumed to be released directly to the environment as a ground-level release during any period in which the secondary containment does not have a negative pressure as defined in technical specifications.</p>	<p>Conforms.</p> <p>See Section 4.1 above.</p>

<u>Regulatory Guidance</u>	<u>Basis of Conformance</u>
<p>4.3 The effect of high wind speeds on the ability of the secondary containment to maintain a negative pressure should be evaluated on an individual case basis. The wind speed to be assumed is the 1-hour average value that is exceeded only 5% of the total number of hours in the data set. Ambient temperatures used in these assessments should be the 1-hour average value that is exceeded only 5% or 95% of the total numbers of hours in the data set, whichever is conservative for the intended use (e.g., if high temperatures are limiting, use those exceeded only 5%).</p>	<p>Conforms.</p> <p>The effects of high wind speeds on secondary containment did not require special consideration. Per USAR Figure 5.3-2, exfiltration does not occur until a wind speed of at least 35 mph at the appropriate building angle is present. Total meteorological data for winds speeds greater than 24 mph at the 10m height for all stability categories combined is much less than 5% over five years (15 hours).</p>
<p>4.4 Credit for dilution in the secondary containment may be allowed when adequate means to cause mixing can be demonstrated. Otherwise, the leakage from the primary containment should be assumed to be transported directly to exhaust systems without mixing. Credit for mixing, if found to be appropriate, should generally be limited to 50%. This evaluation should consider the magnitude of the containment leakage in relation to contiguous building volume or exhaust rate, the location of exhaust plenums relative to projected release locations, the recirculation ventilation systems, and internal walls and floors that impede stream flow between the release and the exhaust.</p>	<p>Conforms.</p> <p>No credit for dilution or holdup in secondary containment was assumed.</p>

<u>Regulatory Guidance</u>	<u>Basis of Conformance</u>
<p>4.5 Primary containment leakage that bypasses the secondary containment should be evaluated at the bypass leak rate incorporated in the technical specifications. If the bypass leakage is through water, e.g., via a filled piping run that is maintained full, credit for retention of iodine and aerosols may be considered on a case-by-case basis. Similarly, deposition of aerosol radioactivity in gas-filled lines may be considered on a case-by-case basis.</p>	<p>Conforms.</p> <p>Secondary containment bypass leakage from the Main Steam Isolation Valves and other sources to the main condenser was assumed. The secondary containment bypass leakage from the other sources is part of total primary containment leakage. Primary containment leakage is controlled by Technical Specifications. The MSIV leakage rate is consistent with proposed, separate, leakage criteria included in this LAR. Modeling of aerosol settling and elemental iodine deposition is based on methodology used by the NRC in AEB-98-03.</p>
<p>4.6 Reduction in the amount of radioactive material released from the secondary containment because of ESF filter systems may be taken into account provided that these systems meet the guidance of Regulatory Guide 1.52 (Ref. A-5) and Generic Letter 99-02 (Ref. A-6).</p>	<p>Conforms as noted below.</p> <p>Standby Gas Treatment System was credited for reducing the amount of radioactive material released. Filter efficiencies consistent with the CLB were assumed. Charcoal filter sample removal and qualification of replacement charcoal meet the guidance of RG 1.52. The NRC previously noted in letter dated January 21, 2000 (ADAMS Accession No. ML003675587) that MNGP met the requirements of Generic Letter 99-02.</p>

<u>Regulatory Guidance</u>	<u>Basis of Conformance</u>
ASSUMPTIONS ON ESF SYSTEM LEAKAGE	
<p>5. ESF systems that recirculate sump water outside of the primary containment are assumed to leak during their intended operation. This release source includes leakage through valve packing glands, pump shaft seals, flanged connections, and other similar components. This release source may also include leakage through valves isolating interfacing systems (Ref. A-7). The radiological consequences from the postulated leakage should be analyzed and combined with consequences postulated for other fission product release paths to determine the total calculated radiological consequences from the LOCA. The following assumptions are acceptable for evaluating the consequences of leakage from ESF components outside the primary containment for BWRs and PWRs.</p>	<p>Conforms.</p> <p>ESF leakage was assumed in DBA analysis and dose from this pathway was combined with dose from the other release pathways.</p>
<p>5.1 With the exception of noble gases, all the fission products released from the fuel to the containment (as defined in Tables 1 and 2 of this guide) should be assumed to instantaneously and homogeneously mix in the primary containment sump water (in PWRs) or suppression pool (in BWRs) at the time of release from the core. In lieu of this deterministic approach, suitably conservative mechanistic models for the transport of airborne activity in containment to the sump water may be used. Note that many of the parameters that make spray and deposition models conservative with regard to containment airborne leakage are nonconservative with regard to the buildup of sump activity.</p>	<p>Conforms.</p> <p>With the exception of noble gases, all fission products released from the fuel were assumed to instantaneously and homogeneously mix in the suppression pool.</p>
<p>5.2 The leakage should be taken as two times the sum of the simultaneous leakage from all components in the ESF recirculation systems above which the technical specifications, or licensee commitments to item III.D.1.1 of NUREG-0737 (Ref. A-8), would require declaring such systems inoperable. The leakage should be assumed to start at the earliest time the recirculation flow occurs in these systems and end at the latest time the releases from these systems are terminated. Consideration should also be given to design leakage through valves isolating ESF recirculation systems from tanks vented to atmosphere, e.g., emergency core cooling system (ECCS) pump miniflow return to the refueling water storage tank.</p>	<p>Conforms.</p> <p>ESF leakage was assumed at the rate of two times the value determined during the Three Mile Island review. This value was assumed to start at the beginning of the accident and remain constant over the entire course of the accident.</p>

<u>Regulatory Guidance</u>	<u>Basis of Conformance</u>
<p>5.3 With the exception of iodine, all radioactive materials in the recirculating liquid should be assumed to be retained in the liquid phase.</p>	<p>Conforms.</p> <p>With the exception of iodine, all radioactive materials were retained in the liquid.</p>
<p>5.4 If the temperature of the leakage exceeds 212°F, the fraction of total iodine in the liquid that becomes airborne should be assumed equal to the fraction of the leakage that flashes to vapor. This flash fraction, FF, should be determined using a constant enthalpy, h, process, based on the maximum time-dependent temperature of the sump water circulating outside the containment:</p> <p>$FF = (hf1 - hf2) / hfg$</p> <p>Where: hf1 is the enthalpy of liquid at system design temperature and pressure; hf2 is the enthalpy of liquid at saturation conditions (14.7 psia, 212°F); and hfg is the heat of vaporization at 212°F.</p>	<p>Conforms.</p> <p>The temperature of ESF leakage is less than 212°F on the basis that ESF systems draw coolant water supply from the condensate storage tank or suppression pool. The suppression pool worst case temperature does not exceed 212°F.</p>
<p>5.5 If the temperature of the leakage is less than 212°F or the calculated flash fraction is less than 10%, the amount of iodine that becomes airborne should be assumed to be 10% of the total iodine activity in the leaked fluid, unless a smaller amount can be justified based on the actual sump pH history and area ventilation rates.</p>	<p>Conforms.</p> <p>A flash fraction of 10% was assumed as leakage temperature remains below 212°F.</p>

<u>Regulatory Guidance</u>	<u>Basis of Conformance</u>
<p>5.6 The radioiodine that is postulated to be available for release to the environment is assumed to be 97% elemental and 3% organic. Reduction in release activity by dilution or holdup within buildings, or by ESF ventilation filtration systems, may be credited where applicable. Filter systems used in these applications should be evaluated against the guidance of Regulatory Guide 1.52 (Ref. A-5) and Generic Letter 99-02 (Ref. A-6).</p>	<p>Conforms.</p> <p>ESF leakage was assumed to be 97% elemental and 3% organic. Releases were assumed to completely and instantaneously mix in the secondary containment volume and then discharged through the Standby Gas Treatment System. No holdup in secondary containment was assumed. Filtering by the Standby Gas Treatment System was assumed after the ground level release positive pressure period. Also see Section 4.6 of Appendix A above.</p>
<p>ASSUMPTIONS ON MAIN STEAM ISOLATION VALVE LEAKAGE IN BWRs</p>	
<p>6. For BWRs, the main steam isolation valves (MSIVs) have design leakage that may result in a radioactivity release. The radiological consequences from postulated MSIV leakage should be analyzed and combined with consequences postulated for other fission product release paths to determine the total calculated radiological consequences from the LOCA. The following assumptions are acceptable for evaluating the consequences of MSIV leakage.</p>	<p>Conforms.</p> <p>Radiological consequences for postulated MSIV leakage were included.</p>

<u>Regulatory Guidance</u>	<u>Basis of Conformance</u>
<p>6.1 For the purpose of this analysis, the activity available for release via MSIV leakage should be assumed to be that activity determined to be in the drywell for evaluating containment leakage (see Regulatory Position 3). No credit should be assumed for activity reduction by the steam separators or by iodine partitioning in the reactor vessel.</p>	<p>Conforms.</p> <p>The MSIV leakage was modeled using the drywell airspace as the leakage source for the first two hours and then the combined drywell and torus airspace for the remainder of the accident (see Section 3.1). No credit for steam separator reduction or iodine partitioning in the reactor vessel was assumed.</p>
<p>6.2 All the MSIVs should be assumed to leak at the maximum leak rate above which the technical specifications would require declaring the MSIVs inoperable. The leakage should be assumed to continue for the duration of the accident. Postulated leakage may be reduced after the first 24 hours, if supported by site-specific analyses, to a value not less than 50% of the maximum leak rate.</p>	<p>Conforms.</p> <p>The MSIV pathway was assumed to leak at the proposed maximum leakage rate of 200 scfh contained in this LAR for the first 24 hours of the accident. Subsequent leakage was reduced as discussed in Section 3.7.</p>
<p>6.3 Reduction of the amount of released radioactivity by deposition and plateout on steam system piping upstream of the outboard MSIVs may be credited, but the amount of reduction in concentration allowed will be evaluated on an individual case basis. Generally, the model should be based on the assumption of well-mixed volumes, but other models such as slug flow may be used if justified.</p>	<p>Conforms.</p> <p>Plateout of particulates and elemental iodine (not noble gases or organic iodine) in the main steam drain lines and condenser was credited. Modeling of aerosol settling and elemental iodine deposition is based on the well mixed model used by the NRC in AEB-98-03.</p>

<u>Regulatory Guidance</u>	<u>Basis of Conformance</u>
<p>6.4 In the absence of collection and treatment of releases by ESFs such as the MSIV leakage control system, or as described in paragraph 6.5 below, the MSIV leakage should be assumed to be released to the environment as an unprocessed, ground-level release. Holdup and dilution in the turbine building should not be assumed.</p>	<p>Conforms.</p> <p>No credit for holdup or dilution in the Turbine Building was assumed. Leakage was modeled as a ground level release.</p>
<p>6.5 A reduction in MSIV releases that is due to holdup and deposition in main steam piping downstream of the MSIVs and in the main condenser, including the treatment of air ejector effluent by offgas systems, may be credited if the components and piping systems used in the release path are capable of performing their safety function during and following a safe shutdown earthquake (SSE). The amount of reduction allowed will be evaluated on an individual case basis. References A-9 and A-10 provide guidance on acceptable models.</p>	<p>Conforms.</p> <p>No credit for treatment of air ejector effluent by the offgas system was assumed. Credit for holdup and deposition in the main steam lines and condenser was assumed.</p> <p>The MSIV leakage pathway includes the main steam piping from the reactor vessel to the outboard isolation valve up to the turbine stop valve, the main steam drain lines up to the condenser, and the main condenser. By Safety Evaluation dated September 16, 1998 (ADAMS Accession No. ML020920138), this pathway was previously evaluated and accepted by the NRC.</p>

<u>Regulatory Guidance</u>	<u>Basis of Conformance</u>
<p>ASSUMPTION ON CONTAINMENT PURGING</p> <p>7. The radiological consequences from post-LOCA primary containment purging as a combustible gas or pressure control measure should be analyzed. If the installed containment purging capabilities are maintained for purposes of severe accident management and are not credited in any design basis analysis, radiological consequences need not be evaluated. If the primary containment purging is required within 30 days of the LOCA, the results of this analysis should be combined with consequences postulated for other fission product release paths to determine the total calculated radiological consequences from the LOCA. Reduction in the amount of radioactive material released via ESF filter systems may be taken into account provided that these systems meet the guidance in Regulatory Guide 1.52 (Ref. A-5) and Generic Letter 99-02 (Ref. A-6).</p>	<p>Conforms.</p> <p>Primary containment purging is not credited in any design basis analysis and is not required within 30 days of the LOCA. Therefore, radiological consequences were not evaluated.</p>

**APPENDIX B
ASSUMPTIONS FOR EVALUATING THE RADIOLOGICAL
CONSEQUENCES OF A FUEL HANDLING ACCIDENT**

<u>Regulatory Guidance</u>	<u>Basis of Conformance</u>
<p>1. Source Term Acceptable assumptions regarding core inventory and the release of radionuclides from the fuel are provided in Regulatory Position 3 of this guide.</p>	<p>Conforms. See Section 3 above.</p>
<p>1.1 The number of fuel rods damaged during the accident should be based on a conservative analysis that considers the most limiting case. This analysis should consider parameters such as the weight of the dropped heavy load or the weight of a dropped fuel assembly (plus any attached handling grapples), the height of the drop, and the compression, torsion, and shear stresses on the irradiated fuel rods. Damage to adjacent fuel assemblies, if applicable (e.g., events over the reactor vessel), should be considered.</p>	<p>Conforms. A limiting case event was analyzed for fuel rod damage from the CLB which was demonstrated to conservatively bound drop locations and MNGP fuel types.</p>
<p>1.2 The fission product release from the breached fuel is based on Regulatory Position 3.2 of this guide and the estimate of the number of fuel rods breached. All the gap activity in the damaged rods is assumed to be instantaneously released. Radionuclides that should be considered include xenons, kryptons, halogens, cesiums, and rubidiums.</p>	<p>Conforms. See Sections 3.2 to 3.5 above.</p>
<p>1.3 The chemical form of radioiodine released from the fuel to the spent fuel pool should be assumed to be 95% cesium iodide (CsI), 4.85 percent elemental iodine, and 0.15 percent organic iodide. The CsI released from the fuel is assumed to completely dissociate in the pool water. Because of the low pH of the pool water, the iodine re-evolves as elemental iodine. This is assumed to occur instantaneously. The NRC staff will consider, on a case-by-case basis, justifiable mechanistic treatment of the iodine release from the pool.</p>	<p>Conforms. See Section 3.5 above.</p>

<p>2. Water Depth</p> <p>If the depth of water above the damaged fuel is 23 feet or greater, the decontamination factors for the elemental and organic species are 500 and 1, respectively, giving an overall effective decontamination factor of 200 (i.e., 99.5% of the total iodine released from the damaged rods is retained by the water). This difference in decontamination factors for elemental (99.85%) and organic iodine (0.15%) species results in the iodine above the water being composed of 57% elemental and 43% organic species. If the depth of water is not 23 feet, the decontamination factor will have to be determined on a case-by-case method.</p>	<p>Conforms.</p> <p>A DF of 200 was used as the minimum water depth is >45 feet.</p>
<p>3. Noble Gases</p> <p>The retention of noble gases in the water in the fuel pool or reactor cavity is negligible (i.e., decontamination factor of 1). Particulate radionuclides are assumed to be retained by the water in the fuel pool or reactor cavity (i.e., infinite decontamination factor).</p>	<p>Conforms.</p> <p>A DF of 1 was used for noble gases (i.e., no retention) and infinite for particulates (complete retention).</p>
<p>4. Fuel Handling Accidents Within The Fuel Building</p>	<p>Not applicable. MNGP does not have a separate fuel building.</p>
<p>5. Fuel Handling Accidents Within Containment</p> <p>For fuel handling accidents postulated to occur within the containment, the following assumptions are acceptable to the NRC staff.</p>	
<p>5.1 If the containment is isolated during fuel handling operations, no radiological consequences need to be analyzed.</p>	<p>Not applicable.</p> <p>The containment is not isolated during the FHA.</p>
<p>5.2 If the containment is open during fuel handling operations, but designed to automatically isolate in the event of a fuel handling accident, the release duration should be based on delays in radiation detection and completion of containment isolation. If it can be shown that containment isolation occurs before radioactivity is released to the environment, no radiological consequences need to be analyzed.</p>	<p>Conforms.</p> <p>No credit was assumed for containment isolation.</p>

<p>5.3 If the containment is open during fuel handling operations (e.g., personnel air lock or equipment hatch is open), the radioactive material that escapes from the reactor cavity pool to the containment is released to the environment over a 2-hour time period.</p>	<p>Conforms.</p> <p>All radioactive material released to the environment was modeled to occur over a 2-hour period.</p>
<p>5.4 A reduction in the amount of radioactive material released from the containment by ESF filter systems may be taken into account provided that these systems meet the guidance of Regulatory Guide 1.52 and Generic Letter 99-02. Delays in radiation detection, actuation of the ESF filtration system, or diversion of ventilation flow to the ESF filtration system should be determined and accounted for in the radioactivity release analyses.</p>	<p>Conforms.</p> <p>No credit was assumed for ESF filter systems.</p>
<p>5.5 Credit for dilution or mixing of the activity released from the reactor cavity by natural or forced convection inside the containment may be considered on a case-by-case basis. Such credit is generally limited to 50% of the containment free volume. This evaluation should consider the magnitude of the containment volume and exhaust rate, the potential for bypass to the environment, the location of exhaust plenums relative to the surface of the reactor cavity, recirculation ventilation systems, and internal walls and floors that impede stream flow between the surface of the reactor cavity and the exhaust plenums.</p>	<p>Conforms.</p> <p>No credit was assumed for dilution or mixing inside the containment.</p>

**APPENDIX C
ASSUMPTIONS FOR EVALUATING THE RADIOLOGICAL
CONSEQUENCES OF A BWR ROD DROP ACCIDENT**

<u>Regulatory Guidance</u>	<u>Basis of Conformance</u>
<p>1. Assumptions acceptable to the NRC staff regarding core inventory are provided in Regulatory Position 3 of this guide. For the rod drop accident, the release from the breached fuel is based on the estimate of the number of fuel rods breached and the assumption that 10% of the core inventory of the noble gases and iodines is in the fuel gap. The release attributed to fuel melting is based on the fraction of the fuel that reaches or exceeds the initiation temperature for fuel melting and on the assumption that 100% of the noble gases and 50% of the iodines contained in that fraction are released to the reactor coolant.</p>	<p>Conforms.</p> <p>See Section 3 above for core inventory.</p> <p>Consistent with the CLB, the total number of damaged fuel rods is 850, of which 9 melt. Also see Section 3.2.</p>
<p>2. If no or minimal¹ fuel damage is postulated for the limiting event, the released activity should be the maximum coolant activity (typically 4 $\mu\text{Ci/gm}$ DE I-131) allowed by the technical specifications.</p> <p>¹The activity assumed in the analysis should be based on the activity associated with the projected fuel damage or the maximum technical specification values, whichever maximizes the radiological consequences. In determining the dose equivalent I-131 (DEI-131), only the radioiodine associated with normal operations or iodine spikes should be included. Activity from projected fuel damage should not be included.</p>	<p>Conforms.</p> <p>The fuel damage case was used as it was shown to bound the maximum coolant activity value (DEI-131) allowed by Technical Specifications.</p>
<p>3. The assumptions acceptable to the NRC staff that are related to the transport, reduction, and release of radioactive material from the fuel and the reactor coolant are as follows.</p>	
<p>3.1 The activity released from the fuel from either the gap or from fuel pellets is assumed to be instantaneously mixed in the reactor coolant within the pressure vessel.</p>	<p>Conforms.</p> <p>The activity released from the fuel from either the gap or from fuel pellets is assumed to be instantaneously mixed in the reactor coolant within the reactor pressure vessel.</p>

<u>Regulatory Guidance</u>	<u>Basis of Conformance</u>
3.2 Credit should not be assumed for partitioning in the pressure vessel or for removal by the steam separators.	Conforms. No credit was assumed for partitioning in the reactor pressure vessel or for removal by the steam separators.
3.3 Of the activity released from the reactor coolant within the pressure vessel, 100% of the noble gases, 10% of the iodine, and 1% of the remaining radionuclides are assumed to reach the turbine and condensers.	Conforms. This guidance was applied in the analysis.

<u>Regulatory Guidance</u>	<u>Basis of Conformance</u>
<p>3.4 Of the activity that reaches the turbine and condenser, 100% of the noble gases, 10% of the iodine, and 1% of the particulate radionuclides are available for release to the environment. The turbine and condensers leak to the atmosphere as a ground-level release at a rate of 1% per day² for a period of 24 hours, at which time the leakage is assumed to terminate. No credit should be assumed for dilution or holdup within the turbine building. Radioactive decay during holdup in the turbine and condenser may be assumed.</p> <p>²If there are forced flow paths from the turbine or condenser, such as unisolated motor vacuum pumps or unprocessed air ejectors, the leakage rate should be assumed to be the flow rate associated with the most limiting of these paths. Credit for collection and processing of releases, such as by off gas or standby gas treatment, will be considered on a case-by-case basis.</p>	<p>Conforms.</p> <p>For the period of time radioactivity leaks from the main condenser, this guidance was followed. Additionally, at no time was credit for holdup or dilution assumed in the Turbine Building.</p> <p>Consistent with Footnote 2, two bounding forced flow path cases were evaluated that address all plant operating conditions at power.</p> <p>Case 1 assumed Steam Jet Air Ejector operation at maximum flow for the duration of the accident. This flow was released from the elevated release point. No leakage was assumed from the main condenser.</p> <p>Case 2 assumed Mechanical Vacuum Pump operation and discharge from the elevated release point until isolated shortly into the event on high main steam line radiation. Following isolation, leakage was assumed to be released from the main condenser as a ground level release consistent with the guidance of Section 3.4 of Appendix C.</p>

<u>Regulatory Guidance</u>	<u>Basis of Conformance</u>
<p>3.5 In lieu of the transport assumptions provided in paragraphs 3.2 through 3.4 above, a more mechanistic analysis may be used on a case-by-case basis. Such analyses account for the quantity of contaminated steam carried from the pressure vessel to the turbine and condensers based on a review of the minimum transport time from the pressure vessel to the first main steam isolation (MSIV) and considers MSIV closure time.</p>	<p>Not applicable.</p> <p>See Sections 3.2 through 3.4 of Appendix C above.</p>
<p>3.6 The iodine species released from the reactor coolant within the pressure vessel should be assumed to be 95% CsI as an aerosol, 4.85% elemental, and 0.15% organic. The release from the turbine and condenser should be assumed to be 97% elemental and 3% organic.</p>	<p>Conforms.</p> <p>This guidance was applied in the analysis.</p>

**APPENDIX D
ASSUMPTIONS FOR EVALUATING THE RADIOLOGICAL
CONSEQUENCES OF A BWR MAIN STEAM LINE BREAK ACCIDENT**

<u>Regulatory Guidance</u>	<u>Basis of Conformance</u>
SOURCE TERM	
<p>1. Assumptions acceptable to the NRC staff regarding core inventory and the release of radionuclides from the fuel are provided in Regulatory Position 3 of this guide. The release from the breached fuel is based on Regulatory Position 3.2 of this guide and the estimate of the number of fuel rods breached.</p>	<p>See response to Section 2 of Appendix D below.</p>
<p>2. If no or minimal¹ fuel damage is postulated for the limiting event, the released activity should be the maximum coolant activity allowed by technical specification. The iodine concentration in the primary coolant is assumed to correspond to the following two cases in the nuclear steam supply system vendor's standard technical specifications.</p> <p>¹The activity assumed in the analysis should be based on the activity associated with the projected fuel damage or the maximum technical specification values, whichever maximizes the radiological consequences. In determining dose equivalent I-131 (DEI-131), only the radioiodine associated with normal operations or iodine spikes should be included. Activity from projected fuel damage should not be included.</p>	<p>Conforms.</p> <p>In accordance with the CLB, no fuel damage is postulated for the MSLBA. Per MNGP USAR Section 14.7.3, "The most limiting main steam line break radiological consequences are associated with a steam line break outside containment. The core remains adequately cooled throughout the accident and no fuel damage will occur."</p> <p>Activity release cases corresponding to the maximum equilibrium and maximum permitted concentrations as allowed by Technical Specifications were modeled.</p>

<u>Regulatory Guidance</u>	<u>Basis of Conformance</u>
2.1 The concentration that is the maximum value (typically 4.0 $\mu\text{Ci/gm}$ DE I-131) permitted and corresponds to the conditions of an assumed pre-accident spike, and	Conforms. A case using the reactor coolant maximum activity limit was performed, based on the proposed Technical Specification of 2 $\mu\text{Ci/gm}$ DE I-131 included in this LAR.
2.1 The concentration that is the maximum equilibrium value (typically 0.2 $\mu\text{Ci/gm}$ DE I-131) permitted for continued full power operation.	Conforms. A case using the reactor coolant equilibrium activity limit was performed, based on the proposed Technical Specification of 0.2 $\mu\text{Ci/gm}$ DE I-131.
3. The activity released from the fuel should be assumed to mix instantaneously and homogeneously in the reactor coolant. Noble gases should be assumed to enter the steam phase instantaneously.	Conforms. All activity released as the result of the MSLBA event is assumed to mix instantaneously and homogeneously in the reactor coolant. Noble gases are assumed to enter the steam phase instantaneously.
TRANSPORT	
4. Assumptions acceptable to the NRC staff related to the transport, reduction, and release of radioactive material to the environment are as follows.	

<u>Regulatory Guidance</u>	<u>Basis of Conformance</u>
4.1 The main steam line isolation valves (MSIV) should be assumed to close in the maximum time allowed by technical specifications.	Conforms. MSIV closure time is not specified in Technical Specifications. An MSIV closure time of 10.5 seconds for the MSLBA is specified in the CLB and was used in the AST DBA MSLBA analysis.
4.2 The total mass of coolant released should be assumed to be that amount in the steam line and connecting lines at the time of the break plus the amount that passes through the valves prior to closure.	Conforms. The total mass of coolant released was assumed to be that amount in the steam line and connecting lines at the time of the break, plus the amount that passes through the valves prior to closure. Additional conservatism was added to further increase this mass.
4.3 All the radioactivity in the released coolant should be assumed to be released to the atmosphere instantaneously as a ground-level release. No credit should be assumed for plateout, holdup, or dilution within facility buildings.	Conforms. All the radioactivity in the released coolant is assumed to be released to the atmosphere instantaneously as a ground-level release, with no credit assumed for plateout, holdup, or dilution within facility buildings.
4.4 The iodine species released from the main steam line should be assumed to be 95% CsI as an aerosol, 4.85% elemental, and 0.15% organic.	Conforms. This guidance was applied in the analysis.

ENCLOSURE 6

MONTICELLO NUCLEAR GENERATING PLANT

APPLICATION FOR LICENSE AMENDMENT

ALTERNATIVE SOURCE TERM

MARKED-UP TECHNICAL SPECIFICATION PAGES

(21 pages follow)

AK. Dose Equivalent I-131 - Dose Equivalent I-131 is the concentration of I-131 (microcuries/gram) which alone would produce the same ~~[thyroid]~~ dose as the quantity and isotopic mixture of I-131, I-132, I-133, I-134 and I-135 actually present. The ~~[thyroid]~~ dose conversion factors used for this calculation shall be those listed in Table III of TID-14844, "Calculation of Distance Factors for Power and Test Reactor Sites" or in NRC Regulatory Guide 1.109, Rev 1, October, 1977. [**Federal Guidance Report (FGR) 11, "Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion, and Ingestion," September 1988; FGR 12, "External Exposure to Radionuclides In Air, Water and Soil, " September 1993; or in NRC Regulatory Guide 1. 109, Revision 1, October 1977.**]

AL. through AP. (Deleted)

AQ. Core Operating Limits Report The Core Operating Limits Report is the unit specific document that provides core operating limits for the current operating reload cycle. These cycle-specific operating limits shall be determined for each reload cycle in accordance with Specification 6.7.A.7. Plant operation within these operating limits is addressed in individual specifications.

AR. Allowable Value - The Allowable Value is the limiting value of the sensed process variable at which the trip setpoint may be found during instrument surveillance.

3.0 LIMITING CONDITIONS FOR OPERATION

4.0 SURVEILLANCE REQUIREMENTS

F. Recirculation Pump Trip and Alternate Rod Injection Initiation

Whenever the reactor is in the RUN mode, the Limiting Conditions for Operation for the instrumentation listed in Table 3.2.5 shall be met.

G. Safeguards Bus Voltage Protection

Whenever the safeguards auxiliary electrical power system is required to be operable by Specification 3.9, the Limiting Conditions for Operation for the Instrumentation listed in Table 3.2.6 shall be met.

H. Instrumentation for Safety/Relief Valve Low-Low Set Logic

Whenever the safety/relief valves are required to be operable by Specification 3.6.E, the Limiting Conditions for Operation for the Instrumentation listed in Table 3.2.7 shall be met.

I. Instrumentation for Control Room Habitability Protection

Whenever the emergency filtration system is required to be operable by Specification 3.17.B, the Limiting Conditions for Operation for the [radiation-] instrumentation listed in Table 3.2.9 shall be met.

[J. Mechanical Vacuum Pump Isolation Instrumentation

Whenever the reactor is in the Run or Startup mode, with the mechanical vacuum pump in service, the Limiting Conditions for Operation for the instrumentation listed in Table 3.2.10 shall be met.]

Table 3.2.9 Instrumentation for Control Room Habitability Protection					
Function	Trip Settings	Minimum No. of Operable or Operating Trip Systems	Total No. of Instrument Channels Per Trip System	Min. No. of Operable or Operating Instrument Channels Per Trip System	Required Conditions*
[Radiation	≤ 2 mR/hr	4	4	2	A or B
1. Low Low Reactor Water Level	≥ -48 "	2	2	2 (Notes 1, 2)	A or B or C
2. High Drywell Pressure	≤ 2 psig	2	2	2 (Notes 1, 2, 3)	A or B]

Notes:

~~[(1) An instrument channel may be bypassed for testing or preventative maintenance for up to eight hours.~~

- (1) There shall be two operable or tripped trip systems for each function. An instrument channel may be placed in an inoperable status for up to 6 hours for required surveillances without placing the trip system in the tripped condition provided that at least one other OPERABLE channel in the same trip system is monitoring that parameter.
- (2) Upon discovery that minimum requirements for the number of operable or operating trip systems or instrument channels are not satisfied action shall be initiated as follows:
 - (a) With one required instrument channel per trip function inoperable, place the inoperable channel or trip system in the tripped condition within 12 hours, or
 - (b) With more than one instrument channel per trip function inoperable, immediately satisfy the requirements by placing the appropriate channels or trip systems in the tripped condition, or
 - (c) If (a) and (b) cannot be met, then place the plant under the specified required conditions using normal operating procedures.]
- (3) Need not be operable when primary containment integrity is not required.

Notes: (Continued)

- * Required conditions when minimum conditions for operation are not satisfied.
 - A) Within 1 hour initiate and maintain operation of the control room emergency filtration system subsystem in the pressurization mode of operation.
 - B) Within 24 hours reduce reactor water temperature to below 212 °F.
 - [C) When reactor water temperature is less than 212 °F, immediately suspend activities having the potential for draining the reactor vessel.]**

Table 3.2.10 Instrumentation That Initiates Mechanical Vacuum Pump Trip and Isolation					
Function	Trip Settings	Minimum No. of Operable or Operating Trip Systems	Total No. of Instrument Channels Per Trip System	Min. No. of Operable or Operating Instrument Channels Per Trip System	Required Conditions*
Main Steam Line Radiation - High	≤ 6.9 R/Hr	2	2	2 (Note 1, 2)	A

[Notes:

- (1) There shall be two operable or tripped trip systems for this function. An instrument channel may be placed in an inoperable status for up to 6 hours for required surveillances without placing the trip system in the tripped condition provided that at least one other OPERABLE channel in the same trip system is monitoring that parameter.
- (2) Upon discovery that minimum requirements for the number of operable or operating trip systems or instrument channels are not satisfied action shall be initiated as follows:
 - (a) With one required instrument channel per trip function inoperable, place the inoperable channel or trip system in the tripped condition within 12 hours, or
 - (b) With more than one instrument channel per trip function inoperable, immediately satisfy the requirements by placing the appropriate channels or trip systems in the tripped condition, or
 - (c) If (a) and (b) cannot be met, place the plant under the specified required conditions using normal operating procedures.

* Required conditions when minimum conditions for operation are not satisfied.

A. Within 12 hours:

- (1) Isolate the mechanical vacuum pump, or
- (2) Isolate the main steam lines, or
- (3) Be in Hot Shutdown.

Table 4.2.1 Continued Minimum Test and Calibration Frequency for Core Cooling, Rod Block and Isolation Instrumentation			
Instrument Channel	Test (3)	Calibration (3)	Sensor Check (3)
<u>REACTOR BUILDING VENTILATION & STANDBY GAS TREATMENT</u>			
1. Reactor Low Low Water Level	Once/3 months (Note 5)	Every Operating Cycle – Transmitter Once/3 months - Trip Unit	Once/12 hours
2. Drywell High Pressure (Note 10)	-	-	-
3. Radiation Monitors (Plenum)	Once/3 months	Once/3 months	Once/day
4. Radiation Monitors (Refueling Floor)	Once/3 months	Once/3 months	Note 4
<u>RECIRCULATION PUMP TRIP AND ALTERNATE ROD INJECTION</u>			
1. Reactor High Pressure	Once/3 months (Note 5)	Once/Operating Cycle-Transmitter Once/3 Months-Trip Unit	Once/Day
2. Reactor Low Low Water Level	Once/3 months (Note 5)	Once/Operating Cycle- Transmitter Once/3 Months-Trip Unit	Once/12 hours
<u>SHUTDOWN COOLING SUPPLY ISOLATION</u>			
1. Reactor Pressure Interlock	Once/3 months	Once/3 Months	None
<u>SAFEGUARDS BUS VOLTAGE</u>			
1. Degraded Voltage Protection	Once/month	Quarterly	Not applicable
2. Loss of Voltage Protection	Once/month	Once/Operating Cycle	Not applicable
<u>SAFETY/RELIEF VALVE LOW-LOW SET LOGIC</u>			
1. Reactor Scram Sensing	Once/Shutdown (Note 8)	-	-
2. Reactor Pressure - Opening	Once/3 months (Note 5)	Once/Operating Cycle	Once/day
3. Reactor Pressure - Closing	Once/3 months (Note 5)	Once/Operating Cycle	Once/day
4. Discharge Pipe Pressure	Once/3 months (Note 5)	See Table 4.14.1	See Table 4.14.1
5. Inhibit Timer	Once/3 months (Note 5)	Once/Operating Cycle	-
<u>CONTROL ROOM HABITABILITY PROTECTION</u>			
1. Radiation	Monthly (Note 5)	18 months	Daily

Table 4.2.1 Continued Minimum Test and Calibration Frequency for Core Cooling, Rod Block and Isolation Instrumentation			
Instrument Channel	Test (3)	Calibration (3)	Sensor Check (3)
<u>CONTROL ROOM HABITABILITY PROTECTION</u>			
[1. Reactor Low Low Water Level	Once/3 months (Note 5)	Every Operating Cycle – Transmitter Once/3 months - Trip Unit	Once/12 hours
2. Drywell High Pressure (Note 10)	-	-	-
<u>MECHANICAL VACUUM PUMP ISOLATION</u>			
Main Steam Line Radiation – High	Once/3 months (Note 5)	Every Operating Cycle	Once/12 hours]

3.2/4.2

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NOTES:

- (1) (Deleted)
- (2) Calibrate prior to normal shutdown and start-up and thereafter check once per 12 hours and test once per week until no longer required. Calibration of this instrument prior to normal shutdown means adjustment of channel trips so that they correspond, within acceptable range and accuracy, to a simulated signal injected into the instrument (not primary sensor). In addition, IRM gain adjustment will be performed, as necessary, in the APRM/IRM overlap region.
- (3) Functional tests, calibrations and sensor checks are not required when the systems are not required to be operable or are tripped. If tests are missed, they shall be performed prior to returning the systems to an operable status.
- (4) Whenever fuel handling is in process, a sensor check shall be performed once per 12 hours.
- (5) A functional test of this instrument means the injection of a simulated signal into the instrument (not primary sensor) to verify the proper instrument channel response alarm and/or initiating action.
- (6) (Deleted)
- (7) (Deleted)
- (8) Once/shutdown if not tested during previous 3 month period.
- (9) Testing of the SRM Not-Full-In rod block is not required if the SRM detectors are secured in the full-in position.
- (10) Uses contacts from scram system. Tested and calibrated in accordance with Tables 4.1.1 and 4.1.2.
- (11) Uses contacts from Group 1 Isolation logic. Tested and calibrated in accordance with Group 1 Low Low Water Level Instrumentation.
- (12) Calibration of instrument channels with resistance temperature detector (RTD) or thermocouple sensors may consist of an in-place qualitative assessment of sensor behavior and normal calibration of the remaining adjustable devices in the channel.

3.0 LIMITING CONDITIONS FOR OPERATION

3.4 STANDBY LIQUID CONTROL SYSTEM

Applicability:

Applies to the operating status of the standby liquid control system.

Objective:

To assure the availability of an independent reactivity control Mechanism **[and a post-LOCA pH control mechanism]**.

Specification:

A. System Operation

1. The standby liquid control system shall be operable at all times **[during Run, Startup and Hot Shutdown]** when fuel is in the reactor and the reactor is not shut down by control rods, except as specified in 3.4.A.2.
2. From and after the date that a redundant component is made or found to be inoperable, reactor operation is permissible only during the following 7 days provided that the redundant component is operable.

3.4/4.4

4.0 SURVEILLANCE REQUIREMENTS

4.4 STANDBY LIQUID CONTROL SYSTEM

Applicability:

Applies to the periodic testing requirements for the standby liquid control system.

Objective:

To verify the operability of the standby liquid control system.

Specification:

A. The operability of the standby liquid control system shall be verified by performance of the following tests:

1. At least once per quarter -

Pump minimum flow rate of 24 gpm shall be verified against a system head of 1275 psig when tested in accordance with the Inservice Testing Program. Comparison of the measured pump flow rate against equation 2 of paragraph 3.4.B.1 shall be made to demonstrate operability of the system in accordance with the ATWS Design Basis.

2. At least once during each operating cycle -

a. Manually initiate one of the two standby liquid control systems and pump demineralized water into the reactor vessel. This test checks explosion of the charge associated with the tested system, proper operation of the valves and pump capacity. Both systems shall be tested and inspected, including each explosion valve in the course of two operating cycles.

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- C. If Specification 3.4.A through B are not met, an orderly shutdown shall be initiated and the reactor shall be in Hot Shutdown within 12 hours **[and in Cold Shutdown In 36 hours]**.

3.0 LIMITING CONDITIONS FOR OPERATION

4. The reactor vessel head bolting studs shall not be under tension unless the temperature of the vessel head flange and the head are $\geq 70^{\circ}\text{F}$.

C. Coolant Chemistry

1. (a) ~~The steady state radioiodine concentration in the reactor coolant shall not exceed 2.0 microcuries for of I-131 dose equivalent per gram of water.~~
In Run, or in Startup and Hot Shutdown with any main steam line not isolated, the specific activity of the reactor coolant shall be limited to DOSE EQUIVALENT I-131 specific activity ≤ 0.2 microcuries per gram.

(1) With reactor coolant specific activity > 0.2 microcuries per gram and ≤ 2.0 microcuries per gram DOSE EQUIVALENT I-131, determine the DOSE EQUIVALENT I-131 once per 4 hours and restore DOSE EQUIVALENT I-131 to within limits within 48 hours. During this condition entry into Run, Startup, or Hot Shutdown is allowed.

(2) If the required action and completion time of 3.6.C.1.(a)(1) are not met OR reactor coolant specific activity is > 2.0 microcuries per gram DOSE EQUIVALENT I-131, then determine DOSE EQUIVALENT I-131 once per 4 hours, AND

- a. Isolate all main steam lines within 12 hours, OR
- b. Be in Hot Shutdown in 12 hours and be in Cold Shutdown in 36 hours.]

3.6/4.6

4.0 SURVEILLANCE REQUIREMENTS

4. When the reactor vessel head studs are under tension and the reactor is in the Cold Shutdown Condition, the reactor vessel shell flange temperature shall be permanently recorded.

C. Coolant Chemistry

1. (a) A sample of reactor coolant shall be taken at least every ~~96 hours~~ **[7 days]** and analyzed radioactive iodines of **to verify DOSE EQUIVALENT] I-131 [through I-135 specific activity is ≤ 0.2 microcuries per gram]** during power operation.

3.0 LIMITING CONDITIONS FOR OPERATION

- (b) The steady state radioiodine concentration in the reactor coolant shall not exceed 0.02 microcuries of I-131 dose equivalent per gram of water when the reactor coolant temperature is >212°F, the reactor is not critical, and primary containment integrity has not been established.

3.6/4.6

4.0 SURVEILLANCE REQUIREMENTS

- (b) A sample of reactor coolant shall be taken and analyzed for radioactive iodines of I-131 through I-135 within 24 hours prior to raising the reactor coolant temperature >212°F, with the reactor not critical, and with primary containment integrity not established.
- (c) When the main condenser offgas system pretreatment monitors indicate an increase in radioactive gaseous effluents of 25 percent or 5000 $\mu\text{Ci}/\text{sec}$, whichever is greater, during steady state reactor operation a reactor coolant sample shall be taken and analyzed for radioactive iodines.
- (d) Isotopic analysis of reactor coolant samples shall be made at least once per month.
- ~~(e) Whenever the steady state radioiodine concentration of prior operation is greater than 1 percent but less than 10 percent of Specification 3.6.C.1.(a), a sample of reactor coolant shall be taken within 24 hours of any reactor startup and analyzed for radioactive iodines of I-131 through I-135.~~
- ~~(f) Whenever the steady state radioiodine concentration of prior operation is greater than 10 percent of Section 3.6.C.1.(a), a sample of reactor coolant shall be taken daily and prior to any reactor startup and analyzed for radioactive iodines of I-131 through I-135 as well as the coolant sample and analyses required by Specification 4.6.C.1.(e) above.~~

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3.0 LIMITING CONDITIONS FOR OPERATION

reactor core, operations with a potential for reducing the shutdown margin below that specified in specification 3.3.A, and handling of irradiated fuel or the fuel cask in the secondary containment are to be immediately suspended if secondary containment integrity is not maintained.

D. Primary Containment Isolation Valves (PCIVs)

1. During reactor power operating conditions, all Primary Containment automatic isolation valves and all primary system instrument line flow check valves shall be operable except as specified in 3.7.D.2 and 3.7.D.3.

3.7/4.7

4.0 SURVEILLANCE REQUIREMENTS

D. Primary Containment Isolation Valves (PCIVs)

1. The primary containment automatic isolation valve surveillance shall be performed as follows:
 - a. At least once per operating cycle the operable isolation valves that are power operated and automatically initiated shall be tested for simulated automatic initiation and closure times.
 - b. At least once per operating cycle the primary system instrument line flow check valves shall be tested for proper operation.
 - c. All normally open power-operated isolation valves shall be tested in accordance with the Inservice Testing Program. Main Steam isolation valves **[(MSIV)]** shall be tested (one at a time) with the reactor power less than 75% of rated.
 - d. At least once per week the main steam-line power-operated isolation valves shall be exercised by partial closure and subsequent reopening.
 - [e. In accordance with the Primary Containment Leakage Rate Testing Program, verify the following leakage rates are within limits:**

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3.0 LIMITING CONDITIONS FOR OPERATION

4.0 SURVEILLANCE REQUIREMENTS

- 2. a In the event one or more penetration flow paths with one PCIV inoperable, reactor operation in the run mode may continue provided that within the subsequent 4 hours (8 hours for MSIVs and 72 hours for EFCVs) restore the valve to operable status, or at least one valve in each line having an inoperable valve is deactivated in the isolated condition. This requirement may be satisfied by use of at least one closed and deactivated automatic valve, closed manual valve, blind flange, or check valve with flow secured, except that a check valve cannot be used to isolate a penetration that has only one PCIV. (Deactivated means electrically or pneumatically disarm or otherwise secure the valve.)*
- b. In the event one or more penetration flow paths with two PCIVs inoperable, reactor operation in the run mode may continue provided that within the subsequent 1 hour restore the valves to operable status, or at least one valve in each line having inoperable valves is deactivated in the isolated condition. This requirement may be satisfied by use of at least one closed and deactivated automatic valve, closed manual valve, or blind flange. (Deactivated means electrically or pneumatically disarm or otherwise secure the valve.)*
- * Isolated valves closed to satisfy these requirements may be reopened on an intermittent basis under approved administrative controls.

3/7/4.7

- (1) **The leakage rate from any one MSIV is ≤ 100 scfh when tested at ≥ 42 psig (P_a) (≤ 77 scfh when tested at ≥ 25 psig).**
- (2) **The leakage rate from the main steam pathway is ≤ 200 scfh when tested at ≥ 42 psig (P_a) (≤ 154 scfh when tested at ≥ 25 psig).]**
- 2. Whenever a containment penetration flow path is isolated by a valve deactivated in the isolated position to meet the requirements of TS 3.7.D.2, the position of the deactivated and isolated valves or the isolation device outside primary containment shall be recorded monthly.** For a containment penetration flow path isolated by a valve deactivated in the isolated position to meet the requirements of TS 3.7.D.2, the position of the deactivated and isolated valves or isolation devices inside primary containment which have not had their position recorded in the previous 92 days, shall have their position recorded prior to entering Startup or Hot Shutdown from Cold Shutdown, if the primary containment was de-inerted while in Cold Shutdown.*

* Isolated valves closed to satisfy these requirements may be reopened on an intermittent basis under approved administrative controls.

** Isolation devices in high radiation areas may be verified by use of administrative means.

3.0 LIMITING CONDITIONS FOR OPERATION

3.17 CONTROL ROOM HABITABILITY

Applicability:

Applies to the control room ventilation system equipment necessary to maintain habitability.

Objectives:

To assure the control room is habitable both under normal and accident conditions.

Specification:

A. Control Room Ventilation System

1. Except as specified in 3.17.A.2 and 3.17.A.3 below, both trains of the control room ventilation system shall be operable, whenever irradiated fuel is in the reactor vessel and reactor coolant temperature is greater than 212°F, or during ~~[-movement of irradiated fuel assemblies in the secondary containment or]~~ activities having the potential for draining the reactor vessel.
- 2.a With one control room ventilation train inoperable, restore the inoperable train to operable status within 30 days.
- 2.b If 2.a is not met, then be in hot shutdown within the next 12 hours following the 30 days and in cold shutdown within 24 hours following the 12 hours.
- 2.c If 2.a is not met during ~~[movement of irradiated fuel assemblies in the secondary containment or]~~ activities having the potential for draining the reactor vessel then immediately place the operable control room ventilation train in operation or immediately suspend these activities.

3.17/4.17

4.0 SURVEILLANCE REQUIREMENTS

4.17 CONTROL ROOM HABITABILITY

Applicability:

Applies to the periodic testing requirements of systems required to maintain control room habitability.

Objectives:

To verify the operability of equipment related to control room habitability.

Specification:

A. Control Room Ventilation System

1. Once per 12 hours check control room temperature.

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Amendment No. 65, 89, 104

3.0 LIMITING CONDITIONS FOR OPERATION

4.0 SURVEILLANCE REQUIREMENTS

- 3.a With both control room ventilation trains inoperable, restore at least one train to operable status within 24 hours.
- 3.b If 3.a is not met, then be in hot shutdown within the next 12 hours and in cold shutdown within 24 hours following the 12 hours.
- 3.c **[If 3.a is not met during** ~~With both control room ventilation trains inoperable, during movement of irradiated fuel assemblies in the secondary containment or]~~ activities having the potential for draining the reactor vessel then immediately suspend these activities.

B. Control Room Emergency Filtration System

- 1. Except as specified in 3.17.B.1.a through d below, two control room emergency filtration system filter trains shall be operable whenever irradiated fuel is in the reactor vessel and reactor coolant temperature is greater than 212°F, or during ~~[movement of recently irradiated fuel assemblies in the secondary containment or]~~ activities having the potential for draining the reactor vessel.

B. Control Room Emergency Filtration System

- 1. At least once per month, initiate from the control room 1000 cfm ($\pm 10\%$) flow through both trains of the emergency filtration treatment system. The system shall operate for at least 10 hours with the heaters operable.

3.0 LIMITING CONDITIONS FOR OPERATION

4.0 SURVEILLANCE REQUIREMENTS

- a. When one control room emergency filtration system filter train is made or found to be inoperable for any reason, restore the inoperable train to operable status within seven days or be in hot shutdown within the next 12 hours following the seven days and either reduce the reactor coolant temperature to below 212°F or initiate and maintain the operable emergency filtration system filter train in the pressurization mode within the following 24 hours.
- b. When both filter trains of the control room emergency filtration system are inoperable, restore at least one train to operable status within 24 hours or be in hot shutdown within the next 12 hours following the 24 hours and reduce the reactor coolant water temperature to below 212°F within the following 24 hours.
- c. With one control room emergency filtration system filter train inoperable during ~~[movement of recently irradiated fuel assemblies in the secondary containment, or]~~ activities having the potential for draining the reactor vessel, restore the inoperable train to operable status within 7 days or immediately after the 7 days initiate and maintain the operable emergency filtration system filter train in the pressurization mode or immediately suspend these activities.
- d. With both control room emergency filtration system filter trains inoperable during ~~[movement of recently irradiated fuel assemblies in the secondary containment, or]~~ activities having the potential for draining the reactor vessel, immediately suspend these activities.

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3.0 LIMITING CONDITIONS FOR OPERATION 4.0 SURVEILLANCE REQUIREMENTS

- c. The system shall be shown to be operable with:
 - (1) Combined filter pressure drop ≤ 8 inches water.
 - (2) Inlet heater power output $5 \text{kw} \pm 10\%$.
 - (3) Automatic initiation upon receipt of a high radiation ~~radiation~~ **[Low Low Reactor Water Level or High Drywell Pressure]** signal.

3. Post Maintenance Requirements

- a. After any maintenance or testing that could affect the HEPA filter or HEPA filter mounting frame leak tight integrity, the results of the in-place DOP tests at 1000 cfm ($\pm 10\%$) shall show $\leq 1\%$ DOP penetration on each individual HEPA filter and shall show $\leq 0.05\%$ DOP penetration on the combined HEPA filters.
- b. After any maintenance or testing that could affect the charcoal adsorber leak tight integrity, the results of in-place halogenated hydrocarbon tests at 1000 cfm ($\pm 10\%$) shall show $\leq 1\%$ penetration on each individual charcoal adsorber and shall show $\leq 0.05\%$ penetration on the combined charcoal adsorber banks.

- c. At least once per operating cycle, but not to exceed 18 months, the following conditions shall be demonstrated for each emergency filtration system train:

- (1) Pressure drop across the combined filters of each train shall be measured at 1000 cfm ($\pm 10\%$) flow rate.
- (2) Operability of inlet heater at nominal rated power shall be verified.
- (3) Verify that on a simulated ~~high radiation~~ **[high radiation initiation]** signal, the train switches to the pressurization mode of operation and the control room is maintained at a positive pressure with respect to adjacent areas at the design flow rate of 1000 cfm ($\pm 10\%$).

3. Post Maintenance Testing

- a. After any maintenance or testing that could affect the leak tight integrity of the HEPA filters, perform in-place DOP tests on the HEPA filters.
- b. After any maintenance or testing that could affect the leak tight integrity of the charcoal adsorber banks, perform halogenated hydrocarbon tests on the charcoal adsorbers.

6.8.J - RESERVED

K. Technical Specifications (TS) Bases Control Program

This program provides a means for processing changes to the Bases of these Technical Specifications.

1. Changes to the Bases of the TS shall be made under appropriate administrative controls and reviews.
2. Changes to Bases may be made without prior NRC approval provided the changes do not involve either of the following:
 - a. a change in the TS incorporated in the license; or
 - b. a change to the USAR or Bases that requires NRC approval pursuant to 10 CFR 50.59.
3. The Bases Control Program shall contain provisions to ensure that the Bases are maintained consistent with the USAR.
4. Proposed changes to the Bases that involve changes as described in a. or b. of Specification 6.8.K.2 above shall be reviewed and approved by the NRC prior to implementation. Changes to the Bases implemented without prior NRC approval shall be provided to the NRC on a frequency consistent with 10 CFR 50.71(e).

6.8.L - RESERVED

M. Primary Containment Leakage Rate Testing Program

1. This program shall establish the leakage rate testing of the containment as required by 10 CFR 50.54(o) and 10 CFR Part 50, Appendix J, Option B, as modified by approved exemptions. This program shall be in accordance with the guidelines contained in Regulatory Guide 1.163, "Performance-Based Containment Leak-Test Program," dated September 1995, as modified by the following exception[s]: NEI 94-01, Rev. 0, "Industry Guideline for Implementing Performance-Based Option of 10 CFR 50, Appendix J."

~~Section 9.2.3: The first Type A test after the March 1993 Type A test shall be performed no later than March 2008.~~

- **[The first Type A test after the March 1993 Type A test shall be performed no later than March 2008. (This is an exception to Section 9.2.3 of NEI 94-01, Rev. 0, "Industry Guideline for Implementing Performance-Based Option of 10 CFR 50, Appendix J").**

6.8.M Continued

- **The leakage contribution from the main steam pathway is excluded from the sum of the leakage rates from Type B and Type C tests specified in (1) Section III.B of 10 CFR 50, Appendix J, Option B; (2) Section 6.4.4 of ANSI/ANS 56.8-1994, "Containment System Leakage Testing Requirements"; and (3) Section 10.2 of NEI 94-01, Rev. 0.**
 - **The leakage contribution from the main steam pathway is excluded from the overall integrated leakage rate from Type A tests specified in: (1) Section III.A of 10 CFR 50, Appendix J, Option B; (2) Section 3.2 of ANSI/ANS 56.8-1994; and (3) Sections 8.0 and 9.0 of NEI 94-01, Rev. 0.]**
2. The calculated peak containment internal pressure for the design basis loss of coolant accident, P_a , is 42 psig. The containment design pressure is 56 psig.
 3. The maximum allowable containment leakage rate, L_a , at P_a , shall be 1.2% of containment air weight per day.
 4. Leakage rate acceptance criteria are:
 - a. Containment leakage rate acceptance criterion is $\leq 1.0 L_a$. During the first unit startup following testing in accordance with this program, the leakage rate acceptance criteria are $< 0.60 L_a$ for the Type B and C tests and $\leq 0.75 L_a$ for Type A tests.
 - b. Air lock testing acceptance criteria are:
 - 1) Overall air leakage rate is $\leq 0.05 L_a$ when tested at $\geq P_a$.
 - 2) For each door, leakage rate is $\leq 0.007 L_a$ when pressurized to ≥ 10 psig.
 5. The provisions of SRs 4.0.D and 4.0.E are applicable to the Primary Containment Leakage Rate Testing Program.
 6. Nothing in these Technical Specifications shall be construed to modify the testing Frequencies required by 10 CFR 50, Appendix J.

ENCLOSURE 7

MONTICELLO NUCLEAR GENERATING PLANT

**APPLICATION FOR LICENSE AMENDMENT
ALTERNATIVE SOURCE TERM**

RE-TYPED TECHNICAL SPECIFICATION PAGES

(21 pages follow)

This enclosure consists of the revised Technical Specification page(s) that incorporate the proposed change(s). The page(s) included in this enclosure are listed below:

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AK. Dose Equivalent I-131 - Dose Equivalent I-131 is the concentration of I-131 (microcuries/gram) which alone would produce the same dose as the quantity and isotopic mixture of I-131, I-132, I-133, I-134 and I-135 actually present. The dose conversion factors used for this calculation shall be those listed in Federal Guidance Report (FGR) 11, "Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion, and Ingestion," September, 1988; FGR 12, "External Exposure to Radionuclides In Air, Water and Soil," September, 1993; or in NRC Regulatory Guide 1.109, Revision 1, October, 1977.

AL. through AP. (Deleted)

AQ. Core Operating Limits Report The Core Operating Limits Report is the unit specific document that provides core operating limits for the current operating reload cycle. These cycle-specific operating limits shall be determined for each reload cycle in accordance with Specification 6.7.A.7. Plant operation within these operating limits is addressed in individual specifications.

AR. Allowable Value - The Allowable Value is the limiting value of the sensed process variable at which the trip setpoint may be found during instrument surveillance.

3.0 LIMITING CONDITIONS FOR OPERATION

4.0 SURVEILLANCE REQUIREMENTS

- F. Recirculation Pump Trip and Alternate Rod Injection Initiation
Whenever the reactor is in the RUN mode, the Limiting Conditions for Operation for the instrumentation listed in Table 3.2.5 shall be met.
- G. Safeguards Bus Voltage Protection
Whenever the safeguards auxiliary electrical power system is required to be operable by Specification 3.9, the Limiting Conditions for Operation for the Instrumentation listed in Table 3.2.6 shall be met.
- H. Instrumentation for Safety/Relief Valve Low-Low Set Logic
Whenever the safety/relief valves are required to be operable by Specification 3.6.E, the Limiting Conditions for Operation for the Instrumentation listed in Table 3.2.7 shall be met.
- I. Instrumentation for Control Room Habitability Protection
Whenever the emergency filtration system is required to be operable by Specification 3.17.B, the Limiting Conditions for Operation for the instrumentation listed in Table 3.2.9 shall be met.
- J. Mechanical Vacuum Pump Isolation Instrumentation
Whenever the reactor is in the Run or Startup mode, with the mechanical vacuum pump in service, the Limiting Conditions for Operation for the instrumentation listed in Table 3.2.10 shall be met.

Table 3.2.9
Instrumentation for Control Room Habitability Protection

Function	Trip Settings	Minimum No. of Operable or Operating Trip Systems	Total No. of Instrument Channels per Trip System	Minimum No. of Operable or Operating Instrument Channels per Trip System	Required Conditions*
1. Low Low Reactor Water Level	$\geq -48''$	2	2	2 (Notes 1, 2)	A or B or C
2. High Drywell Pressure	≤ 2 psig	2	2	2 (Notes 1, 2, 3)	A or B

Notes:

- (1) There shall be two operable or tripped trip systems for each function. An instrument channel may be placed in an inoperable status for up to 6 hours for required surveillances without placing the trip system in the tripped condition provided that at least one other OPERABLE channel in the same trip system is monitoring that parameter.
- (2) Upon discovery that minimum requirements for the number of operable or operating trip systems or instrument channels are not satisfied action shall be initiated as follows:
 - (a) With one required instrument channel per trip function inoperable, place the inoperable channel or trip system in the tripped condition within 12 hours, or
 - (b) With more than one instrument channel per trip function inoperable, immediately satisfy the requirements by placing the appropriate channels or systems in the tripped condition, or
 - (c) If (a) and (b) cannot be met, then place the plant under the specified required conditions using normal operating procedures.
- (3) Need not be operable when primary containment integrity is not required.

Notes: (Continued)

- * Required conditions when minimum conditions for operation are not satisfied.
 - A) Within 1 hour initiate and maintain operation of the control room emergency filtration system subsystem in the pressurization mode of operation.
 - B) Within 24 hours reduce reactor water temperature to below 212°F.
 - C) When reactor water temperature is less than 212°F, immediately suspend activities having the potential for draining the reactor vessel.

Table 3.2.10
Instrumentation That Initiates Mechanical Vacuum Pump Trip and Isolation

Function	Trip Settings	Minimum No. of Operable or Operating Trip Systems	Total No. of Instrument Channels per Trip System	Minimum No. of Operable or Operating Instrument Channels per Trip System	Required Conditions*
Main Steam Line Radiation - High	≤ 6.9 R/Hr	2	2	2 (Notes 1, 2)	A

Notes:

- (1) There shall be two operable or tripped trip systems for this function. An instrument channel may be placed in an inoperable status for up to 6 hours for required surveillances without placing the trip system in the tripped condition provided that at least one other OPERABLE channel in the same trip system is monitoring that parameter.
- (2) Upon discovery that minimum requirements for the number of operable or operating trip systems or instrument channels are not satisfied action shall be initiated as follows:
 - (a) With one required instrument channel per trip function inoperable, place the inoperable channel or trip system in the tripped condition within 12 hours, or
 - (b) With more than one instrument channel per trip function inoperable, immediately satisfy the requirements by placing the appropriate channels or trip systems in the tripped condition, or
 - (c) If (a) and (b) cannot be met, place the plant under the specified required conditions using normal operating procedures.

Notes: (Continued)

* Required conditions when minimum conditions for operation are not satisfied.

A. Within 12 hours:

- (1) Isolate the mechanical vacuum pump, or
- (2) Isolate the main steam lines, or
- (3) Be in Hot Shutdown.

Table 4.2.1 Continued
Minimum Test and Calibration Frequency for Core Cooling,
Rod Block and Isolation Instrumentation

Instrument Channel	Test (3)	Calibration (3)	Sensor Check (3)
<u>REACTOR BUILDING VENTILATION & STANDBY GAS TREATMENT</u>			
1. Reactor Low Low Water Level	Once/3 months (Note 5)	Every Operating Cycle - Transmitter Once/3 months - Trip Unit	Once/12 hours
2. Drywell High Pressure (Note 10)	-	-	-
3. Radiation Monitors (Plenum)	Once/3 months	Once/3 months	Once/day
4. Radiation Monitors (Refueling Floor)	Once/3 months	Once/3 months	Note 4
<u>RECIRCULATION PUMP TRIP AND ALTERNATE ROD INJECTION</u>			
1. Reactor High Pressure	Once/3 months (Note 5)	Once/Operating Cycle-Transmitter Once/3 Months-Trip Unit	Once/Day
2. Reactor Low Low Water Level	Once/3 months (Note 5)	Once/Operating Cycle- Transmitter Once/3 Months-Trip Unit	Once/12 hours
<u>SHUTDOWN COOLING SUPPLY ISOLATION</u>			
1. Reactor Pressure Interlock	Once/3 months	Once/3 Months	None
<u>SAFEGUARDS BUS VOLTAGE</u>			
1. Degraded Voltage Protection	Once/month	Quarterly	Not applicable
2. Loss of Voltage Protection	Once/month	Once/Operating Cycle	Not applicable
<u>SAFETY/RELIEF VALVE LOW-LOW SET LOGIC</u>			
1. Reactor Scram Sensing	Once/Shutdown (Note 8)	-	-
2. Reactor Pressure - Opening	Once/3 months (Note 5)	Once/Operating Cycle	Once/day
3. Reactor Pressure - Closing	Once/3 months (Note 5)	Once/Operating Cycle	Once/day
4. Discharge Pipe Pressure	Once/3 months (Note 5)	See Table 4.14.1	See Table 4.14.1
5. Inhibit Timer	Once/3 months (Note 5)	Once/Operating Cycle	-

Table 4.2.1 Continued
 Minimum Test and Calibration Frequency for Core Cooling,
 Rod Block and Isolation Instrumentation

Instrument Channel	Test (3)	Calibration (3)	Sensor Check (3)
<u>CONTROL ROOM HABITABILITY PROTECTION</u>			
1. Reactor Low Low Water Level	Once/3 months (Note 5)	Every Operating Cycle - Transmitter Once/3 months - Trip Unit	Once/12 hours
2. Drywell High Pressure (Note 10)	-	-	-
<u>MECHANICAL VACUUM PUMP ISOLATION</u>			
Main Steam Line Radiation - High	Once/3 months (Note 5)	Every Operating Cycle	Once/12 hours

Table 4.2.1 Continued
Minimum Test and Calibration Frequency for Core Cooling,
Rod Block and Isolation Instrumentation

NOTES:

- (1) (Deleted)
- (2) Calibrate prior to normal shutdown and start-up and thereafter check once per 12 hours and test once per week until no longer required. Calibration of this instrument prior to normal shutdown means adjustment of channel trips so that they correspond, within acceptable range and accuracy, to a simulated signal injected into the instrument (not primary sensor). In addition, IRM gain adjustment will be performed, as necessary, in the APRM/IRM overlap region.
- (3) Functional tests, calibrations and sensor checks are not required when the systems are not required to be operable or are tripped. If tests are missed, they shall be performed prior to returning the systems to an operable status.
- (4) Whenever fuel handling is in process, a sensor check shall be performed once per 12 hours.
- (5) A functional test of this instrument means the injection of a simulated signal into the instrument (not primary sensor) to verify the proper instrument channel response alarm and/or initiating action.
- (6) (Deleted)
- (7) (Deleted)
- (8) Once/shutdown if not tested during previous 3 month period.
- (9) Testing of the SRM Not-Full-In rod block is not required if the SRM detectors are secured in the full-in position.
- (10) Uses contacts from scram system. Tested and calibrated in accordance with Tables 4.1.1 and 4.1.2.
- (11) Uses contacts from Group 1 Isolation logic. Tested and calibrated in accordance with Group 1 Low Low Water Level Instrumentation.
- (12) Calibration of instrument channels with resistance temperature detector (RTD) or thermocouple sensors may consist of an in-place qualitative assessment of sensor behavior and normal calibration of the remaining adjustable devices in the channel.

3.0 LIMITING CONDITIONS FOR OPERATION

3.4 STANDBY LIQUID CONTROL SYSTEM

Applicability:

Applies to the operating status of the standby liquid control system.

Objective:

To assure the availability of an independent reactivity control mechanism and a post-LOCA pH control mechanism.

Specification:

A. System Operation

1. The standby liquid control system shall be operable at all times during Run, Startup and Hot Shutdown, except as specified in 3.4.A.2.
2. From and after the date that a redundant component is made or found to be inoperable, reactor operation is permissible only during the following 7 days provided that the redundant component is operable.

3.4/4.4

4.0 SURVEILLANCE REQUIREMENTS

4.4 STANDBY LIQUID CONTROL SYSTEM

Applicability:

Applies to the periodic testing requirements for the standby liquid control system.

Objective:

To verify the operability of the standby liquid control system.

Specification:

A. The operability of the standby liquid control system shall be verified by performance of the following tests:

1. At least once per quarter -

Pump minimum flow rate of 24 gpm shall be verified against a system head of 1275 psig when tested in accordance with the Inservice Testing Program. Comparison of the measured pump flow rate against equation 2 of paragraph 3.4.B.1 shall be made to demonstrate operability of the system in accordance with the ATWS Design Basis.

2. At least once during each operating cycle -

a. Manually initiate one of the two standby liquid control systems and pump demineralized water into the reactor vessel. This test checks explosion of the charge associated with the tested system, proper operation of the valves and pump capacity. Both systems shall be tested and inspected, including each explosion valve in the course of two operating cycles.

3.0 LIMITING CONDITIONS FOR OPERATION

4.0 SURVEILLANCE REQUIREMENTS

- C. If Specification 3.4.A through B are not met, an orderly shutdown shall be initiated and the reactor shall be in Hot Shutdown within 12 hours and in Cold Shutdown in 36 hours.

3.0 LIMITING CONDITIONS FOR OPERATION

4. The reactor vessel head bolting studs shall not be under tension unless the temperature of the vessel head flange and the head are $\geq 70^{\circ}\text{F}$.

C. Coolant Chemistry

1. (a.) In Run, or in Startup and Hot Shutdown, with any main steam line not isolated, the specific activity of the reactor coolant shall be limited to DOSE EQUIVALENT I-131 specific activity ≤ 0.2 microcuries per gram.
 - (1) With reactor coolant specific activity > 0.2 microcuries per gram and ≤ 2.0 microcuries per gram DOSE EQUIVALENT I-131, determine DOSE EQUIVALENT I-131 once per 4 hours and restore DOSE EQUIVALENT I-131 to within limits within 48 hours. During this condition entry into Run, Startup, or Hot shutdown is allowed.
 - (2) If the required action and completion time of 3.6.C.1.(a)(1) are not met OR reactor coolant specific activity is > 2.0 microcuries per gram DOSE EQUIVALENT I-131 then, determine DOSE EQUIVALENT I-131 once per 4 hours, AND
 - a. Isolate all Main Steam lines within 12 hours, OR
 - b. Be in Hot Shutdown in 12 hours and be in Cold Shutdown in 36 hours.

4.0 SURVEILLANCE REQUIREMENTS

4. When the reactor vessel head studs are under tension and the reactor is in the Cold Shutdown Condition, the reactor vessel shell flange temperature shall be permanently recorded.

C. Coolant Chemistry

1. (a) A sample of reactor coolant shall be taken at least every 7 days to verify DOSE EQUIVALENT I-131 specific activity is ≤ 0.2 microcuries per gram during power operation.

3.0 LIMITING CONDITIONS FOR OPERATION

- (b.) The steady state radioiodine concentration in the reactor coolant shall not exceed 0.02 microcuries of I-131 dose equivalent per gram of water when the reactor coolant temperature is $>212^{\circ}\text{F}$, the reactor is not critical, and primary containment integrity has not been established.

4.0 SURVEILLANCE REQUIREMENTS

- (b) A sample of reactor coolant shall be taken and analyzed for radioactive iodines of I-131 through I-135 within 24 hours prior to raising the reactor coolant temperature $>212^{\circ}\text{F}$, with the reactor not critical, and with primary containment integrity not established.
- (c) When the main condenser offgas system pretreatment monitors indicate an increase in radioactive gaseous effluents of 25 percent of 5000 microcuries per sec, whichever is greater, during steady state reactor operation a reactor coolant sample shall be taken and analyzed for radioactive iodines.
- (d) Isotopic analysis of reactor coolant samples shall be made at least once per month.

I

3.0 LIMITING CONDITIONS FOR OPERATION

reactor core, operations with a potential for reducing the shutdown margin below that specified in specification 3.3.A, and handling of irradiated fuel or the fuel cask in the secondary containment are to be immediately suspended if secondary containment integrity is not maintained.

D. Primary Containment Isolation Valves (PCIVs)

1. During reactor power operating conditions, all Primary Containment automatic isolation valves and all primary system instrument line flow check valves shall be operable except as specified in 3.7.D.2 and 3.7.D.3.

4.0 SURVEILLANCE REQUIREMENTS

D. Primary Containment Isolation Valves (PCIVs)

1. The primary containment automatic isolation valve surveillance shall be performed as follows:
 - a. At least once per operating cycle the operable isolation valves that are power operated and automatically initiated shall be tested for simulated automatic initiation and closure times.
 - b. At least once per operating cycle the primary system instrument line flow check valves shall be tested for proper operation.
 - c. All normally open power-operated isolation valves shall be tested in accordance with the Inservice Testing Program. Main Steam isolation valves (MSIV) shall be tested (one at a time) with the reactor power less than 75% of rated.
 - d. At least once per week the main steam-line power-operated isolation valves shall be exercised by partial closure and subsequent reopening.
 - e. In accordance with the Primary Containment Leakage Rate Testing Program, verify the following leakage rates are within limits:
 - (1) The leakage rate from any one MSIV is ≤ 100 scfh when tested at ≥ 42 psig (P_a) (≤ 77 scfh when tested at ≥ 25 psig).
 - (2) The leakage rate from the main steam pathway is ≤ 200 scfh when tested at ≥ 25 psig (P_a) (≤ 154 scfh when tested at ≥ 25 psig).

3.0 LIMITING CONDITIONS FOR OPERATION

3.17 CONTROL ROOM HABITABILITYApplicability:

Applies to the control room ventilation system equipment necessary to maintain habitability.

Objectives:

To assure the control room is habitable both under normal and accident conditions.

Specification:

A. Control Room Ventilation System

1. Except as specified in 3.17.A.2 and 3.17.A.3 below, both trains of the control room ventilation system shall be operable, whenever irradiated fuel is in the reactor vessel and reactor coolant temperature is greater than 212°F, or during activities having the potential for draining the reactor vessel.
- 2.a With one control room ventilation train inoperable, restore the inoperable train to operable status within 30 days.
- 2.b If 2.a is not met, then be in hot shutdown within the next 12 hours following the 30 days and in cold shutdown within 24 hours following the 12 hours.

3.17/4.17

4.0 SURVEILLANCE REQUIREMENTS

4.17 CONTROL ROOM HABITABILITYApplicability:

Applies to the periodic testing requirements of systems required to maintain control room habitability.

Objectives:

To verify the operability of equipment related to control room habitability.

Specification:

A. Control Room Ventilation System

1. Once per 12 hours check control room temperature.

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3.0 LIMITING CONDITIONS FOR OPERATION

- 2.c If 2.a is not met during activities having the potential for draining the reactor vessel then immediately place the operable control room ventilation train in operation or immediately suspend these activities.
 - 3.a With both control room ventilation trains inoperable, restore at least one train to operable status within 24 hours.
 - 3.b If 3.a is not met, then be in hot shutdown within the next 12 hours and in cold shutdown within 24 hours following the 12 hours.
 - 3.c If 3.a is not met during activities having the potential for draining the reactor vessel then immediately suspend these activities.
- B. Control Room Emergency Filtration System
- 1. Except as specified in 3.17.B.1.a through d below, two control room emergency filtration system filter trains shall be operable whenever irradiated fuel is in the reactor vessel and reactor coolant temperature is greater than 212°F, or during activities having the potential for draining the reactor vessel.

4.0 SURVEILLANCE REQUIREMENTS

- B. Control Room Emergency Filtration System
- 1. At least once per month, initiate from the control room 1000 cfm ($\pm 10\%$) flow through both trains of the emergency filtration treatment system. The system shall operate for at least 10 hours with the heaters operable.

3.0 LIMITING CONDITIONS FOR OPERATION

4.0 SURVEILLANCE REQUIREMENTS

- a. When one control room emergency filtration system filter train is made or found to be inoperable for any reason, restore the inoperable train to operable status within seven days or be in hot shutdown within the next 12 hours following the seven days and either reduce the reactor coolant temperature to below 212°F or initiate and maintain the operable emergency filtration system filter train in the pressurization mode within the following 24 hours.
- b. When both filter trains of the control room emergency filtration system are inoperable, restore at least one train to operable status within 24 hours or be in hot shutdown within the next 12 hours following the 24 hours and reduce the reactor coolant water temperature to below 212°F within the following 24 hours.
- c. With one control room emergency filtration system filter train inoperable during activities having the potential for draining the reactor vessel, restore the inoperable train to operable status within 7 days or immediately after the 7 days initiate and maintain the operable emergency filtration system filter train in the pressurization mode or immediately suspend these activities.
- d. With both control room emergency filtration system filter trains inoperable during activities having the potential for draining the reactor vessel, immediately suspend these activities.

3.0 LIMITING CONDITIONS FOR OPERATION

- c. The system shall be shown to be operable with:
 - (1) Combined filter pressure drop ≤ 8 inches water.
 - (2) Inlet heater power output $5\text{kw} \pm 10\%$.
 - (3) Automatic initiation upon receipt of a Low Low Reactor Water Level or High Drywell Pressure signal.

3. Post Maintenance Requirements

- a. After any maintenance or testing that could affect the HEPA filter or HEPA filter mounting frame leak tight integrity, the results of the in-place DOP tests at 1000 cfm ($\pm 10\%$) shall show $\leq 1\%$ DOP penetration on each individual HEPA filter and shall show $\leq 0.05\%$ DOP penetration on the combined HEPA filters.
- b. After any maintenance or testing that could affect the charcoal adsorber leak tight integrity, the results of in-place halogenated hydrocarbon tests at 1000 cfm ($\pm 10\%$) shall show $\leq 1\%$ penetration on each individual charcoal adsorber and shall show $\leq 0.05\%$ penetration on the combined charcoal adsorber banks.

4.0 SURVEILLANCE REQUIREMENTS

- c. At least once per operating cycle, but not to exceed 18 months, the following conditions shall be demonstrated for each emergency filtration system train:
 - (1) Pressure drop across the combined filters of each train shall be measured at 1000 cfm ($\pm 10\%$) flow rate.
 - (2) Operability of inlet heater at nominal rated power shall be verified.
 - (3) Verify that on a simulated initiation signal, the train switches to the pressurization mode of operation and the control room is maintained at a positive pressure with respect to adjacent areas at the design flow rate of 1000 cfm ($\pm 10\%$).

3. Post Maintenance Testing

- a. After any maintenance or testing that could affect the leak tight integrity of the HEPA filters, perform in-place DOP tests on the HEPA filters.
- b. After any maintenance or testing that could affect the leak tight integrity of the charcoal adsorber banks, perform halogenated hydrocarbon tests on the charcoal adsorbers.

6.8.J - RESERVED

K. Technical Specifications (TS) Bases Control Program

This program provides a means for processing changes to the Bases of these Technical Specifications.

1. Changes to the Bases of the TS shall be made under appropriate administrative controls and reviews.
2. Changes to Bases may be made without prior NRC approval provided the changes do not involve either of the following:
 - a. a change in the TS incorporated in the license; or
 - b. a change to the USAR or Bases that requires NRC approval pursuant to 10 CFR 50.59.
3. The Bases Control Program shall contain provisions to ensure that the Bases are maintained consistent with the USAR.
4. Proposed changes to the Bases that involve changes as described in a. or b. of Specification 6.8.K.2 above shall be reviewed and approved by the NRC prior to implementation. Changes to the Bases implemented without prior NRC approval shall be provided to the NRC on a frequency consistent with 10 CFR 50.71(e).

6.8.L - RESERVED

M. Primary Containment Leakage Rate Testing Program

1. This program shall establish the leakage rate testing of the containment as required by 10 CFR 50.54(o) and 10 CFR Part 50, Appendix J, Option B, as modified by approved exemptions. This program shall be in accordance with the guidelines contained in Regulatory Guide 1.163, "Performance-Based Containment Leak-Test Program," dated September 1995, as modified by the following exceptions:
 - The first Type A test after the March 1993 Type A test shall be performed no later than March 2008. (This is an exception to Section 9.2.3 of NEI 94-01, Rev. 0, "Industry Guideline for Implementing Performance-Based Option of 10 CFR 50, Appendix J").

6.8.M Continued

- The leakage contribution from the main steam pathway is excluded from the sum of the leakage rates from Type B and Type C tests specified in: (1) Section III.B of 10 CFR 50, Appendix J, Option B; (2) Section 6.4.4 of ANSI/ANS 56.8-1994, "Containment System Leakage Testing Requirements"; and (3) Section 10.2 of NEI 94-01, Rev. 0.
 - The leakage contribution from the main steam pathway is excluded from the overall integrated leakage rate from Type A tests specified in: (1) Section III.A of 10 CFR 50, Appendix J, Option B; (2) Section 3.2 of ANSI/ANS 56.8-1994; and (3) Sections 8.0 and 9.0 of NEI 94-01, Rev. 0.
2. The calculated peak containment internal pressure for the design basis loss of coolant accident, P_a , is 42 psig. The containment design pressure is 56 psig.
 3. The maximum allowable containment leakage rate, L_a , at P_a , shall be 1.2% of containment air weight per day.
 4. Leakage rate acceptance criteria are:
 - a. Containment leakage rate acceptance criterion is $\leq 1.0 L_a$. During the first unit startup following testing in accordance with this program, the leakage rate acceptance criteria are $< 0.60 L_a$ for the Type B and C tests and $\leq 0.75 L_a$ for Type A tests.
 - b. Air lock testing acceptance criteria are:
 - 1) Overall air leakage rate is $\leq 0.05 L_a$ when tested at $\geq P_a$.
 - 2) For each door, leakage rate is $\leq 0.007 L_a$ when pressurized to ≥ 10 psig.
 5. The provisions of SRs 4.0.D and 4.0.E are applicable to the Primary Containment Leakage Rate Testing Program.
 6. Nothing in these Technical Specifications shall be construed to modify the testing Frequencies required by 10 CFR 50, Appendix J.

ENCLOSURE 8

MONTICELLO NUCLEAR GENERATING PLANT

APPLICATION FOR LICENSE AMENDMENT

ALTERNATIVE SOURCE TERM

MARKED-UP TECHNICAL SPECIFICATION BASES PAGES

(19 pages follow)

Bases 2.2:

Exceeding a Safety Limit may cause fuel damage and create a potential for radioactive releases in excess of ~~10 CFR 100~~**[10 CFR 50.67]**, "~~Reactor Site Criteria,~~" [**"Accident source term,"**] guidelines. Therefore, it is required to insert all insertable control rods and restore compliance with the Safety Limits within 2 hours. The 2 hour completion time ensures that the operators take prompt remedial action and also ensures that the probability of an accident occurring during this period is minimal. Other required actions are delineated in 10 CFR 50.36, 10 CFR 50.72, and 10 CFR 50.73

Bases 3.2:

In addition to reactor protection instrumentation which initiates a reactor scram, protective instrumentation has been provided which initiates action to mitigate the consequences of accidents which are beyond the operators ability to control, or terminate a single operator error before it results in serious consequences. This set of specifications provides the limiting conditions of operation for the primary system isolation function, initiation of the emergency core cooling system, and other safety related functions. The objectives of the Specifications are (i) to assure the effectiveness of the protective instrumentation when required, and (ii) to prescribe the trip settings required to assure adequate performance. This set of Specifications also provides the limiting conditions of operation for the control rod block system.

Isolation valves are installed in those lines that penetrate the primary containment and must be isolated during a loss of coolant accident so that the radiation dose limits are not exceeded during an accident condition. Actuation of these valves is initiated by protective instrumentation shown in Table 3.2.1 which senses the conditions for which isolation is required. Such instrumentation must be available whenever primary containment integrity is required. The objective is to isolate the primary containment so that the guidelines of ~~10 CFR 100~~ **[10 CFR 50.67]** are not exceeded during an accident.

The instrumentation which initiates primary system isolation is connected in a dual bus arrangement. Thus, the discussion given in the bases for Specification 3.1 is applicable here.

The low reactor water level instrumentation is set to trip when reactor water level is ≥ 7 " on the instrument. This corresponds to a lower water level inside the shroud at 100% power due to the pressure drop across the dryer/separator. This has been accounted for in the affected transient analysis. This trip initiates closure of Group 2 primary containment isolation valves. Reference Section 7.7.2.2 FSAR. The trip setting provides assurance that the valves will be closed before perforation of the clad occurs even for the maximum break in that line and therefore the setting is adequate.

The low low reactor water level instrumentation is set to trip when reactor water level is ≥ -48 ". This trip initiates closure of the Group 1 and Group 3 Primary containment isolation valves, Reference Section 7.7.2.2 FSAR, and also activates the ECC systems and starts the emergency diesel generators.

Bases 3. 2 (Continued):

This trip setting level was chosen to be low enough to prevent spurious operation but high enough to initiate ECCS operation and primary system isolation so that no melting of the fuel cladding will occur and so that post accident cooling can be accomplished and the guidelines of ~~10-CFR-100~~ [10 CFR 50.67] will not be violated. For the complete circumferential break of a 28-inch recirculation line and with the trip setting given above, ECCS initiation and primary system isolation are initiated in time to meet the above criteria. Reference Section 6.2.7 and 14.6.3 FSAR. The instrumentation also covers the full range or spectrum of breaks and meets the above criteria. Reference Section 6.2.7 FSAR.

The low low reactor water level instrumentation is required to be operable in Run, Startup and Hot Shutdown where considerable energy exists in the Reactor Coolant System (RCS); thus there is a probability of pipe breaks resulting in significant releases of radioactive steam and gas. During Cold Shutdown and Refueling, the probability and consequences of events are low due to the RCS pressure and temperature limitations under these conditions; thus, this function is not required. In addition, this function is also required to be operable during operations with a potential for draining the reactor vessel because the capability of isolating potential sources of leakage must be provided to ensure that offsite dose limits are not exceeded if core damage occurs.

The high drywell pressure instrumentation is a back-up to the water level instrumentation and in addition to initiating ECCS it causes isolation of Group 2 and Group 3 isolation valves. For the complete circumferential break discussed above, this instrumentation will initiate ECCS operation at about the same time as the low low water level instrumentation; thus the results given above are applicable here also. Group 2 and Group 3 isolation valves include the drywell vent, purge, sump isolation, RWCU, and recirc sample valves.

The high drywell pressure function is required to be operable in Run, Startup and Hot Shutdown where considerable energy exists in the RCS; thus there is a probability of pipe breaks resulting in significant releases of radioactive steam and gas. This function is only required to be operable when primary containment integrity is required. This function is not required during Cold Shutdown and Refueling because the probability and consequences of events are low due to the RCS pressure and temperature limitations under these conditions.

Two pressure switches are provided on the discharge of each of the two core spray pumps and each of the four RHR pumps. Two trip systems are provided in the control logic such that either trip system can permit automatic depressurization. Each trip system consists of two trip logic channels such that both trip logic channels are required to permit a system trip.

Division I core spray and RHR pump discharge pressure permissives will interlock one trip system and Division II permissives will interlock the other trip system. One pressure switch on each pump will interlock one of the trip channels and the other pressure switch will interlock the other trip channel within their respective trip system.

Bases 3.2 (Continued):

The pump pressure permissive control logic is designed such that no single failure (short or open circuit) will prevent auto-blowdown or allow auto-blowdown when not required. The trip setting for the low pressure ECCS pump permissive for ADS is set such that it is less than the pump discharge pressure when a pump is operating in a full flow condition and also high enough to avoid any condition that results in a discharge pressure permissive when the pumps are not operating.

Venturis are provided in the main steamlines as a means of measuring steam flow and also limiting the loss of mass inventory from the vessel during a steamline break accident. In addition to monitoring steam flow, instrumentation is provided which causes a trip of Group 1 isolation valves. The primary function of the instrumentation is to detect a break in the main steamline, thus only Group 1 valves are closed. For the worst case accident, main steamline break outside the drywell, this trip setting of 140% of rated steam flow in conjunction with the flow limiters and main steamline valve closure, limit the mass inventory loss such that fuel is not uncovered, fuel clad temperatures remain less than 1000°F and release of radioactivity to the environs is well below ~~[10-CFR-100~~ **10 CFR 50.67]** guidelines. Reference Sections 14.6.5 FSAR.

Temperature monitoring instrumentation is provided in the main steamline tunnel to detect leaks in this area. Trips are provided on this instrumentation and when exceeded cause closure of Group 1 isolation valves. Its setting of 200°F is low enough to detect leaks of the order of 5 to 10 gpm; thus, it is capable of covering the entire spectrum of breaks. For large breaks, it is a back-up to high steam flow instrumentation discussed above, and for small breaks with the resultant small release of radioactivity, gives isolation before the guidelines of ~~[10-CFR-100~~ **10 CFR 50.67]** are exceeded.

Low MSL pressure indicates that there may be a problem with the turbine pressure regulation, which could result in a low reactor vessel water level condition and the RPV cooling down more than 100°F/hr if the pressure loss is allowed to continue. The Main Steam Line Pressure - Low Function is directly assumed in the analysis of the pressure regulator failure (USAR Section 7.6.3.2.4-4). For this event, the closure of the MSIVs ensures that the RPV temperature change limit (100°F/hr) is not reached. In addition, this Function supports actions to ensure that Safety Limit 2.1 .A is not exceeded. (This Function closes the MSIVs prior to pressure decreasing below 785 psig, which results in a scram due to MSIV closure, thus reducing power to < 25% RTP.)

The MSL low pressure signals are initiated from four transmitters that are connected to the MSL header. The transmitters are arranged such that, even though physically separated from each other, each transmitter is able to detection low MSL pressure. Four channels of Main Steam Line Pressure - Low Function are available and are required to be OPERABLE to ensure that no single instrument failure can preclude the isolation function.

The Allowable Value was selected to be high enough to prevent excessive RPV depressurization.

Bases 3.2 (Continued):

Safety/relief valve low-low set logic is provided to prevent any safety/relief valve from opening when there is an elevated water leg in the respective discharge line. A high water leg is formed immediately following valve closure due to the vacuum formed when steam condenses in the line. If the valve reopens before the discharge line vacuum breakers act to return water level to normal, water clearing thrust loads on the discharge line may exceed their design limit. The logic reduces the opening setpoint and increases the blowdown range of three non-APRS valves following a scram. A 15-second interval between subsequent valve actuations is provided assuming one valve fails to open and instrumentation drift has caused the nominal 80-psi blowdown range to be reduced to 60 psi. Maximum water leg clearing time has been calculated to be less than 6 seconds for the Monticello design. Inhibit timers are provided for each valve to prevent the valve from being manually opened less than 10 seconds following valve closure. Valve opening is sensed by pressure switches in the valve discharge line. Each valve is provided with two trip, or actuation, systems. Each system is provided with two channels of instrumentation for each of the above described functions. A two-out-of-two-once logic scheme ensures that no single failure will defeat the low-low set function and no single failure will cause spurious operation of a safety/relief valve. Allowable deviations are provided for each specified instrument setpoint. Valve operation within the specified allowable deviations provide assurance that subsequent safety/relief valve actuations are sufficiently spaced to allow for discharge line water leg clearing.

Control room habitability protection instrumentation **[that actuates on conditions indicative of a LOCA]** assures that the control room operators will be adequately protected against the effects of accidental releases of radioactive leakage ~~[which may bypass secondary containment]~~ following a loss of coolant accident ~~[or radioactive releases from a steam line break accident]~~, thus assuring that the Monticello Nuclear Generating Plant can be operated or shutdown safely.

Although the operator will set the setpoints within the trip settings specified in Tables 3.2.1 through 3.2.**[10]**, the actual values of the various set points can differ appreciably from the value the operator is attempting to set. The deviations could be caused by inherent instrument error, operator setting error, drift of the set point, etc. Therefore, these deviations have been accounted for in the various transient analyses.

[The mechanical vacuum pump isolation instrumentation initiates a trip of the mechanical vacuum pump and closure of the pump suction line isolation valves following events in which main steam line radiation monitors exceed a predetermined value. Tripping and isolating the mechanical vacuum pump limits control room doses in the event of a control rod drop accident (CRDA).

Bases 3.2 (Continued):

The mechanical vacuum pump isolation is assumed in the safety analysis for the CRDA. The mechanical vacuum pump isolation instrumentation initiates an isolation of the mechanical vacuum pump to limit control room doses resulting from fuel cladding failure in a CRDA.

During Run and Startup with the mechanical vacuum pump in service, mechanical vacuum pump isolation is required to be operable to mitigate the consequences of a postulated CRDA. In this condition, fission products released during the CRDA are discharged to the environment. Therefore, mechanical vacuum pump isolation is necessary to terminate the release through this pathway and assure conformance with the radiological consequence evaluation of the CRDA. In Hot Shutdown, Cold Shutdown, or Refuel the consequences of a control rod drop are insignificant, and are not expected to result in any fuel damage or fission product releases. When the mechanical vacuum pump is not in service in Run or Startup, fission product releases via this pathway would not occur.]

Bases 3.3/4.3 (Continued):

Should a control rod drop accident result in **[fuel damage, the resulting control room operator and offsite doses remain below the regulatory limits of a peak fuel energy content of 280 cal/gm, less than 660 (7 x 7) fuel rods are conservatively estimated to perforate. This would result in offsite doses twice that previously reported in the FSAR, but still well below the guideline values of 10 CFR 100[10 CFR 50.67]. For 8 x 8 fuel, less than 850 rods are conservatively estimated to perforate, which has nearly the same consequences as for the 7 x 7 fuel case because of the operating rod power differences.]**

The RWM provides automatic supervision to assure that out-of-sequence control rods will not be withdrawn or inserted; i.e., it limits operator deviations from planned withdrawal sequences. Reference Section 7-9 FSAR. It serves as an independent backup of the normal withdrawal procedure followed by the operator. In the event that the RWM is not capable of enforcing a particular control rod withdrawal/insertion sequence when required, it is considered to be inoperable, and a second independent operator or engineer can manually fulfill the operator-follower control rod pattern conformance function of the RWM. In this case, procedural control is exercised by verifying all control rod positions after the withdrawal of each group, prior to proceeding to the next group. Allowing substitution of a second independent operator or engineer in case of RWM inoperability recognizes the capability to adequately monitor proper rod sequencing in an alternate manner without unduly restricting plant operations. Above 10% power, there is no requirement that the RWM be operable since the control rod drop accident with out-of-sequence rods will result in a peak fuel energy content of less than 280 cal/gm. To assure high RWM availability, the RWM is required to be operating during a startup for the withdrawal of a significant number of control rods for any startup after May 1, 1974.

4. The Source Range Monitor (SRM) system performs no automatic safety system function; i.e., it has no scram function. It does provide the operator with a visual indication of neutron level. This is needed for knowledgeable and efficient reactor startup at low neutron levels. The

Bases 3.4/4.4:

- A. The design objective of the standby liquid control system is to provide the capability of bringing the reactor, at any time in a fuel cycle, from full power and minimum control rod inventory (which is at the peak of the xenon transient) to a subcritical condition with the reactor in the most reactive, xenon-free state without taking credit for control rod movement. To meet this objective, the liquid control system is designed to inject a quantity of boron which produces a concentration of boron in the reactor core in less than 125 minutes sufficient to bring the reactor from full power to a subcritical condition considering the hot to cold reactivity swing, xenon poisoning and an additional 25% boron concentration margin to allow for leakage and imperfect mixing.

The time requirement (125 minutes) for insertion of the boron solution was selected to override the rate of reactivity insertion due to cooldown of the reactor following the xenon poison peak.

The ATWS Rule (10 CFR 50.62) requires the addition of a new design requirement to the generic SLC System design basis. Changes to flow rate, solution concentration or boron enrichment to meet the ATWS Rule do not invalidate the original system design basis. Paragraph (c)(4) of 10 CFR 50.62 states that:

“Each boiling water reactor must have a Standby Liquid Control System (SLCS) with a minimum flow capacity and boron content equivalent in control capacity to 86 gallons per minute of 13 weight percent sodium pentaborate solution” (natural boron enrichment).

[During a DBA LOCA, particulate aerosol iodine will be deposited in the suppression pool. If suppression pool pH is > 7.0, the iodine will not re-evolve as airborne elemental iodine in significant amounts. The radiological analysis assumes that the safety related pH control function is accomplished by operators manually injecting the contents of the SBLC liquid poison tank within two hours of a DBA LOCA.]

The described minimum system parameters (equivalent to 24 gpm, 10.7% concentration and 55 atom percent Boron-10 enrichment) will ensure an equivalent injection capability that meets the ATWS rule requirement **[and will assure that suppression pool pH is maintained > 7.0 following manual injection of boron during a DBA LOCA.]**

Boron enrichment concentration, solution temperature, and volume (including check of tank heater and pipe heat tracing system) are checked on a frequency to assure a high reliability of operation of the system should it ever be required. Only one of the two standby liquid control pumping circuits is needed for proper operation of the system. If one pumping circuit is found to be inoperable, there is no immediate threat to shutdown capability, and reactor operation may continue while repairs are being made. A reliability analysis indicates that the plant can be operated safely in this manner for ten days. For additional margin, the allowable out of service time has been reduced to seven days.

Bases 3.6/4.6 (Continued):

C. Coolant Chemistry

[The radioiodine I-131 dose equivalent concentration in the reactor coolant is an initial condition for evaluation of the radiological consequences of the main steam line break outside containment. No fuel damage is postulated in the main steam line break accident, and the release of radioactive material to the environment is assumed to end when the main steam isolation valves close completely. Both the control room operator and offsite doses were calculated at a maximum reactor coolant equilibrium concentration of 0.2 μCi of I-131 dose equivalent per gram of water and a pre-accident spike concentration of 2.0 μCi of I-131 dose equivalent per gram of water and shown to remain less than the dose guidelines of 10 CFR 50.67.]

[An analysis was prepared to support the establishment of TS 3.6.C.1.(b). In the event of a main steam line break outside primary containment, calculations show the resultant radiological dose at the exclusion area boundary to be less than 10% of the dose guidelines of 10 CFR 100. This dose was calculated on the basis of the radioiodine concentration limit of 2 μCi of I-131 dose equivalent per gram of water. In the event of a postulated high energy line break in the RWCU system outside the drywell, calculations show the resultant radiological consequences are bounded by the steam line rupture.] In the event of a large primary system break in primary containment during a reactor vessel hydrostatic or leakage test with the reactor coolant temperature $>212^\circ\text{F}$, the reactor not critical, and primary containment integrity not established, calculations show the resultant radiological dose at the exclusion area boundary to be conservatively bounded by the dose calculated for a main steam line break outside primary containment. This dose was calculated on the basis of the radioiodine concentration limit of 0.02 μCi of I-131 dose equivalent per gram of water.

[In Run, Startup and Hot Shutdown, with any main steam line not isolated, limits on the primary coolant radioactivity are applicable since there is a potential release path for release of radioactive material from the primary coolant to the environment in the event of a main steam line break outside of primary containment.

In Startup and Hot Shutdown with the main steam lines isolated, such limits do not apply since a release path outside primary containment does not exist. In Cold Shutdown and Refuel, no limits are required since the reactor is not pressurized and the potential for a steam line break is reduced.]

The reactor coolant sample will be used to assure that the limit of Specification 3.6.C.1(a) is not exceeded. The radioiodine concentration would not be expected to change rapidly during steady state operation over a period of ~~[96 hours]~~ **7 days**. In addition, the trend of the radioactive gaseous effluents, which is continuously monitored, is a good indicator of the trend of the radioiodine concentration in the reactor coolant. When a significant increase in radioactive gaseous effluents is indicated, as specified, an additional reactor coolant sample shall be taken and analyzed for radioactive iodine.

Bases 3.6/4.6 (Continued):

~~[Whenever an isotopic analysis is performed, a reasonable effort will be made to determine a significant percentage of those contributors representing the total radioactivity in the reactor coolant sample. Usually at least 80 percent of the total gamma radioactivity can be identified by the isotopic analysis.]~~

It has been observed that radioiodine concentration can change rapidly in the reactor coolant during transient reactor operations such as reactor shutdown, reactor power changes, and reactor startup if failed fuel is present. As specified, additional reactor coolant samples shall be taken and analyzed [~~when for reactor operations in which~~] steady state radioiodine concentrations in the reactor coolant ~~[are not within limits indicate various levels of iodine releases from the fuel]~~. Since the radioiodine concentration in the reactor coolant is not continuously measured, reactor coolant sampling would be ineffective as a means to rapidly detect gross fuel element failures. However, some capability to detect gross fuel element failures is inherent in the radiation monitors in the off-gas system and on the main steam line.

Materials in the primary system are primarily 304 stainless steel and zircaloy. The reactor water chemistry limits are established to prevent damage to these materials. The limit placed on chloride concentration is to prevent stress corrosion cracking of the stainless steel.

When conductivity is in its proper normal range (approximately 10 $\mu\text{mho/cm}$ during reactor startup and 5 $\mu\text{mho/cm}$ during power operation), pH and chloride and other impurities affecting conductivity must also be within their normal range. When and if conductivity becomes abnormal, then chloride measurements are made to determine whether or not they are also out of their normal operating values. This would not necessarily be the case. Conductivity could be high due to the presence of a neutral salt, e.g., Na_2SO_4 , which would not have an effect on pH or chloride. In such a case, high conductivity alone is not a cause for shutdown. In some types of water-cooled reactors, conductivities are in fact high due to purposeful addition of additives. In the case of BWRs, however, no additives are used and where neutral pH is maintained, conductivity provides a very good measure of the quality of the reactor water. Significant changes therein provide the operator with a warning mechanism so he can investigate and remedy the condition causing the change before limiting conditions, with respect to variables affecting the boundaries of the reactor coolant, are exceeded. Methods available to the operator for correcting the off-standard condition include operation of the reactor cleanup system reducing the input of impurities and placing the reactor in the cold shutdown condition. The major benefit of cold shutdown is to reduce the temperature dependent corrosion rates and provide time for the cleanup system to reestablish the purity of the reactor coolant. During startup periods, which are in the category of less than 100,000 pounds per hour, conductivity may exceed 5 $\mu\text{mho/cm}$ because of the initial evolution of gases and the initial addition of dissolved metals. During this period of time when the conductivity exceeds 5 μmho (other than short term spikes), samples will be taken to assure the chloride concentration is less than 0.1 ppm.

Bases 3.6/4.6 (Continued):

The conductivity of the reactor coolant is continuously monitored. The samples of the coolant which are taken every 96 hours will serve as a reference for calibration of these monitors and is considered adequate to assure accurate readings of the monitors. If conductivity is within its normal range, chlorides and other impurities will also be within their normal ranges. The reactor coolant samples will also be used to determine the chlorides. Therefore, the sampling frequency is considered adequate to detect long-term changes in the chloride ion content. Isotopic analyses required by Specification 4.6.C.1(b) may be performed by a gamma scan and gross beta and alpha determination.

Bases 3.7:

A. Primary Containment

The integrity of the primary containment and operation of the emergency core cooling system in combination, limit the offsite doses to values less than [~~10 CFR 100~~ **10 CFR 50.67**] guideline values in the event of a break in the primary system piping. Thus, containment integrity is specified whenever the potential for violation of the primary reactor system integrity exists. Concern about such a violation exists whenever the reactor is critical and above atmospheric pressure. Two exceptions are made to this requirement. The first exception is during initial core loading and while the low power test program is being conducted and ready access to the reactor vessel is required. There will be no pressure on the system at this time which will greatly reduce the chances of a pipe break. The reactor may be taken critical during this period; however, restrictive operating procedures will be in effect again to minimize the probability of an accident occurring. Procedures and the Rod Worth Minimizer would limit incremental control worth to less than 1.3% delta k. A drop of a 1.3% delta k increment of a rod does not result in any fuel damage. In addition, in the unlikely event that an excursion did occur, the reactor building and standby gas treatment system, which shall be operational during this time, offers a sufficient barrier to keep offsite doses well within [~~10 CFR 100~~ **10 CFR 50.67**] guide line values. The second exception is during the performance of reactor vessel hydrostatic and leakage tests per Section XI of the ASME Code where establishing primary containment integrity would restrict access to the reactor vessel head for performance of required inspections. The reactor vessel hydrostatic and leakage tests are performed with the reactor vessel nearly water solid, at nominal operating pressure, not critical and at low decay heat values. However, the minimum reactor coolant temperature required for these tests as identified in Section 3.6.B can be greater than 212°F which provides the potential for steam, rather than water, leaks. In the unlikely event of a large primary system break with primary containment open to secondary containment the positive pressure created in secondary containment could result in a ground level radiological release to the environment. A limit on reactor coolant activity ensures that the potential resultant radiological dose at the exclusion area boundary will be conservatively bounded by the dose calculated for a main steam line break outside primary containment. In addition, low pressure emergency core cooling systems would be required to be operable during reactor vessel hydrostatic and leakage tests with reactor coolant temperature greater than 212°F providing assurance that adequate core cooling could be achieved to preclude fuel failures and subsequent increase in reactor coolant activity.

The pressure suppression pool water provides the heat sink for the reactor primary system energy release following a postulated rupture of the system. The pressure suppression chamber water volume must absorb the associated decay and structural sensible heat release during primary system blowdown from 1000 psig.

Bases 3.7 (Continued):

Specification 3.7.C.5 provides additional actions when the shutdown margin requirements of specification 3.3.A are not met during Refueling. With the shutdown margin not within limits as demonstrated by analysis during Refueling, the operator must immediately suspend core alterations that could reduce SDM (e.g., insertion of fuel in the core or the withdrawal of control rods)., Suspension of these activities shall not preclude completion of movement of a component to a safe condition. Inserting control rods or removing fuel from the core will reduce the total reactivity and are therefore excluded from the suspended actions.

Action must also be immediately initiated to fully insert all insertable control rods in core cells containing one or more fuel assemblies. Action must continue until all insertable control rods in core cells containing one or more fuel assemblies have been fully inserted. Control rods in core cells containing no fuel assemblies do not affect the reactivity of the core and therefore do not have to be inserted.

While only a small amount of particulates are released from the primary containment as a result of the loss of coolant accident, high-efficiency particulate filters before and after the charcoal filters are specified to minimize potential particulate release to the environment and to prevent clogging of the charcoal adsorbers. The charcoal adsorbers are installed to reduce the potential release of radioiodine to the environment. The in-place test results should indicate a system leak tightness of less than 1% bypass leakage for the charcoal adsorbers using halogenated hydrocarbon and a HEPA filter efficiency of at least 99% removal of DOP particulates. Laboratory carbon sample test results indicate a radioactive methyl iodide removal efficiency for expected accident conditions. The allowable penetration for the laboratory test is based on 90% adsorber efficiency assumed in the off-site dose analysis and a safety factor of ≥ 2 . Operation of the standby gas treatment circuits significantly different from the design flow will change the removal efficiency of the HEPA filters and charcoal adsorbers. If the performance requirements are met as specified, the calculated doses would be less than the guidelines stated in [~~40 CFR 400~~ **10 CFR 50.67**] for the accidents analyzed.

D. Primary Containment Isolation Valves

The function of the Primary Containment Isolation Valves (PCIVs), in combination with other accident mitigation systems, is to limit fission product release during and following postulated Design Basis Accidents to within limits. The PCIVs help ensure that an adequate primary containment boundary is maintained during and after an accident by minimizing potential paths to the environment. Therefore, Technical Specifications requirements provide assurance that primary containment function assumed in the safety analysis will be maintained. These valves are either passive or active (automatic). Manual valves, deactivated automatic valves (including remote manual valves) secured in their closed position (including check valves with flow through the valve secured), blind flanges, and closed systems are considered passive devices. Check valves, or other automatic valves designed to close without operator action following an accident, are considered active devices.

Bases 4.7 (Continued):

On September 26, 1995, Regulatory Guide 1.163 became effective providing guidance on performance based testing to the requirements of 10 CFR 50, Appendix J, Option B. Monticello has adopted 10 CFR Part 50, Appendix J, Option B, and a Primary Containment Leakage Rate Testing Program. This program is modified by **[the exceptions noted in TS 6.8.M.1.–the following exception: NEI 94-01, Rev. 0, Section 9.2.3: The first Type A test performed after March 1993 Type A test shall be performed no later than March 2008.]**

[Consistent with the limiting assumptions used in the associated accident analyses, the Primary Containment Leakage Rate Testing Program differentiates between two leakage pathways: (1) primary containment leakage; and (2) main steam pathway. Leakage effluent from the main steam pathway drains to the main condenser and then leaks to the environment. These pathways are defined in the Primary Containment Leakage Rate Testing Program.]

Maintaining primary containment integrity requires compliance with the visual examinations and leakage rate test requirements of the Primary Containment Leakage Rate Testing Program. Failure to meet air lock leakage testing, primary containment purge valve resilient seal leakage testing or main steam isolation valve leakage does not necessarily result in a failure of this SR. The impact of the failure to meet these SRs must be evaluated against the Type A, B and C acceptance criteria of the Primary Containment Leakage Rate Testing Program.

Maintaining primary containment air locks requires compliance with the leakage rate testing requirements of the Primary Containment Leakage Rate Testing Program. This SR reflects the leakage rate testing requirements with respect to air lock leakage (Type B leakage tests). The periodic testing requirements verify that the air lock leakage does not exceed the allowed fraction of the overall primary containment leakage rate. The frequency is required by the Primary Containment Leakage Rate Testing Program.

The SR has been modified by two footnotes. Note * states that an inoperable air lock door does not invalidate the previous successful performance of the overall air lock leakage test. This is considered reasonable since either air lock door is capable of providing a fission barrier in the event of a DBA. Note ** has been added to this SR requiring the results to be evaluated against the acceptance criteria which is applicable to Primary Containment Integrity. This ensures that the air lock leakage is properly accounted for in determining the combined Type B and C primary containment leakage.

Bases 4.7 (Continued):

The air lock interlock mechanism is designed to prevent simultaneous opening of both doors in the air lock. Since both the inner and outer doors of an air lock are designed to withstand the maximum expected post accident primary containment pressure, closure of either door will support primary containment integrity. Thus, the interlock feature supports primary containment integrity while the air lock is being used for personnel transit in and out of the containment. Periodic testing of the interlock demonstrates that the interlock will function as designed and that the simultaneous inner and outer door opening will not inadvertently occur. Due to the purely mechanical nature of this interlock, and given that the interlock mechanism is not normally challenged when primary containment air lock door is used for entry and exit (procedures require strict adherence to single door opening), this test is only required to be performed every 24 months. The 24 month frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage, and the potential for loss of primary containment integrity if the Surveillance were performed with the reactor at power. The 24 month frequency is based on engineering judgment and is considered adequate given that the interlock is not challenged during the use of the air lock.

Bases 4.7 (Continued):

will be in the isolation position should an event occur. This required action does not require any testing or device manipulation. Rather, it involves verification that those devices outside containment and capable of potentially being mispositioned are in the correct position. The completion time of "monthly" for devices outside containment is appropriate because the devices are operated under administrative controls and the probability of their misalignment is low. For the devices inside primary containment, the time period specified "prior to entering Startup or Hot Shutdown from Cold Shutdown, if primary containment was deinerted while in Cold Shutdown, if not performed in the previous 92 days" is based on engineering judgment and is considered reasonable in view of the inaccessibility of the devices and other administrative controls ensuring that device misalignment is an unlikely possibility.

The surveillance requirements are modified by a footnote allowing both active and passive isolation devices, used to isolate a penetration, that are located in high radiation areas can be verified by use of administrative means. Allowing verification by administrative means is considered acceptable, since access to these areas is typically restricted. Therefore, the probability of misalignment of these devices, once they have been verified in the proper position, is low.

The containment is penetrated by a large number of small diameter instrument lines. A program for the periodic testing (see Specification 4.7.D) and examination of the valves in these lines has been developed and a report covering this program was submitted to the AEC on July 27, 1973.

The main steam line isolation valves are functionally tested on a more frequent interval to establish a high degree of reliability.

[In accordance with the Primary Containment Leakage Rate Testing Program the leakage rates for the main steam isolation valves and the main steam pathway must be verified to be within their leakage limits. The main steam pathway includes the combined leakage through all four main steam lines and the drain lines which collect leakage between the reactor vessel and all four inboard MSIVs. The leakage from these drain lines is then routed through a common drain line, with primary containment isolation valves, to the main condenser. These valves and pathway are only required to meet this leakage limit in Run, Startup and Hot Shutdown. In the other operating conditions, the Reactor Coolant System is not pressurized and primary containment leakage limits are not required. This surveillance requirement ensures that MSIV leakage is properly monitored. The Frequency is that required by the Primary Containment Leakage Rate Testing Program. Leakage rates at test pressure are specified as determined from leakage assumptions used in the radiological consequence analyses.]

E. (Deleted)

4.7 BASES

Bases 3.8/4.8:

A. Main Condenser Offgas Activity

BACKGROUND

During unit operation, steam from the low pressure turbine is exhausted directly into the condenser. Air and noncondensable gases are collected in the condenser, then exhausted through the steam jet air ejectors (SJAEs) to the Main Condenser Offgas System. The offgas from the main condenser normally includes radioactive gases.

The Main Condenser Offgas System has been incorporated into the unit design to reduce the gaseous radwaste emission. This system uses a catalytic recombiner to recombine radiolytically dissociated hydrogen and oxygen. The gaseous mixture is cooled, and the water and condensables are removed by the offgas condenser. The radioactivity of the main condenser offgas is measured at the outlet of the offgas condensers prior to entering the holdup line.

The main condenser offgas limits satisfy Criterion 2 of the NRC Policy Statement.

LCO 3.8.A.1

Restricting the gross radioactivity release rate from the main condenser provides reasonable assurance that the total body exposure to an individual at the exclusion area boundary will not exceed a small fraction of the limits of ~~[10 CFR 100~~ **10 CFR 50.67]** in the event that effluent is inadvertently discharged directly to the environment without treatment. The gross gamma activity is controlled to ensure that, during the event, the calculated offsite doses will be well within the limits of ~~[10 CFR 100~~ **10 CFR 50.67]**.

APPLICABILITY

The LCO is applicable when steam is being exhausted to the main condenser and the resulting noncondensables are being processed via the Main Condenser Offgas System. This occurs when the reactor is in the run mode, and during startup and hot shutdown with any main steam line not isolated and the SJAE in operation. In cold shutdown and refueling, steam is not being exhausted to the main condenser and the requirements are not applicable.

Bases 3.17:

A. Control Room Ventilation System

The Control Room Ventilation System provides air conditioning and heating as required to maintain a suitable environment in the main control room and portions of the first and second floors of the Emergency Filtration Train (EFT) building. The system is designed to maintain a nominal temperature of 78°F dry bulb in the main control room in the summer and a nominal temperature of 72°F in the winter. During normal operation, the CRV system recirculates the air in the control room envelope as needed. During a **[LOCA high radiation]** event, the Control Room Ventilation System continues to operate, and the Control Room Emergency Filtration Train system will start automatically to pressurize the control room protective envelope. The Emergency Filtration Train system can also be started manually.

All toxic substances which are stored onsite or stored/shipped within a 5 mile radius of the plant have been analyzed for their effect on the control room operators. It has been concluded that the operators will have at least two minutes to don breathing apparatus before incapacitation. Protection for toxic chemicals is provided through operator training, self-contained breathing apparatus (SBCAs) and the Control Room Breathing Air Supply.

B. Control Room Emergency Filtration System

The Control Room Emergency Filtration System assures that the control room operators will be adequately protected against the effects of radioactive leakage ~~[which may by pass secondary containment]~~ following a loss of coolant accident ~~[, steam line break accident or fuel handling accident]~~. The system is designed to ~~[slightly pressurize the control room on a radiation initiate on a~~ **Low Low Reactor Vessel Water Level or High Drywell Pressure** signal ~~[in the ventilation air]~~. Two completely redundant trains are provided.

During Run, Startup and Hot Shutdown, the control room emergency filtration system must be operable to control operator exposure during and following a **[LOCA design basis accident (DBA)]**, since the ~~[DBA LOCA]~~ could lead to a fission product release.

During Cold Shutdown and Refueling, the probability and consequences of a **[DBA LOCA]** are reduced because of the pressure and temperature limitations in these conditions. Therefore, maintaining the control room emergency filtration system operable is not required during Cold Shutdown or Refueling, except for situations for which significant releases of radioactive material can be postulated, such as during operations with a potential for draining the reactor vessel ~~[, or during movement of recently irradiated fuel assemblies in the secondary containment. Due to radioactive decay, the control room emergency filtration system is only required to be operable during fuel handling involving handling recently irradiated fuel (i.e., fuel that has occupied part of a critical reactor core within the previous 24 hours).]~~

Bases 3.17 (Continued):

Each train has a filter unit consisting of a prefilter, HEPA filters, and charcoal adsorbers. The HEPA filters remove particulates from the Control Room pressurizing air and prevent clogging of the iodine adsorbers. The charcoal adsorbers are installed to remove any radiolodines from the pressurizing air. The verification of performance parameters combined with the qualification testing conducted on new filters and adsorbers provide a high level of assurance that the Emergency Filtration System will perform as predicted in reducing doses to plant personnel below those levels stated in Criterion 19 of Appendix A to 10 CFR 50. The allowable penetration for the laboratory test is based on a conservative adsorber efficiency of 99% and a safety factor of > 2.

~~[Dose calculations have been performed for the Control Room Emergency Filtration System which show that, assuming 85% standby gas treatment system overall removal efficiency and 98% control room emergency filtration system overall removal efficiency and radioiodine plateout, whole body and organ doses remain within NRC guidelines.]~~

LOCA radiological consequence analyses have been performed which show that Control Room operator dose remains below 10 CFR 50.67 limits with the following assumed filter efficiencies: (1) 98% removal efficiencies for control room emergency filtration system and (2) 85% removal efficiencies for elemental and organics and 98% removal efficiency for aerosols for the standby gas treatment system.]

ENCLOSURE 9

MONTICELLO NUCLEAR GENERATING PLANT

**APPLICATION FOR LICENSE AMENDMENT
ALTERNATIVE SOURCE TERM**

**THE NON-PROPRIETARY VERSION OF CALCULATIONS PERFORMED IN
SUPPORT OF THE LICENSE AMENDMENT REQUEST**

(612 pages follow)

This Enclosure includes the following non-proprietary calculations:

- 1) CA-04-036, Rev 1, "MNGP AST - Offsite Post-Accident Atmospheric Dispersion Analysis" (non-proprietary version)
- 2) CA-04-037, Rev 2, "MNGP AST - CR/TSC Post-Accident Atmospheric Dispersion Analysis" (non-proprietary version)
- 3) CA-04-038, Rev 0, "MNGP AST - LOCA Radiological Consequence Analysis" (non-proprietary version)
- 4) CA-04-039, Rev 0, "MNGP AST - MSLBA Radiological Consequence Analysis" (non-proprietary version)
- 5) CA-04-040, Rev 0, "MNGP AST - CRDA Radiological Consequence Analysis" (non-proprietary version)
- 6) CA-04-041, Rev 1, "MNGP AST - FHA Radiological Consequence Analysis" (non-proprietary version)
- 7) CA-04-210, Rev 0, "Alternative Source Term – Core Isotopic Inventory" (complete calculation)

MONTICELLO NUCLEAR GENERATING PLANT		3494
TITLE:	CALCULATION COVER SHEET	Revision 15
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CALCULATION COVER SHEET

Page 1 of _____

Title MNGP AST - Offsite Post-Accident CA- 04 - 036 Add. 0
Atmospheric Dispersion Analysis

PART A – (Not Applicable to Vendor Calcs)

Assigned Personnel			
Name (Print)	Signature	Title	Initials

Record of Issues							
Rev	Description	Total Sheets	Last Sheet	Preparer	Verifier	Approval	Approval Date

Verification Method(s)

- Review
 Alternate Calculation
 Test
 Other
 Technical Review (per 4 AWI-05.08.07 (FP-E-MOD-07))

3087 (DOCUMENT CHANGE, HOLD AND COMMENT FORM) incorporated: _____				
FOR ADMINISTRATIVE USE ONLY	Resp Subv: CNSTP	Assoc Ref: 4 AWI-05.01.25	SR: N	Freq: 0 yrs
	ARMS: 3494	Doc Type: 3042	Admin initials:	Date:

Approved (Signatures available in Master File)

MONTICELLO NUCLEAR GENERATING PLANT		3494
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PART B – (Applicable to Vendor Calculations Only)

Vendor Name Sargent & Lundy Vendor Calc No: 2004-01852, Rev 1
 Vendor Approval Date: 8/30/05

- Form 3345 or QF-0547 attached.
- Safety related? If safety related, attach DIA or reference here. See Other Comments

Reviewed by: Dave Sexton / Kathy Shriver D.E. Shry K.L. Shriver 9/6/05
 Print Name Signature Date
 Accepted by: Dennis Zercher Dennis Zercher 9/6/05
 Print Name Eng. Supv. Signature Date

Record of Issues			
Revision	Description	Total No. of Sheets	Last Sheet Number
1	Rev 1 of 2004-01852 revised Section 6.2.1 of MNGP-001 to utilize meteorological data measured at 10 m elevation, and revised PAVAN runs for UMAX input at the high wind speed bin and HT for the elevated release runs.		

PART C – Design Basis Data (Complete for all Calculations)

10 CFR50.59 Screening or Evaluation No: N/A
 Associated Reference(s): AST LAR

Does this calculation:	YES	NO	Calc No(s), Rev(s), Add(s)
Supersede another calculation?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	CA-94-102, Rev 1, Add 0 (see comments)
Augment (credited by) another calculation?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	CA-04-038 R0 Add 0; CA-04-039 R0 Add 0; CA-04-040 R0 Add 0; CA-04-041 R1 Add 0
Derive inputs from another calculation?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	CA-03-190, Rev 1, Add 0

Approved (Signatures available in Master File)

MONTICELLO NUCLEAR GENERATING PLANT		3494
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Affect the Fire Protection Program per Form 3765?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	If Yes, attach Form 3765
Affect piping or supports?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	If Yes, attach Form 3544
Affect IST Program Valve or Pump Reference Values, and/or Acceptance Criteria?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	If Yes, inform IST Coordinator and provide copy of calculation

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CA-04 - 036

List all documents/procedures that are based on this calculation (include revision):

USAR Sections 2.3 and 14

List all plant procedures used to ensure inputs/assumptions/outputs are maintained (include revision):

N/A

What Systems or components are affected?

System Code(s) (See Form 3805):

MSC

Component ID's (CHAMPS Equip):

N/A

DBD Section (if any):

None

Topic Code (See Form 3805):

DBAE

Structure Code (See Form 3805):

N/A

Other Comments: Sargent & Lundy calculation 2004-01852 Rev 1 incorporates AAC Calculation #MNGP-001 Rev 2 (see attachment for cross-references).

Note: This calculation is not incorporated as part of MNGP's design basis until the associated LARs are approved (AST Phase 1 and 2).

Future needs (reference OTH021015): Update USAR relevant

Approved (Signatures available in Master File)

MONTICELLO NUCLEAR GENERATING PLANT		3494
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sections; provide hard copy of #MNGP-001 Rev 2 attachments when received (currently available in electronic format only).

This calculation was completed in accordance with the approved project work plan (DIA Equivalent) for the AST Implementation S&L Letter # SLMON-2003-085, and PO38317.

Approved (Signatures available in Master File)

MNGP AST Project Calculations List

Calculation No.	Title
<p>MNGP # S&L # AAC #</p>	<p>[Applied Analysis Corporation (AAC) performed DBA calculations for the AST project. Sargent & Lundy provided independent verification and documented results in S&L calculations which incorporated the AAC calculations as attachments. The S&L calculations were accepted by MNGP via the vendor calculation control process (4 AWI-05.01.25). Thus each DBA calculation has three numbers – MNGP, S&L, and AAC.</p> <p>AAC calculations will reference other AST calculations by their AAC number. This list is provided for proper cross-reference of calculations.]</p>
<p>03-190 N/A N/A</p>	<p>Design Inputs For Alternate Source Term (AST) Radiological Analysis</p>
<p>04-036 2004-01852 MNGP-001</p>	<p>MNGP AST - Offsite Post-Accident Atmospheric Dispersion Analysis</p>
<p>04-037 2004-02100 MNGP-002</p>	<p>MNGP AST - CR/TSC Post-Accident Atmospheric Dispersion Analysis</p>
<p>04-038 2004-02101 MNGP-003</p>	<p>MNGP AST - LOCA Radiological Consequence Analysis</p>
<p>04-039 2004-02102 MNGP-004</p>	<p>MNGP AST - MSLBA Radiological Consequence Analysis</p>
<p>04-040 2004-02103 MNGP-005</p>	<p>MNGP AST - CRDA Radiological Consequence Analysis</p>
<p>04-041 2004-02104 MNGP-006</p>	<p>MNGP AST - FHA Radiological Consequence Analysis</p>
<p>04-042 2004-02105 MNGP-007</p>	<p>MNGP AST - Post-LOCA pH Analysis</p>
<p>04-210 2004-07600 N/A</p>	<p>Alternative Source Term – Core Isotopic Inventory</p>
<p>05-130 2005-00480 N/A</p>	<p>Post LOCA Direct Dose to the Control Room From External Sources</p>
<p>05-134 2005-06343 MNGP-012</p>	<p>Post-LOCA Steam Pipe Internal Temperature 30-Day Profile for Radiological Dose Analysis</p>

MONTICELLO NUCLEAR GENERATING PLANT		3345
TITLE:	VENDOR CALCULATION REVIEW CHECKLIST	Revision 3
		Page 1 of 1

CA - 04 - 036, Rev 1
Attachment 1

The purpose of the review is to ensure that the vendor calculation or analysis complies with the conditions of the purchase order and is appropriate for its intended use. The purpose of the review is not to serve as an independent verification. Independent verification of the calculation or analysis by the vendor should be evident in the document.

The reviewer should use the criteria below as a guide to assess the overall quality, completeness and usefulness of the calculation or analysis. The reviewer is not required to check the vendor's calculations in detail.

See 4 AWI-05.01.25 (CALCULATION/ANALYSIS CONTROL) for guidance. Place initials by items reviewed.

REVIEW

- | | |
|---|--------------|
| 1. Form 3544 (PIPING AND SUPPORT NUMBERING) completed for calculations affecting piping or supports. | N/A KMS P.A. |
| 2. Design inputs correspond to those which were transmitted to the vendor. | KMS P.A. |
| 3. Assumptions are described and reasonable. Basis for assumptions identified. | KMS P.A. |
| 4. Applicable codes, standards and regulations are identified and met. | KMS P.A. |
| 5. Applicable construction and operating experience is considered. | KMS P.A. |
| 6. Applicable structure(s), system(s), and component(s) are listed. | KMS P.A. |
| 7. Formulas and equations documented and unusual symbols are defined. | KMS P.A. |
| 8. Acceptance criteria are identified, adequate and satisfied. | KMS P.A. |
| 9. Results are reasonable compared to inputs. | KMS P.A. |
| 10. Source documents are referenced. | KMS P.A. |
| 11. The calculation is appropriate for its intended use. | KMS P.A. |
| 12. The calculation complies with the terms of the Purchase Order. | KMS P.A. |
| 13. Inputs, assumptions, outputs, etc. which could affect plant operation are enforced by adequate procedural controls. List any affected procedures. | KMS P.A. |
| <u>None</u> | |
| | KMS P.A. |

Completed By: K.L. Swiver J.E. Cox Date: 9/6/05

3087 (DOCUMENT CHANGE, HOLD AND COMMENT FORM) incorporated: _____				
FOR ADMINISTRATIVE	Resp Supv: CNSTP	Assoc Ref: 4 AWI-05.01.25	SR: N	Freq: 0 yrs
	ARMS: 3345	Doc Type: 3042	Admin initials:	Date:

Approved (Signatures available in Master File)

ISSUE SUMMARY
Form SOP-0402-07, Revision 7

DESIGN CONTROL SUMMARY	
CLIENT: <u>Nuclear Management Company</u>	UNIT NO.: <u>1</u> Page No.: <u>1 of 6</u>
PROJECT NAME: <u>Monticello Nuclear Generating Plant</u>	
PROJECT NO.: <u>11163-013</u>	<input checked="" type="checkbox"/> NUCLEAR SAFETY- RELATED
CALC. NO.: <u>2004-01852</u>	<input type="checkbox"/> NOT NUCLEAR SAFETY-RELATED
TITLE: <u>MNGP AST – Offsite Post-Accident Atmospheric Dispersion Analysis</u>	
EQUIPMENT NO.: _____	
IDENTIFICATION OF PAGES ADDED/REVISED/SUPERSEDED/VOIDED & REVIEW METHOD	
Initial Issue (37 pages): Calculation (5 pages), Attachment A – AAC Calculation MNGP-001 (29 pages), Attachment B – List of Electronic Files (3 pages)	
	INPUTS/ ASSUMPTIONS <input checked="" type="checkbox"/> VERIFIED <input type="checkbox"/> UNVERIFIED
REVIEW METHOD: <u>Detailed Review</u>	REV. <u>0</u>
STATUS: <u>Approved</u>	DATE FOR REV.: <u>3/23/04</u>
PREPARER <u>W. J. Johnson/(See original for signatures)</u>	DATE: <u>3/22/04</u>
REVIEWER <u>M. D. Elo/(See original for signatures)</u>	DATE: <u>3/22/04</u>
APPROVER <u>M. A. Pressburger/(See original for signatures)</u>	DATE: <u>3/23/04</u>
IDENTIFICATION OF PAGES ADDED/REVISED/SUPERSEDED/VOIDED & REVIEW METHOD	
Revised to use meteorological data measured at 10 m elevation, and to update maximum wind speed and terrain height used in PAVAN. Revision 1 supersedes revision 0. Revision 1 (38 pages): Calculation (6 pages), Attachment A – AAC Calculation MNGP-001 (29 pages), Attachment B – List of Electronic Files (3 pages)	
	INPUTS/ ASSUMPTIONS <input checked="" type="checkbox"/> VERIFIED <input type="checkbox"/> UNVERIFIED
REVIEW METHOD: <u>Detailed Review</u>	REV. <u>1</u>
STATUS: <u>Approved</u>	DATE FOR REV.: <u>8/30/05</u>
PREPARER <u>W. J. Johnson/ <i>W. J. Johnson</i></u>	DATE: <u>8/30/05</u>
REVIEWER <u>A. G. Klazura/ <i>A. G. Klazura</i></u>	DATE: <u>8/30/05</u>
APPROVER <u>S. R. Raupp/ <i>S. R. Raupp</i></u>	DATE: <u>8/20/05</u>
IDENTIFICATION OF PAGES ADDED/REVISED/SUPERSEDED/VOIDED & REVIEW METHOD	
	INPUTS/ ASSUMPTIONS <input type="checkbox"/> VERIFIED <input type="checkbox"/> UNVERIFIED
REVIEW METHOD: _____	REV. _____
STATUS: _____	DATE FOR REV.: _____
PREPARER _____	DATE: _____
REVIEWER _____	DATE: _____
APPROVER _____	DATE: _____

NOTE: PRINT AND SIGN IN THE SIGNATURE AREAS



Calcs. For MNGP-AST – Offsite Post-Accident Atmospheric	
Dispersion Analysis	
X	Safety Related
	Non-Safety Related

Calc No.	2004-01852	
Rev.	1	Date
Page	2	of 6

Client	Nuclear Management Company	
Project	Monticello Nuclear Generating Plant	
Proj. No	11163-013	Equip. No.

Prepared by	Date
Reviewed by	Date
Approved by	Date

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2 DESIGN INPUT.....	3
3 ASSUMPTIONS	3
4 METHODOLOGY AND ACCEPTANCE CRITERIA.....	4
5 CALCULATIONS	4
6 RESULTS AND CONCLUSIONS	4
7 REFERENCES.....	4
ATTACHMENT A. Calculation No. MNGP-001, MNGP AST – Offsite Post-accident Atmospheric Dispersion Analysis (29 pages).....	A-1
ATTACHMENT B. Computer File Listing For Calculation No. MNGP-001 (3 pages)	B-1



Calcs. For MNGP-AST – Offsite Post-Accident Atmospheric	
Dispersion Analysis	
X	Safety Related
	Non-Safety Related

Calc No.	2004-01852	
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Client	Nuclear Management Company	Prepared by	Date
Project	Monticello Nuclear Generating Plant	Reviewed by	Date
Proj. No	11163-013	Approved by	Date
	Equip. No.		

1 PURPOSE AND SCOPE

New offsite short term atmospheric dispersion parameter (χ/Q) values for Nuclear Management Company's (NMC) Monticello Nuclear Generating Plant (MNGP) have been determined in Applied Analysis Corp. (AAC) calculation MNGP-001 (Reference 1), which is included in its entirety in Attachments A and B. The new χ/Q values are determined in accordance with the guidance provided in Regulatory Guide 1.145 (Reference 2).

The purpose of this calculation is to document the S&L independent verification of AAC calculation MNGP-001. The verification consists of a review to assure that the methodology used in the calculation is appropriate to the purpose of the calculation, that the inputs are in accordance with the approved inputs provided by NMC, and that the results of the analysis are consistent with the inputs and methodology.

Revision 1 to this calculation incorporates Revision 2 to MNGP-001. The changes in this revision are the use of meteorological data at the 10 m elevation, and changing the maximum wind speed and terrain height used in PAVAN.

2 DESIGN INPUT

The principal design inputs for this calculation are the new site meteorological data and data identifying the release points and site boundary locations. The design inputs and their bases are identified in Section 4.0 of MNGP-001 (Attachment A). All of the MNGP specific inputs are referenced to the NMC design input calculation (Reference 3) and are therefore approved by NMC.

The Monticello Updated Safety Analysis Report (USAR) Tables 2.3-12 and 2.3-20 (Reference 4) contain historical meteorological data for 1980 at 10 meters and 100 meters, respectively. Table 1 is a comparison between the USAR data and the meteorological data used to determine the new χ/Q values. The new meteorological data is for the five year period 1998-2002, which is consistent with the recommendations in Regulatory Guide 1.194 (Reference 5). Inspection of Table 1 indicates the new data is generally consistent with the USAR historical data. In addition, the new data tends to more stable classes, which is more conservative than the USAR data. The five year meteorological data set contains 41557 observations at 10 meters and 40807 observations at 100 meters, which is a recovery rate greater than 93% and indicates the data set is large enough to be representative of the site.

3 ASSUMPTIONS

The assumptions used in the determination of the short term χ/Q values are documented in Section 3.0 of MNGP-001 (Attachment A). These assumptions are consistent with the methodology and data used in the calculation.



Calcs. For MNGP-AST – Offsite Post-Accident Atmospheric		Calc No. 2004-01852	
Dispersion Analysis		Rev. 1	Date
X	Safety Related	Page 4 of 6	
	Non-Safety Related		

Client	Nuclear Management Company	Prepared by	Date
Project	Monticello Nuclear Generating Plant	Reviewed by	Date
Proj. No	11163-013	Approved by	Date
	Equip. No.		

4 METHODOLOGY AND ACCEPTANCE CRITERIA

The short term χ/Q values are calculated at the Exclusion Area Boundary (EAB) and the Low Population Zone (LPZ) using the computer code PAVAN (Reference 6). PAVAN is an NRC developed code used to calculate χ/Q values in accordance with Regulatory Guide 1.145 and is an appropriate methodology for this calculation.

Because of a limitation in the version of the code used by AAC, it was not possible to include all EAB distances in a single computer run. Therefore, the 5% overall site χ/Q value could not be determined. To account for this limitation, a separate run was performed with the shortest distance to the EAB used in all sectors. This resulted in a conservative 5% overall site χ/Q value.

The purpose of the calculation is to determine the χ/Q values to be used in accident analyses at MNGP. Therefore, there are no acceptance criteria for this calculation.

5 CALCULATIONS

Not applicable to this calculation.

6 RESULTS AND CONCLUSIONS

Calculations were performed for both elevated releases (off-gas stack) and ground level releases (Reactor/Turbine Buildings). The calculated χ/Q values from MNGP-001 are summarized in Table 2 for ground level releases and in Table 3 for elevated releases. These tables also contain the equivalent values from USAR Table 14.7-13. Inspection of these tables indicate that there is generally good agreement between the two sets of values, with the new values larger and therefore more conservative.

Based on the above discussion, it is concluded that the methodology used in the MNGP-001 is appropriate to the purpose of the calculation, that the inputs are in accordance with the approved inputs provided by NMC, and that the results of the analysis are consistent with the inputs and methodology.

7 REFERENCES

1. MNGP-001, Revision 2, "MNGP AST – Offsite Post-accident Atmospheric Dispersion Analysis," prepared by Applied Analysis Corp. for Nuclear Management Company, Monticello Nuclear Generating Plant
2. Regulatory Guide 1.145, "Atmospheric Dispersion Models for Potential Accident Consequence Assessments at Nuclear Power Plants," Revision 1, USNRC, November 1982
3. MNGP Calculation 03-190, Revision 1, "Design Inputs for Alternate Source Term (AST) Radiological Analysis"
4. Monticello Updated Safety Analysis Report, Revision 21
5. Regulatory Guide 1.194, "Atmospheric Relative Concentrations for Control Room Radiological



Calcs. For MNGP-AST – Offsite Post-Accident Atmospheric			Calc No. 2004-01852	
Dispersion Analysis			Rev. 1	Date
X	Safety Related		Page 5	of 6

Client	Nuclear Management Company	Prepared by	Date
Project	Monticello Nuclear Generating Plant	Reviewed by	Date
Proj. No	11163-013	Approved by	Date
	Equip. No.		

- Habitability Assessments at Nuclear Power Plants,” USNRC, June 2003
6. NUREG/CR-2858, “PAVAN: An Atmospheric Dispersion Program for Evaluating Design Basis Accidental Releases of Radioactive Materials from Nuclear Power Stations,” USNRC, November 1982

Table 1. Comparison of New Meteorological Data To Data Reported in the USAR

Class	10 meter Elevation		100 meter Elevation	
	USAR %	MNGP-001 %	USAR %	MNGP-001 %
A	15.14	9.0	7.98	2.1
B	2.54	2.6	4.25	3.3
C	3.82	5.9	4.39	5.0
D	33.56	31.5	42.64	43.7
E	24.48	31.6	24.73	30.0
F	10.62	10.1	12.17	10.3
G	9.85	9.2	3.85	5.7

Table 2. Offsite Ground Level χ/Q Values (sec/m³)

Time Period	USAR	MNGP-001
0-2 hours (EAB)	9.20E-4	7.86E-4
0-2 hours (LPZ)	7.93E-5	8.83E-5
2-8 hours (LPZ)	7.93E-5	8.83E-5
8-24 hours (LPZ)	5.35E-5	6.71E-5
1-4 days (LPZ)	2.28E-5	3.70E-5
4-30 days (LPZ)	6.68E-6	1.57E-5



Calcs. For MNGP-AST – Offsite Post-Accident Atmospheric		
Dispersion Analysis		
X	Safety Related	Non-Safety Related

Calc No.	2004-01852	
Rev.	1	Date
Page	6	of 6

Client	Nuclear Management Company	Prepared by	Date
Project	Monticello Nuclear Generating Plant	Reviewed by	Date
Proj. No	11163-013	Approved by	Date
	Equip. No.		

Table 3. Offsite Elevated χ/Q Values (sec/m³)

Time Period	USAR	MNGP-001
0-0.5 hours (EAB)	1.01E-4	1.11E-4
0.5-2 hours (EAB)	3.21E-6	4.22E-6
0-0.5 hours (LPZ)	3.51E-5	3.86E-5
0.5-2 hours (LPZ)	1.30E-6	2.14E-6
2-8 hours (LPZ)	1.30E-6	2.14E-6
8-24 hours (LPZ)	8.54E-7	1.61E-6
1-4 days (LPZ)	3.70E-7	8.64E-7
4-30 days (LPZ)	1.11E-7	3.54E-7

(Final Page)

See CD “(Proprietary) MNGP AST Calculations”
for CA-04-036/S&L 2004-01852 Attachment A
(AAC Calculation MNGP-001, MNGP AST -
Offsite Post-Accident Atmospheric Dispersion
Analysis).



Calcs. For MNGP-AST – Offsite Post-Accident Atmospheric	
Dispersion Analysis	
X	Safety Related
	Non-Safety Related

Calc No.	2004-01852	
Rev.	1	Date
Page	B-1	of B-3

Client	Nuclear Management Company	Prepared by	Date
Project	Monticello Nuclear Generating Plant	Reviewed by	Date
Proj. No	11163-013	Approved by	Date
	Equip. No.		

ATTACHMENT B. Computer File Listing For Calculation No. MNGP-001

Associated with AAC calculation No. MNGP-001 are a number of computer files that contain input data and computer output. Additional files identified in MNGP-001 contain attachments to the calculation that are not associated with computer runs. All of the files identified in MNGP-001 are contained on a compact disk (CD) associated with this calculation. The list of files and the purpose of each file is summarized in the list below.

File Name	Purpose
MNGP-001\calculation	
DVCS_MNGP-001.pdf	Design verification comment sheet for Rev 0
DVCS_MNGP-001_Rev1.pdf	Design verification comment sheet for Rev 1
DVCS - MNGP-001_Rev2.pdf	Design verification comment sheet for Rev 2
MNGP-001\elevated files\met data	
100M_RG121.00	Joint frequency table, 100m elevation, 2000
100m_rg121.01	Joint frequency table, 100m elevation, 2001
100m_rg121.02	Joint frequency table, 100m elevation, 2002
100M_RG121.98_jfd	Joint frequency table, 100m elevation, 1998
100m_rg121.99	Joint frequency table, 100m elevation, 1999
alr12100.txt	Converted Excel data in text format, 100m elevation
alr12100.xls	Excel spreadsheet summing 5 years of data, 100m elevation
MNGP-001\elevated files\met data\binning comparison	
100M_NON_RG121.00	Joint frequency table, 100m elevation, non RG 1.21, 2000
100m_non_rg121.01	Joint frequency table, 100m elevation, non RG 1.21, 2001
100m_non_rg121.02	Joint frequency table, 100m elevation, non RG 1.21, 2002
100M_NON_RG121.98_jfd	Joint frequency table, 100m elevation, non RG 1.21, 1998
100m_non_rg121.99	Joint frequency table, 100m elevation, non RG 1.21, 1999
8e500aln.dat	PAVAN input, non RG 1.21 case, 100m elevation
8e500aln.OUT	PAVAN output, non RG 1.21 case, 100m elevation
alnrg100.txt	Converted Excel data in text format, non RG 1.21, 100m
alnrg100.xls	Excel spreadsheet summing 5 years of data, non RG 1.21, 100m
MNGP-001\elevated files\pavan runs	
1157e825.dat	PAVAN input, EAB 1157m and 825m, elevated
1157e825.OUT	PAVAN output, EAB 1157m and 825m, elevated
527e500.dat	PAVAN input, EAB 527m and 500m, elevated
527e500.OUT	PAVAN output, EAB 527m and 500m, elevated
560e693.dat	PAVAN input, EAB 560m and 693m, elevated
560e693.OUT	PAVAN output, EAB 560m and 693m, elevated
771e827.dat	PAVAN input, EAB 771m and 827m, elevated
771e827.OUT	PAVAN output, EAB 771m and 827m, elevated
888e785.dat	PAVAN input, EAB 888m and 785m, elevated
888e785.OUT	PAVAN output, EAB 888m and 785m, elevated
899e891.dat	PAVAN input, EAB 899m and 891m, elevated
899e891.OUT	PAVAN output, EAB 899m and 891m, elevated



Calcs. For MNGP-AST – Offsite Post-Accident Atmospheric	
Dispersion Analysis	
X	Safety Related
	Non-Safety Related

Calc No.	2004-01852	
Rev.	1	Date
Page	B-2	of B-3

Client	Nuclear Management Company	Prepared by	Date
Project	Monticello Nuclear Generating Plant	Reviewed by	Date
Proj. No	11163-013	Approved by	Date
	Equip. No.		

File Name	Purpose
983e1048.dat	PAVAN input, EAB 983m and 1048m, elevated
983e1048.OUT	PAVAN output, EAB 983m and 1048m, elevated
e1300all.dat	PAVAN input, EAB 1300m, elevated
e1300all.OUT	PAVAN output, EAB 1300m, elevated
e500all.dat	PAVAN input, EAB 500m, elevated
e500all.OUT	PAVAN output, EAB 500m, elevated
e600all.dat	PAVAN input, EAB 600m, elevated
e600all.OUT	PAVAN output, EAB 600m, elevated
e665.dat	PAVAN input, EAB 665m, elevated
e665.OUT	PAVAN output, EAB 665m, elevated
e900all.dat	PAVAN input, EAB 900m, elevated
e900all.OUT	PAVAN output, EAB 900m, elevated
MNGP-001\ground level files\met data	
10m_rg121.00	Joint frequency table, 10m elevation, 2000
10m_rg121.01	Joint frequency table, 10m elevation, 2001
10m_rg121.02	Joint frequency table, 10m elevation, 2002
10m_rg121.98	Joint frequency table, 10m elevation, 1998
10m_rg121.99	Joint frequency table, 10m elevation, 1999
cleansp.prn	Converted Excel data in text format, 10m elevation
summed.xls	Excel spreadsheet summing 5 years of data, 10m elevation
MNGP-001\ground level files\met data\binning comparison	
10m_non_rg121.00	Joint frequency table, 10m elevation, non RG 1.21, 2000
10m_non_rg121.01	Joint frequency table, 10m elevation, non RG 1.21, 2001
10m_non_rg121.02	Joint frequency table, 10m elevation, non RG 1.21, 2002
10m_non_rg121.98	Joint frequency table, 10m elevation, non RG 1.21, 1998
10m_non_rg121.99	Joint frequency table, 10m elevation, non RG 1.21, 1999
450nonew.dat	PAVAN input, non RG 1.21 case, 10m elevation
450nonew.OUT	PAVAN output, non RG 1.21 case, 10m elevation
nonrgall.prn	Converted Excel data in text format, non RG 1.21, 10m
nonrgall.xls	Excel spreadsheet summing 5 years of data, non RG 1.21, 10m
MNGP-001\ground level files\pavan runs	
450g505n.dat	PAVAN input, EAB 450m and 505m, ground level
450g505n.OUT	PAVAN output, EAB 450m and 505m, ground level
473g451n.dat	PAVAN input, EAB 473m and 451m, ground level
473g451n.OUT	PAVAN output, EAB 473m and 451m, ground level
621g761n.dat	PAVAN input, EAB 621m and 761m, ground level
621g761n.OUT	PAVAN output, EAB 621m and 761m, ground level
6231021n.dat	PAVAN input, EAB 623m and 1021m, ground level
6231021n.OUT	PAVAN output, EAB 623m and 1021m, ground level
741g843n.dat	PAVAN input, EAB 741m and 843m, ground level
741g843n.OUT	PAVAN output, EAB 741m and 843m, ground level
862g864n.dat	PAVAN input, EAB 862m and 864m, ground level
862g864n.OUT	PAVAN output, EAB 862m and 864m, ground level
884g616n.dat	PAVAN input, EAB 884m and 616m, ground level
884g616n.OUT	PAVAN output, EAB 884m and 616m, ground level
9371225n.dat	PAVAN input, EAB 937m and 1225m, ground level
9371225n.OUT	PAVAN output, EAB 937m and 1225m, ground level



Calcs. For MNGP-AST – Offsite Post-Accident Atmospheric	
Dispersion Analysis	
X	Safety Related
	Non-Safety Related

Calc No.	2004-01852	
Rev.	1	Date
Page	B-3	of B-3

Client	Nuclear Management Company	
Project	Monticello Nuclear Generating Plant	
Proj. No	11163-013	Equip. No.

Prepared by	Date
Reviewed by	Date
Approved by	Date

File Name	Purpose
g450alln.dat	PAVAN input, EAB 450m, ground level
g450alln.OUT	PAVAN output, EAB 450m, ground level
MNGP-001\sample problem	
MNGP_001_SampleProblem.pdf	PAVAN Software Verification Form for Rev. 0
TEST1.DAT	PAVAN test problem input for Rev. 0
test1.OUT	PAVAN test problem output for Rev. 0
MNGP-001\sample problem\Rev1	
MNGP_001_Rev1_SampleProblem.pdf	PAVAN Software Verification Form for Rev. 1
Test1.dat	PAVAN test problem input for Rev. 1
test1.OUT	PAVAN test problem output for Rev. 1
MNGP-001\sample problem\Rev2	
MNGP_001_Rev2_SampleProblem.pdf	PAVAN Software Verification Form for Rev. 2
Test1.dat	PAVAN test problem input for Rev. 2
test1.OUT	PAVAN test problem output for Rev. 2

(Final Page)

MONTICELLO NUCLEAR GENERATING PLANT		3494
TITLE:	CALCULATION COVER SHEET	Revision 15
		Page 1 of 4

CALCULATION COVER SHEET

Page 1 of _____

Title MNGP AST - CR/TSC Post-Accident CA- 04 - 037 Add. 0
Atmospheric Dispersion Analysis

PART A – (Not Applicable to Vendor Calcs)

Assigned Personnel			
Name (Print)	Signature	Title	Initials

Record of Issues							
Rev	Description	Total Sheets	Last Sheet	Preparer	Verifier	Approval	Approval Date

Verification Method(s)

- Review
 Alternate Calculation
 Test
 Other
 Technical Review (per 4 AWI-05.08.07 (FP-E-MOD-07))

3087 (DOCUMENT CHANGE, HOLD AND COMMENT FORM) incorporated: _____				
FOR ADMINISTRATIVE USE ONLY	Resp Subv: CNSTP	Assoc Ref: 4 AWI-05.01.25	SR: N	Freq: 0 yrs
	ARMS: 3494	Doc Type: 3042	Admin initials:	Date:

Approved (Signatures available in Master File)

MONTICELLO NUCLEAR GENERATING PLANT		3494
TITLE:	CALCULATION COVER SHEET	Revision 15
		Page 2 of 4

Page 2 of _____

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PART B – (Applicable to Vendor Calculations Only)

Vendor Name Sargent & Lundy Vendor Calc No: 2004-02100, Rev 2
 Vendor Approval Date: 8/30/05

- Form 3345 or QF-0547 attached.
- Safety related? If safety related, attach DIA or reference here. See Other Comments

Reviewed by: Dave Sexton / Kathy Shriver G.E. by K.R. Shriver 9/6/05
 Print Name Signature Date
 Accepted by: Dennis Zercher Dennis Zercher 9/6/05
 Print Name Eng. Supv. Signature Date

Record of Issues			
Revision	Description	Total No. of Sheets	Last Sheet Number
2	Rev 2 of 2004-02100 revised elevated release X/Q calculation; changed PAVAN high wind category UMAX value and CR/TSC sectors.		

PART C – Design Basis Data (Complete for all Calculations)

10 CFR50.59 Screening or Evaluation No: N/A
 Associated Reference(s): ASTLAR

Does this calculation:	YES	NO	Calc No(s), Rev(s), Add(s)
Supersede another calculation?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	CA-94-102, Rev 0, Add 0. See comments.
Augment (credited by) another calculation?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	CA-04-038 R0 Add 0; CA-04-039 R0 Add 0; CA-04-040 R0 Add 0; CA-04-041 R1 Add 0
Derive inputs from another calculation?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	CA-03-190, Rev 1, Add 0
Affect the Fire Protection Program per Form 3765?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	If Yes, attach Form 3765
Affect piping or supports?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	If Yes, attach Form 3544

Approved (Signatures available in Master File)

MONTICELLO NUCLEAR GENERATING PLANT		3494
TITLE:	CALCULATION COVER SHEET	Revision 15
		Page 3 of 4

Affect IST Program Valve or Pump Reference Values, and/or Acceptance Criteria?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	If Yes, inform IST Coordinator and provide copy of calculation
--	--------------------------	-------------------------------------	--

Page 3 of _____
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List all documents/procedures that are based on this calculation (include revision):

USAR Sections 2.3 and 14

List all plant procedures used to ensure inputs/assumptions/outputs are maintained (include revision):

None

What Systems or components are affected?

System Code(s) (See Form 3805): MSC

Component ID's (CHAMPS Equip): N/A

DBD Section (if any): B.08.13, Sections 2.4 and 6

Topic Code (See Form 3805): DBAE

Structure Code (See Form 3805): N/A

Other Comments: Sargent & Lundy calculation 2004-02100 Rev 2 incorporates AAC Calculation #MNGP-002 Rev 4 (see attachment for cross-references). Note: This calculation is not incorporated as part of MNGP's design basis until the associated LARs are approved (AST Phase 1 and 2).

Future needs (reference OTH021016): Update USAR and DBD relevant sections; provide hard copy of #MNGP-002 attachments when received (currently available in electronic format only).

Approved (Signatures available in Master File)

MONTICELLO NUCLEAR GENERATING PLANT		3494
TITLE:	CALCULATION COVER SHEET	Revision 15
		Page 4 of 4

This calculation was completed in accordance with the approved
project work plan (DIA Equivalent) for the AST Implementation S&L
Letter # SLMON-2003-085, and PO38317

Approved (Signatures available in Master File)

MNGP AST Project Calculations List

Calculation No.	Title
<p>MNGP # S&L # AAC #</p>	<p>[Applied Analysis Corporation (AAC) performed DBA calculations for the AST project. Sargent & Lundy provided independent verification and documented results in S&L calculations which incorporated the AAC calculations as attachments. The S&L calculations were accepted by MNGP via the vendor calculation control process (4 AWI-05.01.25). Thus each DBA calculation has three numbers – MNGP, S&L, and AAC.</p> <p>AAC calculations will reference other AST calculations by their AAC number. This list is provided for proper cross-reference of calculations.]</p>
<p>03-190 N/A N/A</p>	<p>Design Inputs For Alternate Source Term (AST) Radiological Analysis</p>
<p>04-036 2004-01852 MNGP-001</p>	<p>MNGP AST - Offsite Post-Accident Atmospheric Dispersion Analysis</p>
<p>04-037 2004-02100 MNGP-002</p>	<p>MNGP AST - CR/TSC Post-Accident Atmospheric Dispersion Analysis</p>
<p>04-038 2004-02101 MNGP-003</p>	<p>MNGP AST - LOCA Radiological Consequence Analysis</p>
<p>04-039 2004-02102 MNGP-004</p>	<p>MNGP AST - MSLBA Radiological Consequence Analysis</p>
<p>04-040 2004-02103 MNGP-005</p>	<p>MNGP AST - CRDA Radiological Consequence Analysis</p>
<p>04-041 2004-02104 MNGP-006</p>	<p>MNGP AST - FHA Radiological Consequence Analysis</p>
<p>04-042 2004-02105 MNGP-007</p>	<p>MNGP AST - Post-LOCA pH Analysis</p>
<p>04-210 2004-07600 N/A</p>	<p>Alternative Source Term – Core Isotopic Inventory</p>
<p>05-130 2005-00480 N/A</p>	<p>Post LOCA Direct Dose to the Control Room From External Sources</p>
<p>05-134 2005-06343 MNGP-012</p>	<p>Post-LOCA Steam Pipe Internal Temperature 30-Day Profile for Radiological Dose Analysis</p>

MONTICELLO NUCLEAR GENERATING PLANT		3345
TITLE:	VENDOR CALCULATION REVIEW CHECKLIST	Revision 3
		Page 1 of 1

CA - 04 - 037, Rev 2
Attachment 1

The purpose of the review is to ensure that the vendor calculation or analysis complies with the conditions of the purchase order and is appropriate for its intended use. The purpose of the review is not to serve as an independent verification. Independent verification of the calculation or analysis by the vendor should be evident in the document.

The reviewer should use the criteria below as a guide to assess the overall quality, completeness and usefulness of the calculation or analysis. The reviewer is not required to check the vendor's calculations in detail.

See 4 AWI-05.01.25 (CALCULATION/ANALYSIS CONTROL) for guidance. Place initials by items reviewed.

REVIEW

1. Form 3544 (PIPING AND SUPPORT NUMBERING) completed for calculations affecting piping or supports.
2. Design inputs correspond to those which were transmitted to the vendor.
3. Assumptions are described and reasonable. Basis for assumptions identified.
4. Applicable codes, standards and regulations are identified and met.
5. Applicable construction and operating experience is considered.
6. Applicable structure(s), system(s), and component(s) are listed.
7. Formulas and equations documented and unusual symbols are defined.
8. Acceptance criteria are identified, adequate and satisfied.
9. Results are reasonable compared to inputs.
10. Source documents are referenced.
11. The calculation is appropriate for its intended use.
12. The calculation complies with the terms of the Purchase Order.
13. Inputs, assumptions, outputs, etc. which could affect plant operation are enforced by adequate procedural controls. List any affected procedures.

N/A KWS G.H.
KWS D.L.
KWS G.H.
KWS G.H.
KWS G.H.
KWS G.H.
KWS G.H.
KWS G.H.
KWS G.H.
KWS G.H.
KWS G.H.
KWS G.H.
KWS G.H.
KWS G.H.

None

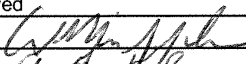
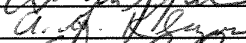
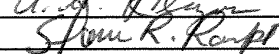
KWS D.L.

Completed By: K.R. Sumner D. Sex Date: 9/6/05

3087 (DOCUMENT CHANGE, HOLD AND COMMENT FORM) incorporated:				
FOR ADMINISTRATIVE	Resp Supv: CNSTP	Assoc Ref: 4 AWI-05.01.25	SR: N	Freq: 0 yrs
	ARMS: 3345	Doc Type: 3042	Admin initials:	Date:

Approved (Signatures available in Master File)

ISSUE SUMMARY
Form SOP-0402-07, Revision 6

DESIGN CONTROL SUMMARY			
CLIENT:	Nuclear Management Company	UNIT NO.:	<u>1</u> Page No.: <u>1 of 6</u>
PROJECT NAME:	Monticello Nuclear Generating Plant		
PROJECT NO.:	11163-013	<input checked="" type="checkbox"/>	NUCLEAR SAFETY- RELATED
CALC. NO.:	2004-02100	<input type="checkbox"/>	NOT NUCLEAR SAFETY-RELATED
TITLE:	MNGP AST – CR/TSC Post-Accident Atmospheric Dispersion Analysis		
EQUIPMENT NO.:	_____		
IDENTIFICATION OF PAGES ADDED/REVISED/SUPERSEDED/VOIDED & REVIEW METHOD			
Initial issue (48 pages): Calculation (5 Pages), Attachment A – AAC Calculation MNGP-002 (41 Pages), Attachment B – List of Electronic Files (2 Pages).			
		INPUTS/ ASSUMPTIONS	
		<input checked="" type="checkbox"/> VERIFIED	
		<input type="checkbox"/> UNVERIFIED	
REVIEW METHOD:	<u>Detailed Review</u>	REV.	<u>0</u>
STATUS:	<u>Approved</u>	DATE FOR REV.:	<u>03-23-04</u>
PREPARER	<u>W. J. Johnson (See original for signature)</u>	DATE:	<u>03-22-04</u>
REVIEWER	<u>M. D. Elo (See original for signature)</u>	DATE:	<u>03-22-04</u>
APPROVER	<u>M. A. Pressburger (See original for signature)</u>	DATE:	<u>03-23-04</u>
IDENTIFICATION OF PAGES ADDED/REVISED/SUPERSEDED/VOIDED & REVIEW METHOD			
Revised to incorporate alternate CR dispersion parameters for Admin Bldg. air intake location. Revision 1 supersedes Revision 0. Revision 1 (67 pages): Calculation (6 pages), Attachment A – AAC Calculation MNGP-002 (58 pages), Attachment B – List of Electronic Files (3 pages).			
		INPUTS/ ASSUMPTIONS	
		<input checked="" type="checkbox"/> VERIFIED	
		<input type="checkbox"/> UNVERIFIED	
REVIEW METHOD:	<u>Detailed Review</u>	REV.	<u>1</u>
STATUS:	<u>Approved</u>	DATE FOR REV.:	<u>11-17-04</u>
PREPARER	<u>W. J. Johnson/(See original for signature)</u>	DATE:	<u>11-17-04</u>
REVIEWER	<u>A. G. Klazura/(See original for signature)</u>	DATE:	<u>11-17-04</u>
APPROVER	<u>S. R. Raupp/(See original for signature)</u>	DATE:	<u>11-17-04</u>
IDENTIFICATION OF PAGES ADDED/REVISED/SUPERSEDED/VOIDED & REVIEW METHOD			
Revised to incorporate a change in the PAVAN-PC calculations. Revision 2 supersedes Revision 1. Revision 2 (69 pages): Calculation (6 pages), Attachment A – AAC Calculation MNGP-002 (60 pages), Attachment B – List of Electronic Files (3 pages).			
		INPUTS/ ASSUMPTIONS	
		<input checked="" type="checkbox"/> VERIFIED	
		<input type="checkbox"/> UNVERIFIED	
REVIEW METHOD:	<u>Detailed Review</u>	REV.	<u>2</u>
STATUS:	<u>Approved</u>	DATE FOR REV.:	<u>8/30/05</u>
PREPARER	<u>W. J. Johnson</u> 	DATE:	<u>8/30/05</u>
REVIEWER	<u>A. G. Klazura</u> 	DATE:	<u>8/30/05</u>
APPROVER	<u>S. R. Raupp</u> 	DATE:	<u>8/30/05</u>

NOTE: PRINT AND SIGN IN THE SIGNATURE AREAS



Calcs. For MNGP-AST – CR/TSC Post-Accident	
Atmospheric Dispersion Analysis	
X	Safety Related
	Non-Safety Related

Calc No.	2004-02100	
Rev.	2	Date
Page	2	of 6

Client	Nuclear Management Company	
Project	Monticello Nuclear Generating Plant	
Proj. No	11163-013	Equip. No.

Prepared by	Date
Reviewed by	Date
Approved by	Date

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2 DESIGN INPUT.....	3
3 ASSUMPTIONS	3
4 METHODOLOGY AND ACCEPTANCE CRITERIA.....	4
5 CALCULATIONS	4
6 RESULTS AND CONCLUSIONS	4
7 REFERENCES.....	4
ATTACHMENT A. Calculation No. MNGP-002, MNGP AST – CR/TSC Post-Accident Atmospheric Dispersion Analysis (60 pages).....	A-1
ATTACHMENT B. Computer File Listing For Calculation No. MNGP-002 (3 pages)	B-1



Calcs. For MNGP-AST – CR/TSC Post-Accident		Calc No. 2004-02100	
Atmospheric Dispersion Analysis		Rev. 2	Date
X	Safety Related	Page 3	of 6
	Non-Safety Related		

Client	Nuclear Management Company	Prepared by	Date
Project	Monticello Nuclear Generating Plant	Reviewed by	Date
Proj. No	11163-013	Approved by	Date
	Equip. No.		

1 PURPOSE AND SCOPE

New Control Room (CR) and Technical Support Center (TSC) short term atmospheric dispersion parameter (χ/Q) values for Nuclear Management Company's (NMC) Monticello Nuclear Generating Plant (MNGP) have been determined in Applied Analysis Corp. (AAC) calculation MNGP-002 (Reference 1), which is included in its entirety in Attachments A and B. The new χ/Q values are determined in accordance with the guidance provided in Regulatory Guide 1.194 (Reference 2).

The purpose of this calculation is to document the S&L independent verification of AAC calculation MNGP-002. The verification consists of a review to assure that the methodology used in the calculation is appropriate to the purpose of the calculation, that the inputs are in accordance with the approved inputs provided by NMC, and that the results of the analysis are consistent with the inputs and methodology.

Revision 1 incorporates additional χ/Q values based on intake/inleakage at the Primary Administration Building (PAB) air intake location as documented in Revision 3 to MNGP-002. Revision 2 changes the PAVAN calculations to be consistent with Reference 2, Section 3.2.2.

2 DESIGN INPUT

The principal design inputs for this calculation are the new site meteorological data and data identifying the release points and CR/TSC input locations. The design inputs and their bases are identified in Section 4.0 of MNGP-002 (Attachment A). All of the MNGP specific inputs are referenced to NMC calculation CA-03-190 (Reference 3) or specific NMC drawings. Therefore the inputs are considered approved by NMC.

The Monticello Updated Safety Analysis Report (USAR) Tables 2.3-12 and 2.3-20 (Reference 4) contain historical meteorological data for 1980. Table 1 is a comparison between the USAR data and the meteorological data used to determine the new χ/Q values. The USAR provides data at 10 meter and 100 meter elevation, whereas the data used in the calculation is at 43 meter elevation (the elevation of the Reactor Building vent). The new meteorological data is for the five year period 1998-2002, which is consistent with the recommendations in Regulatory Guide 1.194 (Reference 2). Inspection of Table 1 indicates the new data is generally consistent with the USAR historical data. The five year meteorological data set used for the control room χ/Q values contains 42569 observations, which is a recovery rate of 97% and indicates the data set is large enough to be representative of the site. Note that meteorological data at the 10 meter and 100 meter elevations is also used in this calculation. Evaluation of the reasonableness of this data is evaluated in calculation 2004-01852 (Reference 8).

3 ASSUMPTIONS

The assumptions used in the determination of the short term χ/Q values are documented in Section 3.0 of MNGP-002 (Attachment A). These assumptions are consistent with the methodology and data used in



Calcs. For MNGP-AST – CR/TSC Post-Accident		Calc No. 2004-02100	
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the calculation.

4 METHODOLOGY AND ACCEPTANCE CRITERIA

The short term χ/Q values for the CR and TSC are calculated using the computer code ARCON96 (Reference 5). ARCON96 is an NRC developed code developed specifically for calculating χ/Q values for building intakes and therefore is an appropriate methodology for this application. In addition, the χ/Q values for elevated releases under fumigation conditions are calculated using the computer code PAVAN (Reference 6). PAVAN is an NRC developed code used to calculate χ/Q values in accordance with Regulatory Guide 1.145 (Reference 7) and is recommended by Regulatory Guide 1.194 for this type of calculation.

The purpose of the calculation is to determine the χ/Q values to be used in accident analyses at MNGP. Therefore, there are no acceptance criteria for this calculation.

5 CALCULATIONS

Not applicable to this calculation.

6 RESULTS AND CONCLUSIONS

Calculations were performed for both elevated releases (off-gas stack) and ground level releases. The calculated χ/Q values from MNGP-002 are summarized in Table 2 for ground level releases and in Table 3 for elevated releases. Four release points are considered for ground level releases (RB Vent, RB Wall, Turbine Building Vent and Condenser) whereas only one release point is considered for elevated releases. For the control room, two intake locations are considered, the CR ventilation system inlet and the PAB ventilation system inlet. These tables also contain the equivalent values from USAR Table 14.7-13. Inspection of these tables indicate that there is generally good agreement between the two sets of values, with the new values generally larger and therefore more conservative. Note that the new calculation considers more release points than are identified in the USAR. Some of the release points (such as the RB wall shown in Table 2) result in χ/Q values that are considerably larger and more conservative than those shown in the USAR.

Based on the above discussion, it is concluded that the methodology used in the MNGP-002 is appropriate to the purpose of the calculation, that the inputs are in accordance with the approved inputs provided by NMC, and that the results of the analysis are consistent with the inputs and methodology.

7 REFERENCES

1. MNGP-002, Revision 4, "MNGP AST – CR/TSC Post-Accident Atmospheric Dispersion Analysis," prepared by Applied Analysis Corp. for Nuclear Management Company, Monticello Nuclear Generating Plant



Calcs. For MNGP-AST – CR/TSC Post-Accident		Calc No. 2004-02100	
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2. Regulatory Guide 1.194, "Atmospheric Relative Concentrations for Control Room Radiological Habitability Assessments at Nuclear Power Plants," USNRC, June 2003
3. MNGP Calculation CA-03-190, Revision 1, "Design Inputs for Alternate Source Term (AST) Radiological Analysis"
4. Monticello Updated Safety Analysis Report, Revision 21
5. NUREG/CR-6331, "Atmospheric Relative Concentrations in Building Wakes," Revision 1, USNRC, May 1997
6. NUREG/CR-2858, "PAVAN: An Atmospheric Dispersion Program for Evaluating Design Basis Accidental Releases of Radioactive Materials from Nuclear Power Stations," USNRC, November 1982
7. Regulatory Guide 1.145, "Atmospheric Dispersion Models for Potential Accident Consequence Assessments at Nuclear Power Plants," Revision 1, USNRC, November 1982
8. 2004-01852, Revision 1, "MNGP AST – Offsite Post-Accident Atmospheric Dispersion Analysis," prepared by Sargent & Lundy for Nuclear Management Company, Monticello Nuclear Generating Plant

Table 1. Comparison of New Meteorological Data To Data Reported in the USAR

Class	USAR 10m %	USAR 100m %	MNGP-002 43m %
A	15.14	7.98	8.4
B	2.54	4.25	2.6
C	3.82	4.39	5.9
D	33.56	42.64	30.8
E	24.48	24.73	32.5
F	10.62	12.17	10.3
G	9.85	3.85	9.5

Table 2. Control Room Ground Level χ/Q Values (sec/m³)

Time Period	USAR	MNGP-002 – CR Intake		MNGP-002 – PAB Intake	
		RB Vent	RB Wall	RB Vent	RB Wall
0-2 hours	1.67E-3	2.48E-3	1.00E-2	2.47E-3	1.43E-2
2-8 hours	1.67E-3	1.81E-3	7.09E-3	1.76E-3	9.69E-3
8-24 hours	1.41E-3	6.58E-4	2.75E-3	6.31E-4	3.82E-3
1-4 days	9.65E-4	4.67E-4	1.90E-3	4.57E-4	2.65E-3
4-30 days	5.62E-4	3.49E-4	1.42E-3	3.41E-4	1.98E-3



Calcs. For MNGP-AST – CR/TSC Post-Accident		Calc No. 2004-02100	
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Table 3. Control Room Elevated γ/Q Values (sec/m³)

Time Period	USAR	MNGP-002 CR	MNGP-002 PAB
0-0.5 hours	2.98E-4	3.37E-4	3.59E-4
0.5-2 hours	2.47E-11	3.73E-6	4.02E-6
2-8 hours	2.47E-11	5.62E-7	5.63E-7
8-24 hours	1.55E-11	2.20E-7	2.13E-7
1-4 days	6.20E-12	2.88E-8	2.58E-8
4-30 days	1.66E-12	1.56E-9	1.25E-9

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See CD “(Proprietary) MNGP AST Calculations”
for CA-04-037/S&L 2004-02100 Attachment A
(AAC Calculation MNGP-002, MNGP AST -
CR/TSC Post-Accident Atmospheric Dispersion
Analysis).



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Client	Nuclear Management Company	Prepared by	Date
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ATTACHMENT B. Computer File Listing For Calculation No. MNGP-002

Associated with AAC calculation No. MNGP-002 are a number of computer files that contain input data and computer output. Additional files identified in MNGP-002 contain attachments to the calculation that are not associated with computer runs. All of the files identified in MNGP-002 are contained on a compact disk (CD) associated with this calculation. The list of files and the purpose of each file is summarized in the list below.

File Name	Purpose
Mngp-002\calc file\Revision 0	
DVCS_MNGP_002.pdf	Design verification comment sheet for Rev 0
Mngp-002\calc file\Revision 1	
DVCS - MNGP-002_Rev1.pdf	Design verification comment sheet for Rev 1
Mngp-002\calc file\Revision 2	
CAR_003.pdf	Corrective Action Report No. 3
DVCS_MNGP_002_Rev2.pdf	Design verification coversheet for Rev 2
MNGP_002_R2_Coversheet.pdf	Signed coversheet for Rev. 2
Mngp-002\calc file\Revision 3	
DVCS_MNGP_002_Rev3.pdf	Design verification comment sheet for Rev 3
MNGP_002_R3_Coversheet.pdf	Signed coversheet for Rev. 3
Mngp-002\calc file\Revision 4	
DVCS MNGP 002 Rev4.pdf	Design verification comment sheet for Rev 4
MNGP_002 Rev 4 Coversheet.pdf	Signed coversheet for Rev. 4
Mngp-002\Arcon runs	
Moncntsc.cfd	Cumulative Frequency Dist: Condenser to TSC
Moncntsc.log	ARCON96 output file: Condenser to TSC
Moncntsc.rsf	ARCON96 input file: Condenser to TSC
moncon.cfd	Cumulative Frequency Dist: Condenser to CR
moncon.log	ARCON96 output file: Condenser to CR
MONCON.RSF	ARCON96 input file: Condenser to CR
monnpc.cfd	Cumulative Frequency Dist: RB closest wall to CR
monnpc.log	ARCON96 output file: RB closest wall to CR
Monnpc.rsf	ARCON96 input file: RB closest wall CR
Monnpts.cfd	Cumulative Frequency Dist: RB closest wall to TSC
Monnpts.log	ARCON96 output file: RB closest wall to TSC
MONNPTS.RSF	ARCON96 input file: RB closest wall TSC
MONTBTSC.cfd	Cumulative Frequency Dist: TB vent to TSC
MONTBTSC.log	ARCON96 output file: TB vent to TSC
MONTBTSC.RSF	ARCON96 input file: TB vent TSC
Montbvcr.cfd	Cumulative Frequency Dist: TB vent to CR
Montbvcr.log	ARCON96 output file: TB vent to CR
MONTBVCR.RSF	ARCON96 input file: TB vent CR
Monvntcn.cfd	Cumulative Frequency Dist: RB vent to CR
Monvntcn.log	ARCON96 output file: RB vent to CR



Calcs. For MNGP-AST – CR/TSC Post-Accident		Calc No. 2004-02100	
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File Name	Purpose
MONVNTCN.RSF	ARCON96 input file: RB vent CR
Monnpcad.cfd	Cumulative Frequency Dist: RB closest wall to CR – PAB inlet
Monnpcad.log	ARCON96 output file: RB closest wall to CR - PAB inlet
Monnpcad.rsf	ARCON96 input file: RB closest wall to CR – PAB inlet
Monvntca.cfd	Cumulative Frequency Dist: RB vent to CR – PAB inlet
Monvntca.log	ARCON96 output file: RB vent to CR – PAB inlet
monvntca.rsf	ARCON96 input file: RB vent to CR – PAB inlet
Montbvca.cfd	Cumulative Frequency Dist: TB vent to CR – PAB inlet
Montbvca.log	ARCON96 output file: TB vent to CR – PAB inlet
montbvca.rsf	ARCON96 input file: TB vent to CR – PAB inlet
monnpcx.log	ARCON96 output file: RB wall to CR – Path 1
monnpcx.rsf	ARCON96 input file: RB wall to CR – Path 1
Mngp-002\Arcon runs\sample problem	
ex1_96.cfd	Cumulative Frequency Dist: Sample problem
ex1_96.log	ARCON96 output file: Sample problem
EX1_96.RSF	ARCON96 input file: Sample problem
MNGP_002_SampleARCONProblem.pdf	AAC Software Installation Verification form
Mngp-002\Arcon runs\sample problem\Rev1	
ex1_96.cfd	Cumulative Frequency Dist: Sample problem
ex1_96.log	ARCON96 output file: Sample problem
EX1_96.RSF	ARCON96 input file: Sample problem
MNGP_002_Rev1_SampleARCONProblem.pdf	AAC Software Installation Verification form, Rev. 1
Mngp-002\Arcon runs\sample problem\Rev3	
ex1_96.cfd	Cumulative Frequency Dist: Sample problem
ex1_96.log	ARCON96 output file: Sample problem
EX1_96.RSF	ARCON96 input file: Sample problem
MNGP_002_Rev3_SampleARCONProblem.pdf	AAC Software Installation Verification form, Rev. 3
Mngp-002\Arcon runs\sample problem\Rev4	
ex1_96.cfd	Cumulative Frequency Dist: Sample problem
ex1_96.log	ARCON96 output file: Sample problem
EX1_96.RSF	ARCON96 input file: Sample problem
MNGP_002_Rev4_SampleARCONProblem.pdf	AAC Software Installation Verification form, Rev. 4
Mngp-002\met data	
43MARCON.98	ARCON96 Met Data as Received from MNGP - 1998
43MARCON.99	ARCON96 Met Data as Received from MNGP – 1999
43MARCON.00	ARCON96 Met Data as Received from MNGP – 2000
43MARCON.01	ARCON96 Met Data as Received from MNGP – 2001
43MARCON.02	ARCON96 Met Data as Received from MNGP - 2002
98newexcel43.met	Modified ARCON96 Met Data - 1998
99newexcel43.met	Modified ARCON96 Met Data – 1999
00newexcel43.met	Modified ARCON96 Met Data – 2000
01newexcel43.met	Modified ARCON96 Met Data – 2001
02newexcel43.met	Modified ARCON96 Met Data – 2002
alr12100.txt	PAVAN Met Data



Calcs. For MNGP-AST – CR/TSC Post-Accident	
Atmospheric Dispersion Analysis	
X	Safety Related
	Non-Safety Related

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Rev.	2	Date
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File Name	Purpose
Mngp-002\Pavan runs	
crcnew2.dat	PAVAN input file
crcnew2.OUT	PAVAN output file
cradmnew2.dat	PAVAN input file – PAB inlet
cradmnew2.OUT	PAVAN output file – PAB inlet
tscnew2.dat	PAVAN input file – TSC inlet
tscnew2.OUT	PAVAN output file – TSC inlet
Mngp-002\Pavan runs\sample problem	
MNGP_002_SamplePAVANProblem.pdf	AAC Software Installation Verification form
TEST1.DAT	PAVAN input file, sample problem
test1.OUT	PAVAN output file, sample problem
Mngp-002\Pavan runs\sample problem\Rev1	
MNGP_002_Rev1_SamplePAVANProblem.pdf	AAC Software Installation Verification form, Rev. 1
Test1.dat	PAVAN input file, sample problem
test1.OUT	PAVAN output file, sample problem
Mngp-002\Pavan runs\sample problem\Rev3	
MNGP_002_Rev3_SamplePAVANProblem.pdf	AAC Software Installation Verification Form, Rev. 3
Test1.dat	PAVAN input file, sample problem
test1.OUT	PAVAN output file, sample problem
Mngp-002\Pavan runs\sample problem\Rev4	
MNGP 002 Rev4 Sample PAVAN Problem.pdf	AAC Software Installation Verification Form, Rev. 4
Test1.dat	PAVAN input file, sample problem
test1.OUT	PAVAN output file, sample problem

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CALCULATION COVER SHEET

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Title MNGP AST – LOCA Radiological CA- 04 - 038 Add. 0
Consequence Analysis

PART A – (Not Applicable to Vendor Calcs)

Assigned Personnel			
Name (Print)	Signature	Title	Initials

Record of Issues							
Rev	Description	Total Sheets	Last Sheet	Preparer	Verifier	Approval	Approval Date

Verification Method(s)

- Review
 Alternate Calculation
 Test
 Other
 Technical Review (per 4 AWI-05.08.07 (FP-E-MOD-07))

3087 (DOCUMENT CHANGE, HOLD AND COMMENT FORM) incorporated: _____				
FOR ADMINISTRATIVE USE ONLY	Resp Subv: CNSTP	Assoc Ref: 4 AWI-05.01.25	SR: N	Freq: 0 yrs
	ARMS: 3494	Doc Type: 3042	Admin initials:	Date:

Approved (Signatures available in Master File)

MONTICELLO NUCLEAR GENERATING PLANT		3494
TITLE:	CALCULATION COVER SHEET	Revision 15
		Page 2 of 4

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PART B – (Applicable to Vendor Calculations Only)

Vendor Name Sargent & Lundy Vendor Calc No: 2004-02101, Rev 1
 Vendor Approval Date: 9/6/05

- Form 3345 or QF-0547 attached.
 - Safety related? If safety related, attach DIA or reference here. See Other Comments
- Reviewed by: Kathy Shriver/Dave Sexton K. Shriver/D. Sexton 9/7/05
 Print Name Signature Date
- Accepted by: Dennis Zercher Dennis Zercher 9/8/05
 Print Name Eng. Supv. Signature Date

Record of Issues			
Revision	Description	Total No. of Sheets	Last Sheet Number
0	Original Issue		

PART C – Design Basis Data (Complete for all Calculations)

10 CFR50.59 Screening or Evaluation No: N/A
 Associated Reference(s): AST LAR

Does this calculation:	YES	NO	Calc No(s), Rev(s), Add(s)
Supersede another calculation?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<i>GENE-B21000594-1-R2, Add. 0, "Radiological Analyses of Design Basis Accidents - Task 24", Section 3.2 only. See comments.</i>
Augment (credited by) another calculation?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<i>CA-05-130 Rev. 0 Add. 0</i>
Derive inputs from another calculation?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<i>CA-03-190, Rev. 1, Add. 0; CA-97-197, Rev. 0, Add. 0; CA-04-042, Rev. 0, Add. 0; CA-96-094, Rev. 0, Add. 0; CA-05-130, Rev. 0, Add. 0; CA-04-036, Rev. 1, Add. 0; CA-04-037, Rev. 2, Add. 0; CA-05-134, Rev. 0, Add. 0; CA-04-210, Rev. 0, Add. 0; and CA-03-099, Rev. 1, Add. 0.</i>
Affect the Fire Protection Program per Form 3765?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	If Yes, attach Form 3765

Approved (Signatures available in Master File)

MONTICELLO NUCLEAR GENERATING PLANT		3494
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Affect piping or supports?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	If Yes, attach Form 3544
Affect IST Program Valve or Pump Reference Values, and/or Acceptance Criteria?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	If Yes, inform IST Coordinator and provide copy of calculation

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List all documents/procedures that are based on this calculation (include revision):

See Future Needs in Other Comments below.

List all plant procedures used to ensure inputs/assumptions/outputs are maintained (include revision):

See Future Needs in Other Comments below.

What Systems or components are affected?

System Code(s) (See Form 3805): CDR, EFT, MST, PCT, PPS, SBGT, SCT, SLC & TOR

Component ID's (CHAMPS Equip): N/A

DBD Section (if any): The performance requirements sections of the following DBDs should be reviewed: DBD-S.02, B.02.04, B.03.05, B.04.01, B.04.02, B.05.06 & B.08.13.

Topic Code (See Form 3805): DBAE

Structure Code (See Form 3805): ADMIN & PCS

Other Comments: Sargent & Lundy (S&L) calculation 2004-02101 Rev 1 incorporates AAC Calculation #MNGP-003 Rev 2 (see attachment for cross-references).

Note: This calculation is not incorporated as part of MNGP's design basis until the associated LARs are approved (AST Phase 1 and 2).

Approved (Signatures available in Master File)

MONTICELLO NUCLEAR GENERATING PLANT		3494
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S&L calculation 2004-02101 Rev. 1 incorporates AAC Calculation # MNGP-003 Rev 2 (see attachment for crossreferences).

S&L calculation 2004-02101, Rev. 0 incorporated AAC Calculation # MNGP-003 Rev 1. S&L 2004-02101 Rev 0 was reviewed and approved by S&L in accordance with their Quality Assurance Plan but has not been formally accepted by NMC as a MNGP design basis calculation. NMC will, instead, accept the updated S&L Revision 1 calculation. As noted in the revision description of AAC Calculation #MNGP-003 Rev. 2, models, sensitivity studies and results from prior calculation revisions support methodology and inputs selected in AAC Calc Rev. 2. For this reason, a copy of S&L calculation 2004-2101, Rev. 0 (AAC MNGP-003 Rev 1) has been retained in NMC CA-04-038, Revision 0 as a separate attachment for future reference or information only. However, all dose consequence analyses are taken directly from AAC MNGP-003 Rev. 2 and it supersedes all prior AAC Rev. 1 and 0 results.

Future needs: Update USAR relevant sections, including Section 14.7.2, and other plant documents in accordance with the MNGP AST Implementation Plan (OTH027370).

This calculation was completed in accordance with the approved project work plan (DIA Equivalent) for the AST Implementation S&L Letter #SLMON-2003-085, and PO38317.

Approved (Signatures available in Master File)

MNGP AST Project Calculations List

Calculation No.	Title
MNGP # S&L # AAC #	<p>[Applied Analysis Corporation (AAC) performed DBA calculations for the AST project. Sargent & Lundy provided independent verification and documented results in S&L calculations which incorporated the AAC calculations as attachments. The S&L calculations were accepted by MNGP via the vendor calculation control process (4 AWI-05.01.25). Thus each DBA calculation has three numbers – MNGP, S&L, and AAC.</p> <p>AAC calculations will reference other AST calculations by their AAC number. This list is provided for proper cross-reference of calculations.]</p>
03-190 N/A N/A	Design Inputs For Alternate Source Term (AST) Radiological Analysis
04-036 2004-01852 MNGP-001	MNGP AST - Offsite Post-Accident Atmospheric Dispersion Analysis
04-037 2004-02100 MNGP-002	MNGP AST - CR/TSC Post-Accident Atmospheric Dispersion Analysis
04-038 2004-02101 MNGP-003	MNGP AST - LOCA Radiological Consequence Analysis
04-039 2004-02102 MNGP-004	MNGP AST - MSLBA Radiological Consequence Analysis
04-040 2004-02103 MNGP-005	MNGP AST - CRDA Radiological Consequence Analysis
04-041 2004-02104 MNGP-006	MNGP AST - FHA Radiological Consequence Analysis
04-042 2004-02105 MNGP-007	MNGP AST - Post-LOCA pH Analysis
04-210 2004-07600 N/A	Alternative Source Term – Core Isotopic Inventory
05-130 2005-00480 N/A	Post LOCA Direct Dose to the Control Room From External Sources
05-134 2005-06343 MNGP-012	Post-LOCA Steam Pipe Internal Temperature 30-Day Profile for Radiological Dose Analysis

MONTICELLO NUCLEAR GENERATING PLANT		3345
TITLE:	VENDOR CALCULATION REVIEW CHECKLIST	Revision 3
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Attachment 1 to Form 3494

The purpose of the review is to ensure that the vendor calculation or analysis complies with the conditions of the purchase order and is appropriate for its intended use. The purpose of the review is not to serve as an independent verification. Independent verification of the calculation or analysis by the vendor should be evident in the document.

The reviewer should use the criteria below as a guide to assess the overall quality, completeness and usefulness of the calculation or analysis. The reviewer is not required to check the vendor's calculations in detail.

See 4 AWI-05.01.25 (CALCULATION/ANALYSIS CONTROL) for guidance. Place initials by items reviewed.

REVIEW

1. Form 3544 (PIPING AND SUPPORT NUMBERING) completed for calculations affecting piping or supports.
2. Design inputs correspond to those which were transmitted to the vendor.
3. Assumptions are described and reasonable. Basis for assumptions identified.
4. Applicable codes, standards and regulations are identified and met.
5. Applicable construction and operating experience is considered.
6. Applicable structure(s), system(s), and component(s) are listed.
7. Formulas and equations documented and unusual symbols are defined.
8. Acceptance criteria are identified, adequate and satisfied.
9. Results are reasonable compared to inputs.
10. Source documents are referenced.
11. The calculation is appropriate for its intended use.
12. The calculation complies with the terms of the Purchase Order.
13. Inputs, assumptions, outputs, etc. which could affect plant operation are enforced by adequate procedural controls. List any affected procedures.

N/A KMS D.L.
KMS D.L.
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KMS D.L.

Note: Design Input Table 5 does not include LOCA X/Q values from Table 3A of CA-04-036, R1. This is acceptable as the bounding 0-2 hr EAB X/Q is used instead (see Section 6.1.21).

KMS D.L.

Completed By: K.L. Swiver / D.E. Prof Date: 9/7/05 / 9/7/05

3087 (DOCUMENT CHANGE, HOLD AND COMMENT FORM) incorporated:					
FOR ADMINISTRATIVE	Resp Supv: CNSTP	Assoc Ref: 4 AWI-05.01.25	SR: N	Freq: 0	Yrs
	ARMS: 3345	Doc Type: 3042	Admin initials:	Date:	

Approved (Signatures available in Master File)

ISSUE SUMMARY
Form SOP-0402-07, Revision 7

DESIGN CONTROL SUMMARY			
CLIENT:	<u>Nuclear Management Company</u>	UNIT NO.: <u>1</u>	Page No.: <u>1 of 5</u>
PROJECT NAME:	<u>Monticello Nuclear Generating Plant</u>		
PROJECT NO.:	<u>11163-013</u>	<input checked="" type="checkbox"/> NUCLEAR SAFETY- RELATED	
CALC. NO.:	<u>2004-02101</u>	<input type="checkbox"/> NOT NUCLEAR SAFETY-RELATED	
TITLE:	<u>MNGP AST – LOCA Radiological Consequence Analysis</u>		
EQUIPMENT NO.:	_____		
IDENTIFICATION OF PAGES ADDED/REVISED/SUPERSEDED/VOIDED & REVIEW METHOD			
Initial Issue (166 pages): Calculation (5 pages), Attachment A – AAC Calculation MNGP-003 (152 pages), Attachment B – List of Electronic Files (9 pages)			
			INPUTS/ ASSUMPTIONS
			<input checked="" type="checkbox"/> VERIFIED
			<input type="checkbox"/> UNVERIFIED
REVIEW METHOD:	<u>Detailed</u>	REV.	<u>0</u>
STATUS:	<u>Approved</u>	DATE FOR REV.:	<u>05/06/04</u>
PREPARER	<u>W. J. Johnson/(See original for signature)</u>	DATE:	<u>05/06/04</u>
REVIEWER	<u>J. M. Rich/(See original for signature)</u>	DATE:	<u>05/06/04</u>
APPROVER	<u>M. A. Pressburger/(See original for signautre)</u>	DATE:	<u>05/06/04</u>
IDENTIFICATION OF PAGES ADDED/REVISED/SUPERSEDED/VOIDED & REVIEW METHOD			
Revised to incorporate revised input data (source term, χ/Q , temperature profiles, etc.), and to remove calculations related to the TSC.			
Revision 1 (102 pages): Calculation (5 pages), Attachment A – AAC Calculation MNGP-003 (94 pages), Attachment B – List of Electronic Files (3 pages)			
Revision 1 supersedes Revision 0.			
			INPUTS/ ASSUMPTIONS
			<input checked="" type="checkbox"/> VERIFIED
			<input type="checkbox"/> UNVERIFIED
REVIEW METHOD:	<u>Detailed</u>	REV.	<u>1</u>
STATUS:	<u>Approved</u>	DATE FOR REV.:	<u>9/6/05</u>
PREPARER	<u>W. J. Johnson/ <i>W. J. Johnson</i></u>	DATE:	<u>9/6/05</u>
REVIEWER	<u>A. G. Klazura/ <i>A. G. Klazura</i></u>	DATE:	<u>9-6-05</u>
APPROVER	<u>S. R. Raupp/ <i>S. R. Raupp</i></u>	DATE:	<u>9/6/05</u>
IDENTIFICATION OF PAGES ADDED/REVISED/SUPERSEDED/VOIDED & REVIEW METHOD			
			INPUTS/ ASSUMPTIONS
			<input type="checkbox"/> VERIFIED
			<input type="checkbox"/> UNVERIFIED
REVIEW METHOD:	_____	REV.	_____
STATUS:	_____	DATE FOR REV.:	_____
PREPARER	_____	DATE:	_____
REVIEWER	_____	DATE:	_____
APPROVER	_____	DATE:	_____

NOTE: PRINT AND SIGN IN THE SIGNATURE AREAS



Calcs. For MNGP AST – LOCA Radiological			
Consequence Analysis			
X	Safety Related		Non-Safety Related

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Client	Nuclear Management Company		
Project	Monticello Nuclear Generating Plant		
Proj. No	11163-013	Equip. No.	

Prepared by		Date	
Reviewed by		Date	
Approved by		Date	

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7 REFERENCES.....	5
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ATTACHMENT B. Computer File Listing For Calculation No. MNGP-003 (3 Pages)	B-1



Calcs. For MNGP AST – LOCA Radiological		Calc No. 2004-02101	
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	Non-Safety Related		

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Proj. No	11163-013	Approved by	Date
	Equip. No.		

1 PURPOSE AND SCOPE

A new calculation has been prepared to evaluate the radiological consequences of the Loss-of-Coolant Accident (LOCA) for Nuclear Management Company's (NMC) Monticello Nuclear Generating Plant (MNGP). LOCA radiological consequences are being recalculated to implement the Alternate Source Term (AST) at MNGP. The calculation is documented in Applied Analysis Corp. (AAC) calculation MNGP-003 (Reference 1), which is included in its entirety in Attachments A and B. Radiological doses are determined in accordance with the guidance provided in Regulatory Guide 1.183 (Reference 2).

The purpose of this calculation is to document the S&L independent verification of AAC calculation MNGP-003. The verification consists of a review to assure that the methodology used in the calculation is appropriate to the purpose of the calculation, that the inputs are in accordance with the approved inputs provided by NMC, and that the results of the analysis are consistent with the inputs and methodology.

Revision 1 to this calculation incorporates Revision 2 to MNGP-003. The primary changes in this revision are the removal of TSC doses and the incorporation of revised input parameters, including new source terms, χ/Q values, primary and ESF leak rates, and a new main steam line temperature profile.

2 DESIGN INPUT

The design inputs and their bases are identified in Section 4.0 of MNGP-003 (Attachment A). All of the MNGP specific inputs (except χ/Q values, temperature profile, source term and direct shine doses) are referenced to NMC Design Input Request (DIR) Calculation CA-03-190 (Reference 3) and are therefore approved by NMC. Atmospheric dispersion parameters (χ/Q 's) were taken from calculations MNGP-001 and MNGP-002 (References 6 and 7), the temperature profile from calculation MNGP-012 (Reference 10), and source term and direct shine doses were taken from NMC calculations (References 8 and 9). S&L also independently verified the AAC calculations, and S&L originally prepared the NMC calculations.

3 ASSUMPTIONS

The assumptions used in the determination of the LOCA radiological doses are documented in Section 3.0 of MNGP-003 (Attachment A). These assumptions are consistent with the methodology and data used in the calculation. Furthermore, these assumptions are consistent with NMC input per Calculation CA-03-190 (Reference 3).



Calcs. For MNGP AST – LOCA Radiological		Calc No. 2004-02101	
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Project	Monticello Nuclear Generating Plant	Reviewed by	Date
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	Equip. No.		

4 METHODOLOGY AND ACCEPTANCE CRITERIA

Methodology

Radiological doses are calculated at the Exclusion Area Boundary (EAB), the Low Population Zone (LPZ) and in the Control Room using the computer code RADTRAD Version 3.03 (Reference 5). RADTRAD is an NRC developed code used to estimate doses at offsite locations (EAB and LPZ) and in the control room. Use of the RADTRAD code is an appropriate methodology for this calculation.

Detailed methodology used in the determination of the LOCA radiological doses is documented in Section 5.0 of MNGP-003 (Attachment A). The methodology is appropriate for this application and consistent with the design basis for the LOCA per Regulatory Guide 1.183.

Dose Acceptance Criteria

Radiological dose acceptance criteria for the EAB, the outer boundary of the LPZ and in the control room are given in 10 CFR 50.67 (Reference 4), which are the same as the acceptance criteria in Table 6 of Regulatory Guide 1.183 (Reference 2). The acceptance criteria are summarized below:

EAB and LPZ: 25 rem TEDE
 Control Room: 5 rem TEDE

5 CALCULATIONS

Not applicable to this calculation.

6 RESULTS AND CONCLUSIONS

Calculations were performed as prescribed by Appendix A to Regulatory Guide 1.183 (Reference 2). The calculated doses are presented in MNGP-003 Table Nos. 14, 14A, 15 and 15A. These calculated doses for the EAB, LPZ, and CR meet the associated acceptance criteria of Reference 4.

Based on the above discussion, it is concluded that the methodology used in the MNGP-003 is appropriate to the purpose of the calculation, that the inputs are in accordance with the approved inputs provided by NMC, and that the results of the analysis are consistent with the inputs and methodology.



Calcs. For MNGP AST – LOCA Radiological		Calc No. 2004-02101	
Consequence Analysis		Rev. 1	Date
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Client	Nuclear Management Company	Prepared by	Date
Project	Monticello Nuclear Generating Plant	Reviewed by	Date
Proj. No	11163-013	Approved by	Date
	Equip. No.		

7 REFERENCES

1. MNGP-003, Revision 2, “MNGP AST – LOCA Radiological Consequence Analysis,” prepared by Applied Analysis Corp. for Nuclear Management Company, Monticello Nuclear Generating Plant
2. Regulatory Guide 1.183, “Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Plants,” Revision 0, USNRC, July 2000
3. Monticello Calculation 03-190, “Design Inputs for Alternate Source Term (AST) Radiological Analysis,” Revision 1
4. Code of Federal Regulations, Title 10, Section 50.67, “Accident Source Term”, 2003
5. “RADTRAD: A Simplified Model for RADionuclide Transport and Removal And Dose Estimation”, NUREG/CR-6604, April 1998; Supplement 1, June 8, 1999; and Supplement 2, October 2002
6. MNGP-001, Revision 2, “MNGP AST – Offsite Post-accident Atmospheric Dispersion Analysis,” prepared by Applied Analysis Corp. for Nuclear Management Company, Monticello Nuclear Generating Plant (verified under S&L Calculation 2004-01852, Revision 1)
7. MNGP-002, Revision 4, “MNGP AST - CR/TSC Post-Accident Atmospheric Dispersion Analysis,” prepared by Applied Analysis Corp. for Nuclear Management Company, Monticello Nuclear Generating Plant (verified under S&L Calculation 2004-02100, Revision 1)
8. Monticello Calculation 05-130, “Post LOCA Direct Dose to the Control Room from External Sources,” Revision 0 (S&L Calculation 2005-00480, Revision 0)
9. Monticello Calculation 04-210, “Alternate Source Term – Core Isotopic Inventory,” Revision 0 (S&L Calculation 2004-07600, Revision 0)
10. MNGP-012, Revision 0, “Post-LOCA Steam Pipe Internal Temperature 30-Day Profile for Radiological Dose Analysis,” prepared by Applied Analysis Corp. for Nuclear Management Company, Monticello Nuclear Generating Plant (verified under S&L Calculation 2005-06343, Revision 0)

(Final Page)

See CD “(Proprietary) MNGP AST Calculations”
for CA-04-038/S&L 2004-02101 Attachment A
(AAC Calculation MNGP-003, MNGP AST - LOCA
Radiological Consequence Analysis).



Calcs. For MNGP AST – LOCA Radiological		Calc No.	2004-02101
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X	Safety Related	Page	B-1 of B-3
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Client	Nuclear Management Company	Prepared by	Date
Project	Monticello Nuclear Generating Plant	Reviewed by	Date
Proj. No	11163-013	Approved by	Date
	Equip. No.		

ATTACHMENT B. Computer File Listing For Calculation No. MNGP-003

Associated with AAC Calculation No. MNGP-003 are a number of computer files that contain input data and computer output. Additional files identified in MNGP-003 contain attachments to the calculation that are not associated with computer runs. All of the files identified in MNGP-003 are contained on a compact disk (CD) associated with this calculation. The file names and the purpose of each file are summarized in the list below.

File	Description
MNGP-003\Att 1 - Cover Sheet PDF	
MNGP-003 R2 Signed Cover Sheet.pdf	Signed calculation coversheet – Att 1
MNGP-003\Att 2 - DVCS PDF	
DVCS-MNGP-003-R2.pdf	Design verification review sheets for Revision 2 – Att 2
MNGP-003\Atts 3A to 3F - Benchmark RADTRAD Runs	
BWR_DBA.RFT	Release fraction and timing file for sample problems – Att 3E
BWR_I131.NIF	Nuclide information file for sample problems – Att 3E
Computer Sample Problem Validation Sheet-003.pdf	RADTRAD validation sheet – Att 3F
Fgr11&12.inp	Dose Conversion file for sample problems – Att 3E
Test13b.o0	RADTRAD output file, sample problem 13b – Att 3A
Test13b.psf	RADTRAD input file, sample problem 13b – Att 3A
Test14b.o0	RADTRAD output file, sample problem 14b – Att 3B
Test14b.psf	RADTRAD input file, sample problem 14b – Att 3B
Test15.o0	RADTRAD output file, sample problem 15 – Att 3C
Test15.psf	RADTRAD input file, sample problem 15 – Att 3C
Test16.o0	RADTRAD output file, sample problem 16 – Att 3D
Test16.psf	RADTRAD input file, sample problem 16 – Att 3D
MNGP-003\Att 6 – LOCA DCF File	
Fgr11&12.inp	INP file for AST LOCA – Att 6
MNGP-003\Atts 11A to 11B - Model Figures	
Flow Diagram - MSIV Leakage Network - 100 SCFH Max Per Line.doc	Sketch for MSIV leakage pathway – Att 11A
lines-sec_ctmt_bypass_lkg.ppt	Secondary containment bypass sketch – Att 11B
MNGP-003\Att 13 - RFT File	
BWR_DBA.RFT	RADTRAD default release fraction and timing file – Att 13
MNGP-003\Att 40 - ESF RFT	
MNGP ESF - Iodines.RFT	Release fraction and timing file for ESF leakage – Att 40
MNGP-003\Atts 90 to 100 – Revision 2 LOCA Dose Cases	
Revised MNGP AST LOCA.nif	Revised nuclide information file – Att 90
PL(1pt1078 % per day)_PPP_Rev2.psf	RADTRAD input file, primary PPP leakage CR dose, 900 cfm intake 500 cfm inleakage – Att 91



Calcs. For MNGP AST – LOCA Radiological		Calc No. 2004-02101	
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	Non-Safety Related		

Client	Nuclear Management Company	Prepared by	Date
Project	Monticello Nuclear Generating Plant	Reviewed by	Date
Proj. No	11163-013	Approved by	Date
	Equip. No.		

File	Description
PL(1pt1078 % per day)_PPP_Rev2.o0	RADTRAD output file, primary PPP leakage CR dose, 900 cfm intake 500 cfm inleakage – Att 91
PL(1pt1078 % per day)_Post PPP_F1pt7_Rev2.psf	RADTRAD input file, post-PPP PL CR dose, 900 cfm intake 500 cfm inleakage fumigation 1.7 hr – Att 92
PL(1pt1078 % per day)_Post PPP_F1pt7_Rev2.o0	RADTRAD output file, post-PPP PL CR dose, 900 cfm intake 500 cfm inleakage fumigation 1.7 hr – Att 92
ESF(0pt35cfm)_PPP_Rev2.psf	RADTRAD input file, ESF PPP leakage CR dose, 900 cfm intake 500 cfm inleakage – Att 93
ESF(0pt35cfm)_PPP_Rev2.o0	RADTRAD output file, ESF PPP leakage CR dose, 900 cfm intake 500 cfm inleakage – Att 93
ESF(0pt35cfm)_Post PPP_F1pt7_Rev2.psf	RADTRAD input file, post-PPP ESF CR dose, 900 cfm intake 500 cfm inleakage – Att 94
ESF(0pt35cfm)_Post PPP_F1pt7_Rev2.o0	RADTRAD output file, post-PPP ESF CR dose, 900 cfm intake 500 cfm inleakage – Att 94
MNGP Revised Comp Pipe_Rev2_PL Dump with TAC.psf	RADTRAD input file, condenser leakage composite pipe CR dose, 900 cfm intake 500 cfm inleakage – Att 95
MNGP Revised Comp Pipe_Rev2_PL Dump with TAC.o0	RADTRAD input file, condenser leakage composite pipe CR dose, 900 cfm intake 500 cfm inleakage – Att 95
PL(1pt1078 % per day)_PPP_Rev2_EPU.psf	RADTRAD input file, EPU primary PPP leakage CR dose, 900 cfm intake 500 cfm inleakage – Att 96
PL(1pt1078 % per day)_PPP_Rev2_EPU.o0	RADTRAD output file, EPU primary PPP leakage CR dose, 900 cfm intake 500 cfm inleakage – Att 96
PL(1pt1078 % per day)_Post PPP_F1pt7_Rev2_EPU.psf	RADTRAD input file, EPU post-PPP PL CR dose, 900 cfm intake 500 cfm inleakage fumigation 1.7 hr – Att 97
PL(1pt1078 % per day)_Post PPP_F1pt7_Rev2_EPU.o0	RADTRAD output file, EPU post-PPP PL CR dose, 900 cfm intake 500 cfm inleakage fumigation 1.7 hr – Att 97
ESF(0pt35cfm)_PPP_Rev2_EPU.psf	RADTRAD input file, EPU ESF PPP leakage CR dose, 900 cfm intake 500 cfm inleakage – Att 98
ESF(0pt35cfm)_PPP_Rev2_EPU.o0	RADTRAD output file, EPU ESF PPP leakage CR dose, 900 cfm intake 500 cfm inleakage – Att 98
ESF(0pt35cfm)_Post PPP_F1pt7_Rev2_EPU.psf	RADTRAD input file, EPU post-PPP ESF CR dose, 900 cfm intake 500 cfm inleakage – Att 99
ESF(0pt35cfm)_Post PPP_F1pt7_Rev2_EPU.o0	RADTRAD output file, EPU post-PPP ESF CR dose, 900 cfm intake 500 cfm inleakage – Att 99
MNGP Revised Comp Pipe_Rev2_PL Dump with TAC_EPU.psf	RADTRAD input file, EPU condenser leakage composite pipe CR dose, 900 cfm intake 500 cfm inleakage – Att 100
MNGP Revised Comp Pipe_Rev2_PL Dump with TAC_EPU.o0	RADTRAD input file, EPU condenser leakage composite pipe CR dose, 900 cfm intake 500 cfm inleakage – Att 100
MNGP-003\Att 102 – DW Leakage	
Pressure Decay – Reduced Leakage Rate.xls	Spreadsheet for determining the reduction in leakage rates – Att 102
MNGP-003\Att 103 – Removal Efficiency	
Well-Mixed Flow Model – Overall Removal Efficiencies – R2.xls	Spreadsheet for calculating piping deposition effective removal efficiencies – Att 103
MNGP-003\Att 104 – Condenser Removal	
MNGP Condenser Lambda_100 SCFH Maximum Per Line Model – R2.xls	Spreadsheet for calculating condenser deposition effective removal efficiencies – Att 104



Calcs. For MNGP AST – LOCA Radiological			
Consequence Analysis			
X	Safety Related		Non-Safety Related

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Client	Nuclear Management Company		
Project	Monticello Nuclear Generating Plant		
Proj. No	11163-013	Equip. No.	

Prepared by		Date	
Reviewed by		Date	
Approved by		Date	

File	Description
MNGP-003\Att 105 – Pipe Data	
Pipe_Data_020304 – R2.xls	Spreadsheet for calculating pipe parameters – Att 105

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MONTICELLO NUCLEAR GENERATING PLANT		3494
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CALCULATION COVER SHEET

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Title MNGP AST – MSLBA Radiological CA- 04 - 039 Add. 0
Consequence Analysis

PART A – (Not Applicable to Vendor Calcs)

Assigned Personnel			
Name (Print)	Signature	Title	Initials

Record of Issues							
Rev	Description	Total Sheets	Last Sheet	Preparer	Verifier	Approval	Approval Date

Verification Method(s)

- Review
 Alternate Calculation
 Test
 Other
 Technical Review (per 4 AWI-05.08.07 (FP-E-MOD-07))

3087 (DOCUMENT CHANGE, HOLD AND COMMENT FORM) incorporated: _____				
FOR ADMINISTRATIVE USE ONLY	Resp Subv: CNSTP	Assoc Ref: 4 AWI-05.01.25	SR: N	Freq: 0 yrs
	ARMS: 3494	Doc Type: 3042	Admin initials:	Date:

Approved (Signatures available in Master File)

MONTICELLO NUCLEAR GENERATING PLANT		3494
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PART B – (Applicable to Vendor Calculations Only)

Vendor Name Sargent & Lundy Vendor Calc No: 2004-02102
 Vendor Approval Date: 8/30/05

- Form 3345 or QF-0547 attached.
- Safety related? If safety related, attach DIA or reference here. See Other Comments

Reviewed by: Joel Beres / Mike Aleksey Joel Beres / Mike Aleksey 7/26/05 - 9/6/05
 Print Name Signature Date
 Accepted by: Dennis Zercher Dennis Zercher 9-7-2005
 Print Name Eng. Supv. Signature Date

Record of Issues			
Revision	Description	Total No. of Sheets	Last Sheet Number
0	Original Issue		

PART C – Design Basis Data (Complete for all Calculations)

10 CFR50.59 Screening or Evaluation No: N/A
 Associated Reference(s): ASTLAR

Does this calculation:	YES	NO	Calc No(s), Rev(s), Add(s)
Supersede another calculation?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<i>GENE-B21000594-1-R2, "Radiological Analyses of Design Basis Accidents - Task 24", Section 3.3 only. See comments.</i>
Augment (credited by) another calculation?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Derive inputs from another calculation?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<i>CA-03-190 R1 Add. 0; CA-04-036 R1 Add. 0; CA-04-037 R2 Add. 0</i>
Affect the Fire Protection Program per Form 3765?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	If Yes, attach Form 3765
Affect piping or supports?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	If Yes, attach Form 3544

Approved (Signatures available in Master File)

MONTICELLO NUCLEAR GENERATING PLANT		3494
TITLE:	CALCULATION COVER SHEET	Revision 15
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Affect IST Program Valve or Pump Reference Values, and/or Acceptance Criteria?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	If Yes, inform IST Coordinator and provide copy of calculation
--	--------------------------	-------------------------------------	--

Page 3 of _____
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List all documents/procedures that are based on this calculation (include revision):
USAR, Rev 21 (Section 14.7.3 and associated tables)

List all plant procedures used to ensure inputs/assumptions/outputs are maintained (include revision):
7010 Rev 4, 0255-07-1A-1, Rev 22. Also see Future Needs below.

What Systems or components are affected?

System Code(s) (See Form 3805):	MST
Component ID's (CHAMPS Equip):	N/A
DBD Section (if any):	B.2.4
Topic Code (See Form 3805):	DBAE
Structure Code (See Form 3805):	N/A

Approved (Signatures available in Master File)

MONTICELLO NUCLEAR GENERATING PLANT		3494
TITLE:	CALCULATION COVER SHEET	Revision 15
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Other Comments: Sargent & Lundy calculation 2004-02102 Rev 1 incorporates AAC Calculation #MNGP-004 Rev 1 (see attachment for cross-references).

Note: This calculation is not incorporated as part of MNGP's design basis until the associated LARs are approved (AST Phase 1 and 2).

Future needs: Update relevant USAR sections and other plant documents in accordance with the MNGP AST Implementation Plan (OTH027343).

This calculation was completed in accordance with the approved project work plan (DIA Equivalent) for the AST Implementation S&L Letter #SLMON-2003-085, and PO38317.

Approved (Signatures available in Master File)

MNGP AST Project Calculations List

Calculation No.	Title
MNGP # S&L # AAC #	<p>[Applied Analysis Corporation (AAC) performed DBA calculations for the AST project. Sargent & Lundy provided independent verification and documented results in S&L calculations which incorporated the AAC calculations as attachments. The S&L calculations were accepted by MNGP via the vendor calculation control process (4 AWI-05.01.25). Thus each DBA calculation has three numbers – MNGP, S&L, and AAC.</p> <p>AAC calculations will reference other AST calculations by their AAC number. This list is provided for proper cross-reference of calculations.]</p>
03-190 N/A N/A	Design Inputs For Alternate Source Term (AST) Radiological Analysis
04-036 2004-01852 MNGP-001	MNGP AST - Offsite Post-Accident Atmospheric Dispersion Analysis
04-037 2004-02100 MNGP-002	MNGP AST - CR/TSC Post-Accident Atmospheric Dispersion Analysis
04-038 2004-02101 MNGP-003	MNGP AST - LOCA Radiological Consequence Analysis
04-039 2004-02102 MNGP-004	MNGP AST - MSLBA Radiological Consequence Analysis
04-040 2004-02103 MNGP-005	MNGP AST - CRDA Radiological Consequence Analysis
04-041 2004-02104 MNGP-006	MNGP AST - FHA Radiological Consequence Analysis
04-042 2004-02105 MNGP-007	MNGP AST - Post-LOCA pH Analysis
04-210 2004-07600 N/A	Alternative Source Term – Core Isotopic Inventory
05-130 2005-00480 N/A	Post LOCA Direct Dose to the Control Room From External Sources
05-134 2005-06343 MNGP-012	Post-LOCA Steam Pipe Internal Temperature 30-Day Profile for Radiological Dose Analysis

MONTICELLO NUCLEAR GENERATING PLANT		3345
TITLE:	VENDOR CALCULATION REVIEW CHECKLIST	Revision 3
		Page 1 of 1

CA - 04 - 039, Rev 0
Attachment 1

The purpose of the review is to ensure that the vendor calculation or analysis complies with the conditions of the purchase order and is appropriate for its intended use. The purpose of the review is not to serve as an independent verification. Independent verification of the calculation or analysis by the vendor should be evident in the document.

The reviewer should use the criteria below as a guide to assess the overall quality, completeness and usefulness of the calculation or analysis. The reviewer is not required to check the vendor's calculations in detail.

See 4 AWI-05.01.25 (CALCULATION/ANALYSIS CONTROL) for guidance. Place initials by items reviewed.

REVIEW

1. Form 3544 (PIPING AND SUPPORT NUMBERING) completed for calculations affecting piping or supports.
2. Design inputs correspond to those which were transmitted to the vendor.
3. Assumptions are described and reasonable. Basis for assumptions identified.
4. Applicable codes, standards and regulations are identified and met.
5. Applicable construction and operating experience is considered.
6. Applicable structure(s), system(s), and component(s) are listed.
7. Formulas and equations documented and unusual symbols are defined.
8. Acceptance criteria are identified, adequate and satisfied.
9. Results are reasonable compared to inputs.
10. Source documents are referenced.
11. The calculation is appropriate for its intended use.
12. The calculation complies with the terms of the Purchase Order.
13. Inputs, assumptions, outputs, etc. which could affect plant operation are enforced by adequate procedural controls. List any affected procedures.

J. NA
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7010 Rev. 4 MAIN STEAM HIGH FLOW GROUP 1 ISOLATION INSTRUMENT TIME RESPONSE TEST
0255 - 07 - 1A - 1 MAIN STEAM VALVE EXERCISE TESTS REV. 22

Completed By: *[Signature]* Date: 9/6/05 9/6/05

3087 (DOCUMENT CHANGE, HOLD AND COMMENT FORM) incorporated:				
FOR ADMINISTRATIVE	Resp Supv: CNSTP	Assoc Ref: 4 AWI-05.01.25	SR: N	Freq: 0 yrs
	ARMS: 3345	Doc Type: 3042	Admin initials:	Date:

Approved (Signatures available in Master File)

ISSUE SUMMARY
Form SOP-0402-07, Revision 7

DESIGN CONTROL SUMMARY			
CLIENT:	Nuclear Management Company	UNIT NO.: <u>1</u>	Page No.: 1 of 5
PROJECT NAME:	Monticello Nuclear Generating Plant		
PROJECT NO.:	11163-013	<input checked="" type="checkbox"/> NUCLEAR SAFETY- RELATED	
CALC. NO.:	2004-02102	<input type="checkbox"/> NOT NUCLEAR SAFETY-RELATED	
TITLE:	MNGP AST-MSLBA Radiological Consequence Analysis		
EQUIPMENT NO.:	_____		
IDENTIFICATION OF PAGES ADDED/REVISED/SUPERSEDED/VOIDED & REVIEW METHOD			
Initial Issue (50 pages): Calculation (6 pages), Attachment A – AAC Calculation MNGP-004 (41 pages), Attachment B – List of Electronic Files (3 pages)			
			INPUTS/ ASSUMPTIONS <input checked="" type="checkbox"/> VERIFIED <input type="checkbox"/> UNVERIFIED
REVIEW METHOD:	<u>Detailed Review</u>	REV.	<u>0</u>
STATUS:	<u>Approved</u>	DATE FOR REV.:	<u>03-23-04</u>
PREPARER	<u>M. D. Elo/(See original for signature)</u>	DATE:	<u>03-23-04</u>
REVIEWER	<u>W. J. Johnson/(See original for signature)</u>	DATE:	<u>03-23-04</u>
APPROVER	<u>M. A. Pressburger/(See original for signature)</u>	DATE:	<u>03-23-04</u>
IDENTIFICATION OF PAGES ADDED/REVISED/SUPERSEDED/VOIDED & REVIEW METHOD			
Revised to incorporate new γ/Q values and correct error in RADTRAD NIF file. Revision 1 supersedes Revision 0 Revision 1 (51 pages): Calculation (5 pages), Attachment A – AAC Calculation MNGP-004 (43 pages), Attachment B – List of Electronic Files (3 pages)			
			INPUTS/ ASSUMPTIONS <input checked="" type="checkbox"/> VERIFIED <input type="checkbox"/> UNVERIFIED
REVIEW METHOD:	<u>Detailed</u>	REV.	<u>1</u>
STATUS:	<u>Approved</u>	DATE FOR REV.:	<u>8/30/05</u>
PREPARER	<u>W. J. Johnson</u>	DATE:	<u>8/30/05</u>
REVIEWER	<u>A. G. Klazura</u>	DATE:	<u>8/30/05</u>
APPROVER	<u>S. R. Raupp</u>	DATE:	<u>8/30/05</u>
IDENTIFICATION OF PAGES ADDED/REVISED/SUPERSEDED/VOIDED & REVIEW METHOD			
			INPUTS/ ASSUMPTIONS <input type="checkbox"/> VERIFIED <input type="checkbox"/> UNVERIFIED
REVIEW METHOD:	_____	REV.	_____
STATUS:	_____	DATE FOR REV.:	_____
PREPARER	_____	DATE:	_____
REVIEWER	_____	DATE:	_____
APPROVER	_____	DATE:	_____

NOTE: PRINT AND SIGN IN THE SIGNATURE AREAS



Calcs. For MNGP AST – MSLBA Radiological			
Consequence Analysis			
X	Safety Related		Non-Safety Related

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Rev.	1	Date	
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Client	Nuclear Management Company		
Project	Monticello Nuclear Generating Plant		
Proj. No	11163-013	Equip. No.	

Prepared by		Date	
Reviewed by		Date	
Approved by		Date	

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ATTACHMENT B. Computer File Listing For Calculation No. MNGP-004 (3 pages)	B-1



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Client	Nuclear Management Company	Prepared by	Date
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1 PURPOSE AND SCOPE

A new calculation has been prepared to evaluate the radiological consequences of the Main Steam Line Break Accident (MSLBA) for Nuclear Management Company's (NMC) Monticello Nuclear Generating Plant (MNGP). MSLBA radiological consequences are being recalculated to implement the Alternate Source Term (AST) at MNGP. The calculation is documented in Applied Analysis Corp. (AAC) calculation MNGP-004 (Reference 1), which is included in its entirety in Attachments A and B. Radiological doses are determined in accordance with the guidance provided in Regulatory Guide 1.183 (Reference 2).

The purpose of this calculation is to document the S&L independent verification of AAC calculation MNGP-004. The verification consists of a review to assure that the methodology used in the calculation is appropriate to the purpose of the calculation, that the inputs are in accordance with the approved inputs provided by NMC, and that the results of the analysis are consistent with the inputs and methodology.

Revision 1 incorporates additional χ/Q values based on intake/inleakage at the Primary Administration Building (PAB) air intakes as documented in Revision 1 to MNGP-004. This revision also includes a modification of the RADTRAD NIF files to correct the half life of Kr-85m.

2 DESIGN INPUT

The design inputs and their bases are identified in Section 4.0 of MNGP-004 (Attachment A). All of the MNGP specific inputs (except χ/Q 's) are referenced to NMC Design Input Request (DIR) Calculation CA-03-190 (Reference 3) and are therefore approved by NMC. Atmospheric dispersion parameters (χ/Q 's) were taken from calculations MNGP-001 and MNGP-002 (References 7 and 8) which were also independently verified by S&L.

3 ASSUMPTIONS

The assumptions used in the determination of the MSLBA radiological doses are documented in Section 3.0 of MNGP-004 (Attachment A). These assumptions are consistent with the methodology and data used in the calculation. Furthermore, these assumptions are consistent with NMC input per Calculation CA-03-190 (Reference 3).



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4 METHODOLOGY AND ACCEPTANCE CRITERIA

Methodology

Radiological doses are calculated at the Exclusion Area Boundary (EAB), the Low Population Zone (LPZ) and in the Control Room using the computer code RADTRAD Version 3.03 (Reference 6). RADTRAD is an NRC developed code used to estimate doses at offsite locations; the exclusion area boundary (EAB) and the low population zone (LPZ); and in the control room. Use of the RADTRAD code is an appropriate methodology for this calculation.

Detailed methodology used in the determination of the MSLBA radiological doses is documented in Section 5.0 of MNGP-004 (Attachment A). The methodology is appropriate for this application and consistent with the MNGP design basis for the MSLBA per USAR Section 14.7.3.

Noble Gas Source Term

The noble gas source term used in MNGP-004 assumes the default set of nuclides available in RADTRAD 3.03. Several Krypton and Xenon isotopes are not included as shown in FGR-12, Table III.1, pp. 60 and 64 (Kr-83m, Xe-131m, Xe-133m, Xe-135m and Xe-138) (Reference 10). In addition, Iodine in-growth of noble gases is not modeled for the duration of the accident. Observation of the initial activities shows clearly that if the missing noble gas isotopes were included, there would be no impact on the radiological consequences. Iodine activities are approximately 10 to 100 times greater than noble gas activities. Furthermore, the Iodines affect the dose through two pathways, inhalation and air immersion, refer to FGR-11 (Reference 9) and FGR-12 (Reference 10) which represent the basis for the dose conversion factors used in RADTRAD. The total Iodine contribution to the TEDE is much greater than the noble gas contribution to the air immersion pathway. Hence, a nominal increase in the noble gas activity will not affect the dose and therefore, inclusion of missing noble gases is not necessary. Xenon in-growth from Iodine decay is also not necessary to consider because the puff release is very short (10.5 second MSIV closure time) and because the turnover time for the control room air volume is no more than 90 minutes (Cases 9, 18, 27). It is expected that as the turnover time increases (CR flow rate decreases), the Iodine decay in the CR would increase the contribution from Xenon daughters. However, the results in Tables 10, 11, and 12 in MNGP-004 show that the CR dose decreases with decreasing intake flow rate. This effect would counter any minor increase in noble gas contribution due to Iodine decay. Therefore, no impact on the dose is expected due to in-growth.

5 CALCULATIONS

Not applicable to this calculation.



Calcs. For MNGP AST – MSLBA Radiological		Calc No. 2004-02102	
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Project	Monticello Nuclear Generating Plant	Reviewed by	Date
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6 RESULTS AND CONCLUSIONS

Calculations were performed as prescribed by Appendix D to Regulatory Guide 1.183 (Reference 2) for two cases; (1) Fuel Damage or Pre-incident Spike and (2) Equilibrium Iodine Activity. The calculated doses are presented in MNGP-004 Table Nos. 10, 11 and 12. These calculated doses meet the associated acceptance criteria of References 2 and 5.

Based on the above discussion, it is concluded that the methodology used in the MNGP-004 is appropriate to the purpose of the calculation, that the inputs are in accordance with the approved inputs provided by NMC, and that the results of the analysis are consistent with the inputs and methodology.

7 REFERENCES

1. MNGP-004, Revision 1, "MNGP AST – MSLBA Radiological Consequence Analysis," prepared by Applied Analysis Corp. for Nuclear Management Company, Monticello Nuclear Generating Plant
2. Regulatory Guide 1.183, "Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Plants," Revision 0, USNRC, July 2000
3. NMC Calculation CA-03-190, "Design Inputs for Alternate Source Term (AST) Radiological Analysis," Revision 1
4. Monticello Updated Safety Analysis Report, Revision 21
5. Code of Federal Regulations, Title 10, Section 50.67, "Accident Source Term", 2003
6. "RADTRAD: A Simplified Model for RADionuclide Transport and Removal And Dose Estimation", NUREG/CR-6604, April 1998; Supplement 1, June 8, 1999; and Supplement 2, October 2002
7. MNGP-001, Revision 2, "MNGP AST – Offsite Post-accident Atmospheric Dispersion Analysis," prepared by Applied Analysis Corp. for Nuclear Management Company, Monticello Nuclear Generating Plant (verified under S&L Calculation 2004-01852, Revision 1)
8. MNGP-002, Revision 4, "CR/TSC Post-Accident Atmospheric Dispersion Analysis," prepared by Applied Analysis Corp. for Nuclear Management Company, Monticello Nuclear Generating Plant (verified under S&L Calculation 2004-02100, Revision 2)
9. Federal Guidance Report 11 (FGR-11), Limiting Values of Radionuclide Intake And Air Concentration and Dose Conversion Factors for Inhalation, Submersion, and Ingestion, September 1988 (EPA-520/1-88-020)
10. Federal Guidance Report 12 (FGR-12), External Exposure to Radionuclides in Air, Water, and Soil, September 1993 (EPA-402-R-93-081)

(Final Page)

See CD “(Proprietary) MNGP AST Calculations”
for CA-04-039/S&L 2004-02102 Attachment A
(AAC Calculation MNGP-004, MNGP AST -
MSLBA Radiological Consequence Analysis).



Calcs. For MNGP AST – MSLBA Radiological	
Consequence Analysis	
X	Safety Related
	Non-Safety Related

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Client	Nuclear Management Company	Prepared by	Date
Project	Monticello Nuclear Generating Plant	Reviewed by	Date
Proj. No	11163-013	Approved by	Date
	Equip. No.		

ATTACHMENT B. Computer File Listing For Calculation No. MNGP-004

Associated with AAC Calculation No. MNGP-004 are a number of computer files that contain input data and computer output. Additional files identified in MNGP-004 contain attachments to the calculation that are not associated with computer runs. All of the files identified in MNGP-004 are contained on a compact disk (CD) associated with this calculation. The list of files and the purpose of each file is summarized in the list below.

It is noted that on the RADTRAD software verification form, (file: *Computer Sample Problem Validation Sheet-004.pdf*), the file test17.o0 should read as test16.o0. This is a typographical error, the file test16.o0 is listed below and included on the attached CD.

File	Description
MNGP-004\calculation	
ATT_2_MSLBA.xls	EXCEL spreadsheet calculations
DVCS-MNGP-004.pdf	Design verification comment sheet
MNGP_004_Coversheet.pdf	Signed coversheet
DVCS-MNGP-004_R1.pdf	Design verification comment sheet revision 1
MNGP_004_R1-Coversheet.pdf	Signed coversheet revision 1
MNGP-004\Radtrad	
MSLBA.RFT	Release Fractions and Timing file
MSLBA-2DE.nif	Pre-Incident Iodine Spike - Nuclide Inventory file
MSLBA_CASE1.o0	Pre-Incident Iodine Spike - Case 1 output file
MSLBA_CASE1.psf	Pre-Incident Iodine Spike - Case 1 input file
MSLBA_CASE2.o0	Pre-Incident Iodine Spike - Case 2 output file
MSLBA_CASE2.psf	Pre-Incident Iodine Spike - Case 2 input file
MSLBA_CASE3.o0	Pre-Incident Iodine Spike - Case 3 output file
MSLBA_CASE3.psf	Pre-Incident Iodine Spike - Case 3 input file
MSLBA_CASE4.o0	Pre-Incident Iodine Spike - Case 4 output file
MSLBA_CASE4.psf	Pre-Incident Iodine Spike - Case 4 input file
MSLBA_CASE5.o0	Pre-Incident Iodine Spike - Case 5 output file
MSLBA_CASE5.psf	Pre-Incident Iodine Spike - Case 5 input file
MSLBA_CASE6.o0	Pre-Incident Iodine Spike - Case 6 output file
MSLBA_CASE6.psf	Pre-Incident Iodine Spike - Case 6 input file
MSLBA_CASE7.o0	Pre-Incident Iodine Spike - Case 7 output file
MSLBA_CASE7.psf	Pre-Incident Iodine Spike - Case 7 input file
MSLBA_CASE8.o0	Pre-Incident Iodine Spike - Case 8 output file
MSLBA_CASE8.psf	Pre-Incident Iodine Spike - Case 8 input file
MSLBA_CASE9.o0	Pre-Incident Iodine Spike - Case 9 output file
MSLBA_CASE9.psf	Pre-Incident Iodine Spike - Case 9 input file
MSLBA-02DE.nif	Equilibrium Iodine - Nuclide Inventory file



Calcs. For MNGP AST – MSLBA Radiological	
Consequence Analysis	
X	Safety Related
	Non-Safety Related

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Client	Nuclear Management Company	Prepared by		Date	
Project	Monticello Nuclear Generating Plant	Reviewed by		Date	
Proj. No	11163-013	Approved by		Date	
	Equip. No.				

File	Description
MSLBA_CASE10.o0	Equilibrium Iodine - Case 10 output file
MSLBA_CASE10.psf	Equilibrium Iodine - Case 10 input file
MSLBA_CASE11.o0	Equilibrium Iodine - Case 11 output file
MSLBA_CASE11.psf	Equilibrium Iodine - Case 11 input file
MSLBA_CASE12.o0	Equilibrium Iodine - Case 12 output file
MSLBA_CASE12.psf	Equilibrium Iodine - Case 12 input file
MSLBA_CASE13.o0	Equilibrium Iodine - Case 13 output file
MSLBA_CASE13.psf	Equilibrium Iodine - Case 13 input file
MSLBA_CASE14.o0	Equilibrium Iodine - Case 14 output file
MSLBA_CASE14.psf	Equilibrium Iodine - Case 14 input file
MSLBA_CASE15.o0	Equilibrium Iodine - Case 15 output file
MSLBA_CASE15.psf	Equilibrium Iodine - Case 15 input file
MSLBA_CASE16.o0	Equilibrium Iodine - Case 16 output file
MSLBA_CASE16.psf	Equilibrium Iodine - Case 16 input file
MSLBA_CASE17.o0	Equilibrium Iodine - Case 17 output file
MSLBA_CASE17.psf	Equilibrium Iodine - Case 17 input file
MSLBA_CASE18.o0	Equilibrium Iodine - Case 18 output file
MSLBA_CASE18.psf	Equilibrium Iodine - Case 18 input file
MSLBA_MIX.nif	Mixed Case – Nuclide inventory file
MSLBA_CASE19.o0	Mixed Case – Case 19 output file
MSLBA_CASE19.psf	Mixed Case – Case 19 input file
MSLBA_CASE20.o0	Mixed Case – Case 20 output file
MSLBA_CASE20.psf	Mixed Case – Case 20 input file
MSLBA_CASE21.o0	Mixed Case - Case 21 output file
MSLBA_CASE21.psf	Mixed Case - Case 21 input file
MSLBA_CASE22.o0	Mixed Case - Case 22 output file
MSLBA_CASE22.psf	Mixed Case - Case 22 input file
MSLBA_CASE23.o0	Mixed Case - Case 23 output file
MSLBA_CASE23.psf	Mixed Case - Case 23 input file
MSLBA_CASE24.o0	Mixed Case - Case 24 output file
MSLBA_CASE24.psf	Mixed Case - Case 24 input file
MSLBA_CASE25.o0	Mixed Case - Case 25 output file
MSLBA_CASE25.psf	Mixed Case - Case 25 input file
MSLBA_CASE26.o0	Mixed Case – Case 26 output file
MSLBA_CASE26.psf	Mixed Case – Case 26 input file
MSLBA_CASE27.o0	Mixed Case – Case 27 output file
MSLBA_CASE27.psf	Mixed Case – Case 27 input file
MSLBA_CASE28.o0	Mixed Case – Case 28 output file
MSLBA_CASE28.psf	Mixed Case – Case 28 input file
MSLBA_CASE29.o0	Mixed Case – Case 29 output file
MSLBA_CASE29.psf	Mixed Case – Case 29 input file
MNGP-004\sample problem	



Calcs. For MNGP AST – MSLBA Radiological	
Consequence Analysis	
X	Safety Related
	Non-Safety Related

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Client	Nuclear Management Company	
Project	Monticello Nuclear Generating Plant	
Proj. No	11163-013	Equip. No.

Prepared by	Date
Reviewed by	Date
Approved by	Date

File	Description
Computer Sample Problem Validation Sheet-004_R1.pdf	RADTRAD Software verification form
Test13b.o0	Test problem 13b output file
Test13b.psf	Test problem 13b input file
Test14b.o0	Test problem 14b output file
Test14b.psf	Test problem 14b input file
Test15.o0	Test problem 15 output file
Test15.psf	Test problem 15 input file
Test16.o0	Test problem 16 output file
Test16.psf	Test problem 16 input file
BWR_DBA.RFT	Test problems - Release fractions and timing file
BWR_I131.NIF	Test problems - Nuclide inventory file
Fgr11&12.inp	Dose conversion factors file (FGR-11 and FGR-12)

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MONTICELLO NUCLEAR GENERATING PLANT		3494
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CALCULATION COVER SHEET

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Title MNGP AST – CRDA Radiological CA- 04 - 040 Add. 0
Consequence Analysis

PART A – (Not Applicable to Vendor Calcs)

Assigned Personnel			
Name (Print)	Signature	Title	Initials

Record of Issues							
Rev	Description	Total Sheets	Last Sheet	Preparer	Verifier	Approval	Approval Date

Verification Method(s)

- Review
 Alternate Calculation
 Test
 Other
 Technical Review (per 4 AWI-05.08.07 (FP-E-MOD-07))

3087 (DOCUMENT CHANGE, HOLD AND COMMENT FORM) incorporated: _____				
FOR ADMINISTRATIVE USE ONLY	Resp Subv: CNSTP	Assoc Ref: 4 AWI-05.01.25	SR: N	Freq: 0 yrs
	ARMS: 3494	Doc Type: 3042	Admin initials:	Date:

Approved (Signatures available in Master File)

MONTICELLO NUCLEAR GENERATING PLANT		3494
TITLE:	CALCULATION COVER SHEET	Revision 15
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PART B – (Applicable to Vendor Calculations Only)

Vendor Name Sargent & Lundy Vendor Calc No: 2004-02103
 Vendor Approval Date: 8/30/05

- Form 3345 or QF-0547 attached.
- Safety related? If safety related, attach DIA or reference here. See Other Comments

Reviewed by: Joel Beres / Mike Aleksey Joel Beres 9/6/05 9/6/05
 Print Name Signature Date
 Accepted by: Dennis Zercher Dennis Zercher 9-7-2005
 Print Name Eng. Supv. Signature Date

Record of Issues			
Revision	Description	Total No. of Sheets	Last Sheet Number
0	Original Issue		

PART C – Design Basis Data (Complete for all Calculations)

10 CFR50.59 Screening or Evaluation No: N/A
 Associated Reference(s): AST LAR

Does this calculation:	YES	NO	Calc No(s), Rev(s), Add(s)
Supersede another calculation?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<i>GENE-B21000594-1-R2, "Radiological Analyses of Design Basis Accidents - Task 24", Section 3.1 only. See comments.</i>
Augment (credited by) another calculation?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Derive inputs from another calculation?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<i>CA-03-190 R1 Add. 0; CA-04-036 R1 Add. 0; CA-04-037 R2 Add. 0; CA-04-210 R0 Add. 0</i>
Affect the Fire Protection Program per Form 3765?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	If Yes, attach Form 3765
Affect piping or supports?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	If Yes, attach Form 3544

Approved (Signatures available in Master File)

MONTICELLO NUCLEAR GENERATING PLANT		3494
TITLE:	CALCULATION COVER SHEET	Revision 15
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Affect IST Program Valve or Pump Reference Values, and/or Acceptance Criteria?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	If Yes, inform IST Coordinator and provide copy of calculation
--	--------------------------	-------------------------------------	--

Page 3 of _____
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List all documents/procedures that are based on this calculation (include revision):

USAR, Rev 21 (Section 14.7.1, Tables 14.7-2a and 2b)

List all plant procedures used to ensure inputs/assumptions/outputs are maintained (include revision):

0150 (including 1281), Rev 27. Also see Future Needs below.

What Systems or components are affected?

System Code(s) (See Form 3805): CDR, PPS, RPS

Component ID's (CHAMPS Equip): N/A

DBD Section (if any): B.5.6

Topic Code (See Form 3805): DBAE

Structure Code (See Form 3805): N/A

Other Comments: Sargent & Lundy calculation 2004-02103 Rev 1 incorporates AAC Calculation #MNGP-005 Rev 1 (see attachment for cross-references).

Note: This calculation is not incorporated as part of MNGP's design basis until the associated LARs are approved (AST Phase 1 and 2).

Future needs: Update USAR relevant sections and other plant documents in accordance with the MNGP AST Implementation Plan (OTH027342).

Approved (Signatures available in Master File)

MONTICELLO NUCLEAR GENERATING PLANT		3494
TITLE:	CALCULATION COVER SHEET	Revision 15
		Page 4 of 4

This calculation was completed in accordance with the approved project work plan (DIA Equivalent) for the AST Implementation S&L Letter #SLMON-2003-085, and PO38317.

Approved (Signatures available in Master File)

MNGP AST Project Calculations List

Calculation No.	Title
MNGP # S&L # AAC #	<p>[Applied Analysis Corporation (AAC) performed DBA calculations for the AST project. Sargent & Lundy provided independent verification and documented results in S&L calculations which incorporated the AAC calculations as attachments. The S&L calculations were accepted by MNGP via the vendor calculation control process (4 AWI-05.01.25). Thus each DBA calculation has three numbers – MNGP, S&L, and AAC.</p> <p>AAC calculations will reference other AST calculations by their AAC number. This list is provided for proper cross-reference of calculations.]</p>
03-190 N/A N/A	Design Inputs For Alternate Source Term (AST) Radiological Analysis
04-036 2004-01852 MNGP-001	MNGP AST - Offsite Post-Accident Atmospheric Dispersion Analysis
04-037 2004-02100 MNGP-002	MNGP AST - CR/TSC Post-Accident Atmospheric Dispersion Analysis
04-038 2004-02101 MNGP-003	MNGP AST - LOCA Radiological Consequence Analysis
04-039 2004-02102 MNGP-004	MNGP AST - MSLBA Radiological Consequence Analysis
04-040 2004-02103 MNGP-005	MNGP AST - CRDA Radiological Consequence Analysis
04-041 2004-02104 MNGP-006	MNGP AST - FHA Radiological Consequence Analysis
04-042 2004-02105 MNGP-007	MNGP AST - Post-LOCA pH Analysis
04-210 2004-07600 N/A	Alternative Source Term – Core Isotopic Inventory
05-130 2005-00480 N/A	Post LOCA Direct Dose to the Control Room From External Sources
05-134 2005-06343 MNGP-012	Post-LOCA Steam Pipe Internal Temperature 30-Day Profile for Radiological Dose Analysis

MONTICELLO NUCLEAR GENERATING PLANT		3345
TITLE:	VENDOR CALCULATION REVIEW CHECKLIST	Revision 3
		Page 1 of 1

CA - 04 - 040, Rev 0
Attachment 1

The purpose of the review is to ensure that the vendor calculation or analysis complies with the conditions of the purchase order and is appropriate for its intended use. The purpose of the review is not to serve as an independent verification. Independent verification of the calculation or analysis by the vendor should be evident in the document.

The reviewer should use the criteria below as a guide to assess the overall quality, completeness and usefulness of the calculation or analysis. The reviewer is not required to check the vendor's calculations in detail.

See 4 AWI-05.01.25 (CALCULATION/ANALYSIS CONTROL) for guidance. Place initials by items reviewed.

REVIEW

1. Form 3544 (PIPING AND SUPPORT NUMBERING) completed for calculations affecting piping or supports.
 2. Design inputs correspond to those which were transmitted to the vendor.
 3. Assumptions are described and reasonable. Basis for assumptions identified.
 4. Applicable codes, standards and regulations are identified and met.
 5. Applicable construction and operating experience is considered.
 6. Applicable structure(s), system(s), and component(s) are listed.
 7. Formulas and equations documented and unusual symbols are defined.
 8. Acceptance criteria are identified, adequate and satisfied.
 9. Results are reasonable compared to inputs.
 10. Source documents are referenced.
 11. The calculation is appropriate for its intended use.
 12. The calculation complies with the terms of the Purchase Order.
 13. Inputs, assumptions, outputs, etc. which could affect plant operation are enforced by adequate procedural controls. List any affected procedures.
- JL NA*
JB
AS
JL
JB
JB
JB
JB
JB
AS
JB
JB
JL
- DISO GROUP 2 & SCRAM ISOLATION SIMULATED AUTOMATIC ISOLATION TEST REV 27
(PARENT OR) 1281 SIMULATED AUTOMATIC ISOLATION OF CONDENSER VACUUM PUMP

Completed By: *Jack Burns* Date: 9/6/05 9/6/05

3087 (DOCUMENT CHANGE, HOLD AND COMMENT FORM) incorporated:								
FOR ADMINISTRATIVE	Resp Supv:	CNSTP	Assoc Ref:	4 AWI-05.01.25	SR:	N	Freq:	0 yrs
	ARMS:	3345	Doc Type:	3042	Admin initials:		Date:	

Approved (Signatures available in Master File)

ISSUE SUMMARY
Form SOP-0402-07, Revision 7

DESIGN CONTROL SUMMARY			
CLIENT:	Nuclear Management Company	UNIT NO.:	1 Page No.: 1 of 6
PROJECT NAME:	Monticello Nuclear Generating Plant		
PROJECT NO.:	11163-013	<input checked="" type="checkbox"/>	NUCLEAR SAFETY- RELATED
CALC. NO.:	2004-02103	<input type="checkbox"/>	NOT NUCLEAR SAFETY-RELATED
TITLE:	MNGP-AST – CRDA Radiological Consequence Analysis		
EQUIPMENT NO.:			
IDENTIFICATION OF PAGES ADDED/REVISED/SUPERSEDED/VOIDED & REVIEW METHOD			
Initial Issue (39 pages): Calculation (6 pages), Attachment A – AAC Calculation MNGP-005 (31 pages), Attachment B – List of Electronic Files (2 pages)			
			INPUTS/ ASSUMPTIONS
			<input checked="" type="checkbox"/> VERIFIED
			<input type="checkbox"/> UNVERIFIED
REVIEW METHOD:	<u>Detailed Review</u>	REV.	<u>0</u>
STATUS:	<u>Approved</u>	DATE FOR REV.:	<u>03/23/04</u>
PREPARER	<u>M. D. Elo/(See original for signatures)</u>	DATE:	<u>03/23/04</u>
REVIEWER	<u>W. J. Johnson/(See original for signatures)</u>	DATE:	<u>03/23/04</u>
APPROVER	<u>M. A. Pressburger/(See original for signatures)</u>	DATE:	<u>03/23/04</u>
IDENTIFICATION OF PAGES ADDED/REVISED/SUPERSEDED/VOIDED & REVIEW METHOD			
Revision 1 updates the calculation for new core inventories and X/Qs, to correct the half-life of Kr-85m and to add 3 more release point scenarios. Revision 1 supersedes Revision 0. Revision 1 (69 pages): Calculation (6 pages), Attachment A – AAC Calculation MNGP-005 (61 pages), Attachment B – List of Electronic Files (2 pages)			
			INPUTS/ ASSUMPTIONS
			<input checked="" type="checkbox"/> VERIFIED
			<input type="checkbox"/> UNVERIFIED
REVIEW METHOD:	<u>Detailed Review</u>	REV.	<u>1</u>
STATUS:	<u>Approved</u>	DATE FOR REV.:	<u>08/30/05</u>
PREPARER	<u>W. J. Johnson/</u> <i>WJ Johnson</i>	DATE:	<u>08/30/05</u>
REVIEWER	<u>A. G. Klazura/</u> <i>A G Klazura</i>	DATE:	<u>8/30/05</u>
APPROVER	<u>S. R. Raupp/</u> <i>S R Raupp</i>	DATE:	<u>8/30/05</u>
IDENTIFICATION OF PAGES ADDED/REVISED/SUPERSEDED/VOIDED & REVIEW METHOD			
			INPUTS/ ASSUMPTIONS
			<input type="checkbox"/> VERIFIED
			<input type="checkbox"/> UNVERIFIED
REVIEW METHOD:	_____	REV.	_____
STATUS:	_____	DATE FOR REV.:	_____
PREPARER	_____	DATE:	_____
REVIEWER	_____	DATE:	_____
APPROVER	_____	DATE:	_____

NOTE: PRINT AND SIGN IN THE SIGNATURE AREAS



Calcs. For MNGP AST – CRDA Radiological Consequence			
Analysis			
X	Safety Related		Non-Safety Related

Calc No.	2004-02103		
Rev.	1	Date	
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Client	Nuclear Management Company		
Project	Monticello Nuclear Generating Plant		
Proj. No	11163-013	Equip. No.	

Prepared by		Date	
Reviewed by		Date	
Approved by		Date	

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Calcs. For MNGP AST – CRDA Radiological Consequence			
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X	Safety Related		Non-Safety Related

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Proj. No	11163-013	Equip. No.	Approved by	Date

1 PURPOSE AND SCOPE

A new calculation has been prepared to evaluate the radiological consequences of the Control Rod Drop Accident (CRDA) for Nuclear Management Company’s (NMC) Monticello Nuclear Generating Plant (MNGP). CRDA radiological consequences are being recalculated to implement the Alternate Source Term (AST) at MNGP. The calculation is documented in Applied Analysis Corp. (AAC) calculation MNGP-005 (Reference 1), which is included in its entirety in Attachments A and B. Radiological doses are determined in accordance with the guidance provided in Regulatory Guide 1.183 (Reference 2).

The purpose of this calculation is to document the S&L independent verification of AAC calculation MNGP-005. The verification consists of a review to assure that the methodology used in the calculation is appropriate to the purpose of the calculation, that the inputs are in accordance with the approved inputs provided by NMC, and that the results of the analysis are consistent with the inputs and methodology.

In Revision 1 the calculation is updated to revise the core inventory and the atmospheric dispersion (χ/Q) values, correct the half-life of Kr-85m, and add three more hypothetical release point scenarios.

2 DESIGN INPUT

The design inputs and their bases are identified in Section 4.0 of MNGP-005 (Attachment A). All of the MNGP specific inputs (except χ/Q 's) are referenced to NMC Design Input Request (DIR) Calculation CA-03-190 (Reference 3) and are therefore approved by NMC. Atmospheric dispersion parameters (χ/Q 's) were taken from calculations MNGP-001 and MNGP-002 (References 7 and 8) which were also independently verified by S&L.

3 ASSUMPTIONS

The assumptions used in the determination of the CRDA radiological doses are documented in Section 3.0 of MNGP-005 (Attachment A). These assumptions are consistent with the methodology and data used in the calculation. Furthermore, these assumptions are consistent with NMC input per Calculation CA-03-190 (Reference 3).



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4 METHODOLOGY AND ACCEPTANCE CRITERIA

Methodology

Radiological doses are calculated at the Exclusion Area Boundary (EAB), the Low Population Zone (LPZ) and in the Control Room using the computer code RADTRAD Version 3.03 (Reference 6). RADTRAD is an NRC developed code used to estimate doses at offsite locations; the exclusion area boundary (EAB) and the low population zone (LPZ); and in the control room. Use of the RADTRAD code is an appropriate methodology for this calculation.

The dose rate at the Main Steam Line Radiation Monitor is calculated using the computer code MicroShield (Reference 11). MicroShield is a point kernel gamma-ray transport code, which is an appropriate methodology for this calculation.

Detailed methodology used in the determination of the CRDA radiological doses is documented in Section 5.0 of MNGP-005 (Attachment A). The methodology is appropriate for this application and consistent with the MNGP design basis for the CRDA per USAR Section 14.7.1 (Reference 4).

Dose Acceptance Criteria

Radiological dose acceptance criteria for the EAB, the outer boundary of the LPZ and in the control room are given in 10 CFR 50.67 (Reference 5). For the BWR rod drop accident, the specific dose acceptance criteria at the EAB and LPZ are identified in Table 6 of Regulatory Guide 1.183 (Reference 2). In summary the dose criteria for the BWR rod drop accident are as follows:

- EAB: 6.3 rem TEDE (Reference 2)
- LPZ: 6.3 rem TEDE (Reference 2)
- Control Room: 5 rem TEDE (Reference 5).

Noble Gas Source Term

The noble gas source term used in MNGP-005 assumes the default set of nuclides available in RADTRAD 3.03. Several Krypton and Xenon isotopes (Kr-83m, Xe-131m, Xe-133m, Xe-135m and Xe-138) are not included as shown in FGR-12, Table III.1, pp. 60 and 64 (Reference 9). In addition, Iodine in-growth of noble gases is not modeled for the duration of the accident. Observation of the initial activities in Attachment A1 of 2004-07600 (Reference 10) shows that the activities of the missing isotopes are comparable to those selected in the analysis. Although the missing isotopes are short-lived, their initial activities and ingrowth over 2 hours may increase the calculated 2-hour EAB dose by a marginal amount. The impact on the LPZ and CR doses is expected to be negligible because



Calcs. For MNGP AST – CRDA Radiological Consequence			Calc No. 2004-02103	
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the dose calculation period is larger, 24 hours, and short-lived nuclides will have a smaller effect. Nonetheless, the available margin in MNGP-005 is significant, even at an analyzed reactor power level of 2044 MWth. The maximum calculated EAB/LPZ dose (1.84 rem for the SJAE release scenario) is less than 30% of the allowable (6.3 rem) and the maximum calculated CR dose (1.81 rem for the SJAE release scenario) is less than 37% of the allowable (5 rem). Therefore, given the large margin in the results, the results of calculation MNGP-005 are reasonable.

5 CALCULATIONS

Not applicable to this calculation.

6 RESULTS AND CONCLUSIONS

Calculations were performed as prescribed by Appendix C to Regulatory Guide 1.183 (Reference 2). The calculated doses are presented in MNGP-005 Tables No. 6 through 9. These calculated doses meet the associated acceptance criteria of References 2 and 5.

Based on the above discussion, it is concluded that the methodology used in the MNGP-005 is appropriate to the purpose of the calculation, that the inputs are in accordance with the approved inputs provided by NMC, and that the results of the analysis are consistent with the inputs and methodology.

7 REFERENCES

1. MNGP-005, Revision 1, "MNGP AST – CRDA Radiological Consequence Analysis," prepared by Applied Analysis Corp. for Nuclear Management Company, Monticello Nuclear Generating Plant
2. Regulatory Guide 1.183, "Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Plants," Revision 0, USNRC, July 2000
3. NMC Calculation CA-03-190, "Design Inputs for Alternate Source Term (AST) Radiological Analysis," Revision 1
4. Monticello Updated Safety Analysis Report, Revision 21
5. Code of Federal Regulations, Title 10, Section 50.67, "Accident Source Term"
6. "RADTRAD: A Simplified Model for RADionuclide Transport and Removal And Dose Estimation", NUREG/CR-6604, April 1998; Supplement 1, June 8, 1999; and Supplement 2, October 2002
7. MNGP-001, Revision 2, "MNGP AST – Offsite Post-accident Atmospheric Dispersion



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Analysis		
X	Safety Related	Non-Safety Related

Calc No.	2004-02103	
Rev.	1	Date
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Client	Nuclear Management Company	
Project	Monticello Nuclear Generating Plant	
Proj. No	11163-013	Equip. No.

Prepared by	Date
Reviewed by	Date
Approved by	Date

Analysis,” prepared by Applied Analysis Corp. for Nuclear Management Company, Monticello Nuclear Generating Plant (verified under S&L Calculation 2004-01852, Revision 1)

8. MNGP-002, Revision 4, “CR/TSC Post-Accident Atmospheric Dispersion Analysis,” prepared by Applied Analysis Corp. for Nuclear Management Company, Monticello Nuclear Generating Plant (verified under S&L Calculation 2004-02100, Revision 1)
9. Federal Guidance Report 12 (FGR-12), External Exposure to Radionuclides in Air, Water, and Soil, September 1993 (EPA-402-R-93-081)
10. 2004-07600, Revision 0, “Alternative Source Term – Core Isotopic Inventory,” prepared by S&L for Nuclear Management Company, Monticello Nuclear Generating Plant
11. MicroShield Version 5.05, Copyright 1995-1999 Grove Engineering

(Final Page)

See CD “(Proprietary) MNGP AST Calculations”
for CA-04-040/S&L 2004-02103 Attachment A
(AAC Calculation MNGP-005, MNGP AST - CRDA
Radiological Consequence Analysis).



Calcs. For MNGP AST – CRDA Radiological Consequence	
Analysis	
X	Safety Related
	Non-Safety Related

Calc No.	2004-02103	
Rev.	1	Date
Page	B-1	of B-2

Client	Nuclear Management Company	Prepared by	Date
Project	Monticello Nuclear Generating Plant	Reviewed by	Date
Proj. No	11163-013	Approved by	Date
	Equip. No.		

ATTACHMENT B. Computer File Listing For Calculation No. MNGP-005

Associated with AAC Calculation No. MNGP-005 are a number of computer files that contain input data and computer output. Additional files identified in MNGP-005 contain attachments to the calculation that are not associated with computer runs. All of the files identified in MNGP-005 are contained on a compact disk (CD) associated with this calculation. The list of files and the purpose of each file is summarized in the list below.

File	Description
MNGP-005\calculation	
ATT_2_CRDA_MSL Data.xls	EXCEL spreadsheet calculations
Attachment-L_Pipe_Data_Rev 1.xls	Excel spreadsheet for main steam line volume
DVCS-MNGP-005R1.pdf	Design verification comment sheet
MNGP_005R1_Coversheet	Signed coversheet
MNGP-005\calculation\Revision 0	
DVCS-MNGP-005.pdf	Design verification comment sheet
DVCS-MNGP-005CS.pdf	Design verification comment sheet (signed cover sheet)
MNGP-005\Radtrad	
CRDA.RFT	Release Fractions and Timing file
CRDA.nif	Nuclide Inventory file
CRDA_CASE1.o0	Case 1 output file
CRDA_CASE1.psf	Case 1 input file
CRDA_CASE2.o0	Case 2 output file
CRDA_CASE2.psf	Case 2 input file
CRDA_CASE3.o0	Case 3 output file
CRDA_CASE3.psf	Case 3 input file
CRDA_CASE4.o0	Case 4 output file
CRDA_CASE4.psf	Case 4 input file
CRDA_CASE5.o0	Case 5 output file
CRDA_CASE5.psf	Case 5 input file
CRDA_CASE6.o0	Case 6 output file
CRDA_CASE6.psf	Case 6 input file
CRDA_CASE7.o0	Case 7 output file
CRDA_CASE7.psf	Case 7 input file
CRDA_CASE8.o0	Case 8 output file
CRDA_CASE8.psf	Case 8 input file
CRDA_CASE9.o0	Case 9 output file
CRDA_CASE9.psf	Case 9 input file
CRDA-Less Damage.nif	Nuclide inventory file, less damage
CRDA MVP Isolation Offgas Stack.rft	Release fraction and timing file
MVP Isolation Offgas Stack Release_7440_1000.psf	Offgas release input file



Calcs. For MNGP AST – CRDA Radiological Consequence	
Analysis	
X	Safety Related
	Non-Safety Related

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Rev.	1	Date
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Client	Nuclear Management Company	Prepared by	Date
Project	Monticello Nuclear Generating Plant	Reviewed by	Date
Proj. No	11163-013	Approved by	Date
	Equip. No.		

File	Description
MVP Isolation Offgas Stack Release_7440_1000.o0	Offgas release output file
MVP Isolation Condenser Release_7440_1000.psf	Condenser release input file
MVP Isolation Condenser Release_7440_1000.o0	Condenser release output file
MVP Operation – No Isolation_7440_1000.psf	MVP release input file
MVP Operation – No Isolation_7440_1000.o0	MVP release output file
SJAE Operation_7440_1000.psf	SJAE release, 1000 cfm inleakage input file
SJAE Operation_7440_1000.o0	SJAE release, 1000 cfm inleakage output file
SJAE Operation_7440_500.psf	SJAE release, 500 cfm inleakage input file
SJAE Operation_7440_500.o0	SJAE release, 500 cfm inleakage output file
SJAE Operation_7440_300.psf	SJAE release, 300 cfm inleakage input file
SJAE Operation_7440_300.o0	SJAE release, 300 cfm inleakage output file
SJAE Operation_0_150.psf	SJAE release, 150 cfm inleakage input file
SJAE Operation_0_150.o0	SJAE release, 150 cfm inleakage output file
SJAE Operation_0_75.psf	SJAE release, 75 cfm inleakage input file
SJAE Operation_0_75.o0	SJAE release, 75 cfm inleakage output file
MNGP-005\MicroShield	
MSLRM.MS5	Microshield file
MSLRM-1.MS5	Microshield file
MSLRM-2.MS5	Microshield file
MNGP-005\sample problem	
Computer Sample Problem RADTRAD Validation Sheet-005R1.pdf	RADTRAD Software verification form
Test13b.o0	Test problem 13b output file
Test13b.psf	Test problem 13b input file
Test14b.o0	Test problem 14b output file
Test14b.psf	Test problem 14b input file
Test15.o0	Test problem 15 output file
Test15.psf	Test problem 15 input file
Test16.o0	Test problem 16 output file
Test16.psf	Test problem 16 input file
BWR_DBA.RFT	Test problems - Release fractions and timing file
BWR_I131.NIF	Test problems - Nuclide inventory file
Fgr11&12.inp	Dose conversion factors file (FGR-11 and FGR-12)
Computer Sample Problem MicroShield Validation Sheet-005R1.pdf	Microshield Software verification form
ans_ii.MS5	MicroShield sample problem

(Final Page)

MONTICELLO NUCLEAR GENERATING PLANT		3494
TITLE:	CALCULATION COVER SHEET	Revision 15
		Page 1 of 4

CALCULATION COVER SHEET

Page 1 of _____

Title MNGP AST - FHA Radiological CA- 04 - 041 Add. 0
Consequence Analysis

PART A – (Not Applicable to Vendor Calcs)

Assigned Personnel			
Name (Print)	Signature	Title	Initials

Record of Issues							
Rev	Description	Total Sheets	Last Sheet	Preparer	Verifier	Approval	Approval Date

Verification Method(s)

- Review
 Alternate Calculation
 Test
 Other
 Technical Review (per 4 AWI-05.08.07 (FP-E-MOD-07))

3087 (DOCUMENT CHANGE, HOLD AND COMMENT FORM) incorporated: _____				
FOR ADMINISTRATIVE USE ONLY	Resp Subv: CNSTP	Assoc Ref: 4 AWI-05.01.25	SR: N	Freq: 0 yrs
	ARMS: 3494	Doc Type: 3042	Admin initials:	Date:

Approved (Signatures available in Master File)

MONTICELLO NUCLEAR GENERATING PLANT		3494
TITLE:	CALCULATION COVER SHEET	Revision 15
		Page 2 of 4

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PART B – (Applicable to Vendor Calculations Only)

Vendor Name Sargent & Lundy Vendor Calc No: 2004-02104, Rev 1
 Vendor Approval Date: 8/31/05

- Form 3345 or QF-0547 attached.
- Safety related? If safety related, attach DIA or reference here. See Other Comments

Reviewed by: Mike Aleksey / Dave Sexton [Signature] 9/7/05 / 9/2/05
 Print Name Signature Date
 Accepted by: Dennis Zercher [Signature] 9-8-2005
 Print Name Eng. Supv. Signature Date

Record of Issues			
Revision	Description	Total No. of Sheets	Last Sheet Number
1	Rev 1 of 2004-02104 revises core inventory and X/Q's, and provides additional cases for reduced inleakage rates.		

PART C – Design Basis Data (Complete for all Calculations)

10 CFR50.59 Screening or Evaluation No: N/A
 Associated Reference(s): AST LAR

Does this calculation:	YES	NO	Calc No(s), Rev(s), Add(s)
Supersede another calculation?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	GENE-B21000594-1-R2, Add 0, "Radiological Analyses of Design Basis Accidents - Task 24", Section 3.4 only. See comments.
Augment (credited by) another calculation?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Derive inputs from another calculation?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	CA-03-190 R1 Add 0; CA-04-036 R1 Add 0; CA-04-037 R2 Add 0; CA-04-210 R0 Add 0

Approved (Signatures available in Master File)

MONTICELLO NUCLEAR GENERATING PLANT		3494
TITLE:	CALCULATION COVER SHEET	Revision 15
		Page 3 of 4

Affect the Fire Protection Program per Form 3765?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	If Yes, attach Form 3765
Affect piping or supports?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	If Yes, attach Form 3544
Affect IST Program Valve or Pump Reference Values, and/or Acceptance Criteria?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	If Yes, inform IST Coordinator and provide copy of calculation

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List all documents/procedures that are based on this calculation (include revision):

See Future Needs in Other Comments section (e.g. USAR Section 14.7.6, Tables 14.7-22,23, and 24)

List all plant procedures used to ensure inputs/assumptions/outputs are maintained (include revision):

See Future Needs in Other Comments section (e.g. 9007, Rev. 30 and 9007-B, Rev. 14)

What Systems or components are affected?

System Code(s) (See Form 3805):

CRN, EFT & FPC

Component ID's (CHAMPS Equip):

N/A

DBD Section (if any):

B.08.13 Section 4.3.3, T.21 Section 4.1.4

Topic Code (See Form 3805):

DBAE

Structure Code (See Form 3805):

N/A

Approved (Signatures available in Master File)

MONTICELLO NUCLEAR GENERATING PLANT		3494
TITLE:	CALCULATION COVER SHEET	Revision 15
		Page 4 of 4

Other Comments: Sargent & Lundy calculation 2004-02104 Rev 1 incorporates AAC Calculation #MNGP-006 Rev 1 (see attachment to this form for cross-references).

Note: This calculation is not incorporated as part of MNGP's design basis until the associated LARS are approved (AST Phase 1 and 2).

Future needs (reference OTH021017): Update USAR relevant sections(e.g. Rev. 21 Section 14.7.6, Tables 14.7-22,23, and 24); revise plant procedures if needed (e.g. 9007, Rev. 30 and 9007-B, Rev. 14); provide hard copy of #MNGP-006 Rev 1 attachments when received (currently available in electronic format only).

This calculation was completed in accordance with the approved project work plan (DIA Equivalent) for the AST Implementation S&L Letter #SLMON-2003-085, and PO38317.

Approved (Signatures available in Master File)

MNGP AST Project Calculations List

Calculation No.	Title
<p>MNGP # S&L # AAC #</p>	<p>[Applied Analysis Corporation (AAC) performed DBA calculations for the AST project. Sargent & Lundy provided independent verification and documented results in S&L calculations which incorporated the AAC calculations as attachments. The S&L calculations were accepted by MNGP via the vendor calculation control process (4 AWI-05.01.25). Thus each DBA calculation has three numbers – MNGP, S&L, and AAC.</p> <p>AAC calculations will reference other AST calculations by their AAC number. This list is provided for proper cross-reference of calculations.]</p>
<p>03-190 N/A N/A</p>	<p>Design Inputs For Alternate Source Term (AST) Radiological Analysis</p>
<p>04-036 2004-01852 MNGP-001</p>	<p>MNGP AST - Offsite Post-Accident Atmospheric Dispersion Analysis</p>
<p>04-037 2004-02100 MNGP-002</p>	<p>MNGP AST - CR/TSC Post-Accident Atmospheric Dispersion Analysis</p>
<p>04-038 2004-02101 MNGP-003</p>	<p>MNGP AST - LOCA Radiological Consequence Analysis</p>
<p>04-039 2004-02102 MNGP-004</p>	<p>MNGP AST - MSLBA Radiological Consequence Analysis</p>
<p>04-040 2004-02103 MNGP-005</p>	<p>MNGP AST - CRDA Radiological Consequence Analysis</p>
<p>04-041 2004-02104 MNGP-006</p>	<p>MNGP AST - FHA Radiological Consequence Analysis</p>
<p>04-042 2004-02105 MNGP-007</p>	<p>MNGP AST - Post-LOCA pH Analysis</p>
<p>04-210 2004-07600 N/A</p>	<p>Alternative Source Term – Core Isotopic Inventory</p>
<p>05-130 2005-00480 N/A</p>	<p>Post LOCA Direct Dose to the Control Room From External Sources</p>
<p>05-134 2005-06343 MNGP-012</p>	<p>Post-LOCA Steam Pipe Internal Temperature 30-Day Profile for Radiological Dose Analysis</p>

MONTICELLO NUCLEAR GENERATING PLANT		3345
TITLE:	VENDOR CALCULATION REVIEW CHECKLIST	Revision 3
		Page 1 of 1

CA - 04 - 041, Rev 1
Attachment to form 3494

The purpose of the review is to ensure that the vendor calculation or analysis complies with the conditions of the purchase order and is appropriate for its intended use. The purpose of the review is not to serve as an independent verification. Independent verification of the calculation or analysis by the vendor should be evident in the document.

The reviewer should use the criteria below as a guide to assess the overall quality, completeness and usefulness of the calculation or analysis. The reviewer is not required to check the vendor's calculations in detail.

See 4 AWI-05.01.25 (CALCULATION/ANALYSIS CONTROL) for guidance. Place initials by items reviewed.

REVIEW

1. Form 3544 (PIPING AND SUPPORT NUMBERING) completed for calculations affecting piping or supports.
2. Design inputs correspond to those which were transmitted to the vendor.
3. Assumptions are described and reasonable. Basis for assumptions identified.
4. Applicable codes, standards and regulations are identified and met.
5. Applicable construction and operating experience is considered.
6. Applicable structure(s), system(s), and component(s) are listed.
7. Formulas and equations documented and unusual symbols are defined.
8. Acceptance criteria are identified, adequate and satisfied.
9. Results are reasonable compared to inputs.
10. Source documents are referenced.
11. The calculation is appropriate for its intended use.
12. The calculation complies with the terms of the Purchase Order.
13. Inputs, assumptions, outputs, etc. which could affect plant operation are enforced by adequate procedural controls. List any affected procedures.
9007, 9007-B (reference OTH021017)

NA
OK
OK
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OK

Completed By: *[Signature]* / D.E. [Signature] Date: 9/7/05 / 9/7/05

3087 (DOCUMENT CHANGE, HOLD AND COMMENT FORM) incorporated: _____				
FOR ADMINISTRATIVE	Resp Supv: CNSTP	Assoc Ref: 4 AWI-05.01.25	SR: N	Freq: 0 yrs
	ARMS: 3345	Doc Type: 3042	Admin initials:	Date:

Approved (Signatures available in Master File)

ISSUE SUMMARY
Form SOP-0402-07, Revision 7

DESIGN CONTROL SUMMARY			
CLIENT:	Nuclear Management Company	UNIT NO.:	1 Page No.: 1 of 5
PROJECT NAME:	Monticello Nuclear Generating Plant		
PROJECT NO.:	11163-013	<input checked="" type="checkbox"/>	NUCLEAR SAFETY- RELATED
CALC. NO.:	2004-02104	<input type="checkbox"/>	NOT NUCLEAR SAFETY-RELATED
TITLE:	MNGP AST – FHA Radiological Consequence Analysis		
EQUIPMENT NO.:	_____		
IDENTIFICATION OF PAGES ADDED/REVISED/SUPERSEDED/VOIDED & REVIEW METHOD			
Initial Issue (37 pages): Calculation (6 pages), Attachment A – AAC Calculation MNGP-006 (29 pages), Attachment B – List of Electronic Files (2 pages)			
		INPUTS/ ASSUMPTIONS	
		<input checked="" type="checkbox"/> VERIFIED	
		<input type="checkbox"/> UNVERIFIED	
REVIEW METHOD:	<u>Detailed Review</u>	REV.	<u>0</u>
STATUS:	<u>Approved</u>	DATE FOR REV.:	<u>03-23-04</u>
PREPARER	<u>M. D. Elo/(See original for signature)</u>	DATE:	<u>03-22-04</u>
REVIEWER	<u>W. J. Johnson/(See original for signature)</u>	DATE:	<u>03-22-04</u>
APPROVER	<u>M. A. Pressburger/(See original for signature)</u>	DATE:	<u>03-23-04</u>
IDENTIFICATION OF PAGES ADDED/REVISED/SUPERSEDED/VOIDED & REVIEW METHOD			
Revised to incorporate new source terms and X/Q values, correct error in RADTRAD NIF file and add additional models. Revision 1 supersedes Revision 0.			
Revision 1 (38 pages): Calculation (5 pages), Attachment A – AAC Calculation MNGP-006 (31 pages), Attachment B – List of Electronic Files (2 pages)			
		INPUTS/ ASSUMPTIONS	
		<input checked="" type="checkbox"/> VERIFIED	
		<input type="checkbox"/> UNVERIFIED	
REVIEW METHOD:	<u>Detailed Review</u>	REV.	<u>1</u>
STATUS:	<u>Approved</u>	DATE FOR REV.:	<u>8/31/05</u>
PREPARER	<u>W. J. Johnson/</u> <i>W. J. Johnson</i>	DATE:	<u>8/31/05</u>
REVIEWER	<u>A. G. Klazura/</u> <i>A. G. Klazura</i>	DATE:	<u>8/31/05</u>
APPROVER	<u>S. R. Raupp/</u> <i>S. R. Raupp</i>	DATE:	<u>8/21/05</u>
IDENTIFICATION OF PAGES ADDED/REVISED/SUPERSEDED/VOIDED & REVIEW METHOD			
		INPUTS/ ASSUMPTIONS	
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Prepared by		Date	
Reviewed by		Date	
Approved by		Date	

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1 PURPOSE AND SCOPE

A new calculation has been prepared to evaluate the radiological consequences of the Fuel Handling Accident (FHA) for Nuclear Management Company's (NMC) Monticello Nuclear Generating Plant (MNGP). FHA radiological consequences are being recalculated to implement the Alternate Source Term (AST) at MNGP. The calculation is documented in Applied Analysis Corp. (AAC) calculation MNGP-006 (Reference 1), which is included in its entirety in Attachments A and B. Radiological doses are determined in accordance with the guidance provided in Regulatory Guide 1.183 (Reference 2).

The purpose of this calculation is to document the S&L independent verification of AAC calculation MNGP-006. The verification consists of a review to assure that the methodology used in the calculation is appropriate to the purpose of the calculation, that the inputs are in accordance with the approved inputs provided by NMC, and that the results of the analysis are consistent with the inputs and methodology.

Revision 1 incorporates revised source terms and χ/Q values, modifies the RADTRAD NIF file to correct the half life of Kr-83m, removes discussion of a 30 hour delay and adds two additional RADTRAD models for reduced inleakage.

2 DESIGN INPUT

The design inputs and their bases are identified in Section 4.0 of MNGP-006 (Attachment A). All of the MNGP specific inputs (except χ/Q 's) are referenced to NMC Design Input Request (DIR) Calculation CA-03-190 (Reference 3) and are therefore approved by NMC. Atmospheric dispersion parameters (χ/Q 's) were taken from calculations MNGP-001 and MNGP-002 (References 7 and 8) which were also independently verified by S&L.

3 ASSUMPTIONS

The assumptions used in the determination of the FHA radiological doses are documented in Section 3.0 of MNGP-006 (Attachment A). These assumptions are consistent with the methodology and data used in the calculation. Furthermore, these assumptions are consistent with NMC input per Calculation CA-03-190 (Reference 3).

4 METHODOLOGY AND ACCEPTANCE CRITERIA

Methodology

Radiological doses are calculated at the Exclusion Area Boundary (EAB), the Low Population Zone (LPZ) and in the Control Room using the computer code RADTRAD Version 3.03 (Reference 6).



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RADTRAD is an NRC developed code used to estimate doses at offsite locations; the exclusion area boundary (EAB) and the low population zone (LPZ); and in the control room. Use of the RADTRAD code is an appropriate methodology for this calculation.

Detailed methodology used in the determination of the FHA radiological doses is documented in Section 5.0 of MNGP-006 (Attachment A). The methodology is appropriate for this application and consistent with the MNGP design basis for the FHA per USAR Section 14.7.6 (Reference 4).

Dose Acceptance Criteria

Radiological dose acceptance criteria for the EAB, the outer boundary of the LPZ and in the control room are given in 10 CFR 50.67 (Reference 5). For the fuel handling accident, the specific dose acceptance criteria at the EAB and LPZ are identified in Table 6 of Regulatory Guide 1.183 (Reference 2). In summary the dose criteria for the fuel handling accident are as follows:

- EAB: 6.3 rem TEDE (Reference 2)
- LPZ: 6.3 rem TEDE (Reference 2)
- Control Room: 5 rem TEDE (Reference 5).

Noble Gas Source Term

The noble gas source term used in MNGP-006 assumes the default set of nuclides available in RADTRAD 3.03. Several Krypton and Xenon isotopes (Kr-83m, Xe-131m, Xe-133m, Xe-135m and Xe-138) are not included as shown in FGR-12, Table III.1, pp. 60 and 64 (Reference 9). In addition, Iodine in-growth of noble gases is not modeled for the 2-hour duration of the accident. Observation of the initial activities in Attachment A1 of Reference 10 shows that the activities of the missing isotopes are comparable to those selected in the analysis. However, the 24 hour delay prior to fuel movement will ensure that the impact of Kr-83m and Xe-138 will be negligible because of their short half lives. The impact of Xe-131m, Xe-133m and Xe-135m will be reduced since their short half-lives will significantly reduce their activities at the start of the accident. Their activities will be controlled by iodine decay only (ingrowth). This ingrowth term will be much less than their initial activities based on the small associated branching fractions and the reduced iodine activities after 24 hours. Therefore, the relative impact of these metastable isotopes will be small compared to the longer-lived Xe-133 and Xe-135. Therefore the calculated doses will not be affected by these effects and the calculation MNGP-006 is conservative as given.

5 CALCULATIONS

Not applicable to this calculation.



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6 RESULTS AND CONCLUSIONS

Calculations were performed as prescribed by Appendix B to Regulatory Guide 1.183 (Reference 2). The calculated doses are presented in MNGP-006 Table No. 7. These calculated doses meet the associated acceptance criteria of References 2 and 5 at an analyzed power level of 1918 MWth and at the analyzed EPU power level of 2044 MWth.

Based on the above discussion, it is concluded that the methodology used in the MNGP-006 is appropriate to the purpose of the calculation, that the inputs are in accordance with the approved inputs provided by NMC, and that the results of the analysis are consistent with the inputs and methodology.

7 REFERENCES

1. MNGP-006, Revision 1, "MNGP AST – FHA Radiological Consequence Analysis," prepared by Applied Analysis Corp. for Nuclear Management Company, Monticello Nuclear Generating Plant
2. Regulatory Guide 1.183, "Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Plants," Revision 0, USNRC, July 2000
3. NMC Calculation CA-03-190, "Design Inputs for Alternate Source Term (AST) Radiological Analysis," Revision 1
4. Monticello Updated Safety Analysis Report, Revision 21
5. Code of Federal Regulations, Title 10, Section 50.67, "Accident Source Term", 2003
6. "RADTRAD: A Simplified Model for RADionuclide Transport and Removal And Dose Estimation", NUREG/CR-6604, April 1998; Supplement 1, June 8, 1999; and Supplement 2, October 2002
7. MNGP-001, Revision 2, "MNGP AST – Offsite Post-accident Atmospheric Dispersion Analysis," prepared by Applied Analysis Corp. for Nuclear Management Company, Monticello Nuclear Generating Plant (verified under S&L Calculation 2004-01852, Revision 1)
8. MNGP-002, Revision 4, "CR/TSC Post-Accident Atmospheric Dispersion Analysis," prepared by Applied Analysis Corp. for Nuclear Management Company, Monticello Nuclear Generating Plant (verified under S&L Calculation 2004-02100, Revision 2)
9. Federal Guidance Report 12 (FGR-12), External Exposure to Radionuclides in Air, Water, and Soil, September 1993 (EPA-402-R-93-081)
10. S&L Calculation 2004-07600, Revision 0, "Alternate Source Term Core Isotopic Inventory" (MNGP Calculation 04-210, Revision 0)

(Final Page)

See CD “(Proprietary) MNGP AST Calculations”
for CA-04-041/S&L 2004-02104 Attachment A
(AAC Calculation MNGP-006, MNGP AST - FHA
Radiological Consequence Analysis).



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ATTACHMENT B. Computer File Listing For Calculation No. MNGP-006

Associated with AAC Calculation No. MNGP-006 are a number of computer files that contain input data and computer output. Additional files identified in MNGP-006 contain attachments to the calculation that are not associated with computer runs. All of the files identified in MNGP-006 are contained on a compact disk (CD) associated with this calculation. The list of files and the purpose of each file is summarized in the list below.

File	Description
MNGP-006\calculation	
ATT_2_FHA.xls	EXCEL spreadsheet calculations
DVCS-MNGP-006.pdf	Design verification comment sheet
MNGP_006_Coversheet.pdf	Signed coversheet
DVCS-MNGP-006_R1.pdf	Design verification comment sheet rev 1
MNGP_006R1_Coversheet.pdf	Signed coversheet, rev 1
MNGP-006\Radtrad	
FHA.RFT	Release Fractions and Timing file
FHA.nif	Nuclide Inventory file
FHA_CASE1.o0	Case 1 output file
FHA_CASE1.psf	Case 1 input file
FHA_CASE2.o0	Case 2 output file
FHA_CASE2.psf	Case 2 input file
FHA_CASE3.o0	Case 3 output file
FHA_CASE3.psf	Case 3 input file
FHA_CASE4.o0	Case 4 output file
FHA_CASE4.psf	Case 4 input file
FHA_CASE5.o0	Case 5 output file
FHA_CASE5.psf	Case 5 input file
FHA_CASE6.o0	Case 6 output file
FHA_CASE6.psf	Case 6 input file
FHA_CASE7.o0	Case 7 output file
FHA_CASE7.psf	Case 7 input file
FHA_CASE8.o0	Case 8 output file
FHA_CASE8.psf	Case 8 input file
FHA_CASE9.o0	Case 9 output file
FHA_CASE9.psf	Case 9 input file
FHA_CASE10.o0	Case 10 output file
FHA_CASE10.psf	Case 10 input file
FHA_CASE11.o0	Case 11 output file
FHA_CASE11.psf	Case 11 input file
MNGP-006\sample problem	



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Approved by		Date	

File	Description
Computer Sample Problem Validation Sheet-006R1.pdf	RADTRAD Software verification form
Test13b.o0	Test problem 13b output file
Test13b.psf	Test problem 13b input file
Test14b.o0	Test problem 14b output file
Test14b.psf	Test problem 14b input file
Test15.o0	Test problem 15 output file
Test15.psf	Test problem 15 input file
Test16.o0	Test problem 16 output file
Test16.psf	Test problem 16 input file
BWR_DBA.RFT	Test problems - Release fractions and timing file
BWR_I131.NIF	Test problems - Nuclide inventory file
Fgr11&12.inp	Dose conversion factors file (FGR-11 and FGR-12)

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CALCULATION COVER SHEET

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Title Alternative Source Term - Core Isotopic Inventory CA- 04 - 210 Add. N/A

PART A – (Not Applicable to Vendor Calcs)

Assigned Personnel			
Name (Print)	Signature	Title	Initials

Record of Issues							
Rev	Description	Total Sheets	Last Sheet	Preparer	Verifier	Approval	Approval Date

Verification Method(s)

- Review
 Alternate Calculation
 Test
 Other
 Technical Review (per 4 AWI-05.08.07 (FP-E-MOD-07))

3087 (DOCUMENT CHANGE, HOLD AND COMMENT FORM) incorporated: _____							
FOR ADMINISTRATIVE USE ONLY	Resp Subv: CNSTP	Assoc Ref: 4 AWI-05.01.25	SR: N	Freq: 0	vrs		
	ARMS: 3494	Doc Type: 3042	Admin initials:	Date:			

Approved (Signatures available in Master File)

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PART B – (Applicable to Vendor Calculations Only)

Vendor Name Sargent & Lundy Vendor Calc No: 2004-07600
Vendor Approval Date: 11-08-2004

Form 3345 or QF-0547 attached.

Sargent & Lundy
Project 11163-013,
Project Work Plan
Rev. 3 dated 10/7/04

Safety related? If safety related, attach DIA or reference here.

Reviewed by: Melissa Limbeck Melissa Limbeck 7/1/05
Print Name Signature Date
Accepted by: Thomas M Parker Thomas M Parker for A Myrals 7/10/05
Print Name Eng. Supv. Signature Date

Record of Issues			
Revision	Description	Total No. of Sheets	Last Sheet Number
0	Alternative Source Term - Core Isotopic Inventory - Initial Issue	520	Att01 Page 1 of 1

PART C – Design Basis Data (Complete for all Calculations)

10 CFR50.59 Screening or Evaluation No: N/A
Alternative Source Term License Amendment Request
Associated Reference(s): Request

Does this calculation:	YES	NO	Calc No(s), Rev(s), Add(s)
Supersede another calculation?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	GENE-B2100591-2, Radiological Analysis Sources, Rerate Task 21, see comments rev. 0, add. 0, CA-03-194, see comments

Approved (Signatures available in Master File)

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Augment (credited by) another calculation?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<i>CA-04-038 Rev 0 Add 0, MNGP AST LOCA Radiological Consequence Analysis</i> <i>CA-04-039 Rev 0 Add 0, MNGP AST MSLBA Radiological Consequence Analysis</i> <i>CA-04-040 Rev 0 Add 0, MNGP AST CRDA Radiological Consequence Analysis</i> <i>CA-04-041 Rev 1 Add 0, MNGP AST FHA Radiological Consequence Analysis</i>
Derive inputs from another calculation?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Affect the Fire Protection Program per Form 3765?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	If Yes, attach Form 3765
Affect piping or supports?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	If Yes, attach Form 3544
Affect IST Program Valve or Pump Reference Values, and/or Acceptance Criteria?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	If Yes, inform IST Coordinator and provide copy of calculation

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List all documents/procedures that are based on this calculation (include revision):

Reference OTH020543 & PCR001719 (Hudson). Assumptions are pertinent to core design process. Nuclear Analysis & Design Procedure will be updated per PCR001719

List all plant procedures used to ensure inputs/assumptions/outputs are maintained (include revision):

N/A

What Systems or components are affected?

System Code(s) (See Form 3805):

N/A

Component ID's (CHAMPS Equip):

N/A

DBD Section (if any):

DBAE

Topic Code (See Form 3805):

N/A

Approved (Signatures available in Master File)

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Structure Code (See Form 3805):

N/A

Other Comments: This calculation supersedes the results of rerate task 21 section 3.2.1 Fission Product Inventories for Design Basis Accidents Offsite Dose Calculations. This calculation will also supercede the results of CA-03-194 upon approval of the Full Scope Alternative Source Term License Amendment Request. Note: This calculation is not incorporated as part of MNGP's design basis until after the associated LARs are approved.

Approved (Signatures available in Master File)

CA-04-210, Rev. 0
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Attachment A2	Table A2: Core Isotopic Inventory (data in Ci per MWt) - Case 2 Maximum Assembly Burnup	20
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Attachment C1	3345 Vendor Calculation Review Checklist	1
	Total	520

ISSUE SUMMARY
Form SOP-0402-07, Revision 6

DESIGN CONTROL SUMMARY			
CLIENT:	Nuclear Management Company	UNIT NO.:	1 Page No.: 1
PROJECT NAME:	Monticello Nuclear Generating Plant		
PROJECT NO.:	11163-013	<input checked="" type="checkbox"/> NUCLEAR SAFETY- RELATED	
CALC. NO.:	2004-07600	<input type="checkbox"/> NOT NUCLEAR SAFETY-RELATED	
TITLE:	Alternative Source Term – Core Isotopic Inventory		
EQUIPMENT NO.:	N/A		
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Original Issue			
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REVIEW METHOD:	Detailed	REV.	0
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REVIEWER	B. J. Andrews <i>B. J. Andrews</i>	DATE:	11-8-2004
APPROVER	W. J. Johnson <i>W. J. Johnson</i>	DATE:	11-8-04
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REVIEWER	_____	DATE:	_____
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Prepared by	Date
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1. PURPOSE AND SCOPE

The purpose of this calculation is to develop a core isotopic inventory for use in the Alternative Source Term (AST) radiological evaluations. The calculation is based on the design input parameters supplied by the Nuclear Management Company and it has been performed using the computer code ORIGEN 2.1. This calculation is safety related.

2. DESIGN INPUT

The reactor core information was taken from the Monticello Updated Safety Analysis Report (Reference 1). Specific input to the model was derived from the NMC DIT No.18739 (Reference 2). The key parameters specific to this calculation are listed in Table 1.

Table 1: Input Parameters for Analysis Specific to Monticello Plant

PARAMETER	VALUE	REFERENCE AND COMMENT
Enrichment Factor (Average initial enrichment of Monticello fuel)	3.93 %wt U-235	NMC DIT No.18739
Power Level (Core Power Level used in the calculation)	1918 MWt	NMC DIT No.18739 This power level includes the 2% increase required for analysis by RG 1.49 (Reference 3). This is documented in DIR CA-03-190 (Reference 4).
Fuel Data: MT uranium/assembly	0.183 MTU/assembly	NMC DIT No.18739 MTU/assembly value varies from 0.164 to 0.183; Upper end of the range has been used for conservatism.
Total number of assemblies in the core	484	NMC DIT No.18739



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Table 1 (Continued): Input Parameters for Analysis Specific to Monticello Plant

PARAMETER	VALUE	REFERENCE AND COMMENT
Cycle/Burnup Data:		
Cycle length	24 months (23 months operating with 1 month outage)	NMC DIT No.18739
Number of cycles an assembly is irradiated. (total irradiation time)	4 cycles	NMC DIT No.18739
Total assembly burnup for average assembly	33.96 GWD/MT	NMC DIT No.18739
Total assembly burnup for maximum burnup assembly	54.00 GWD/MT	NMC DIT No.18739

The uranium content of the fuel assemblies varies from 0.164 to 0.183 Metric Ton of Initial Heavy Metal (MTIHM). However to be conservative in the calculation and in accordance with NMC DIT No.18739, the upper end value of 0.183 MT IHM/assembly has been used in this analysis.

The core power level used in this calculation is 1918 MWt. The average burnup for the fuel in Monticello core is taken as 33,960 MWD/MTIHM. For a separate simulation, the maximum burnup of 54,000 MWD/MTIHM was used.

The key parameters for the computer code simulation are the core power level, the average (or maximum) burnup data, the U-235 content of the fuel and the fuel cycle data. The enrichment for the Monticello fuel is 3.93 wt % of U-235. Even though the fuel cycle scheme used at Monticello is four cycles with each cycle length consisting of 24 month period (23 months operating and 1 month outage), the model in this calculation conservatively consisted of continuous irradiation of fuel for a time period calculated to match the burnup conditions of design input. This is discussed in Section 4 of this calculation.

3. ASSUMPTIONS

ORIGEN 2.1 requires use of an appropriate generic model (cross section libraries) from the several models provided in the code. The model BWRUE has been used in this calculation. It is considered to be applicable to the Monticello fuel composition and fuel cycle conditions based on the following:



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- ? Of the various generic BWR reactor models available in ORIGEN 2.1, the BWRUE model closely represents the Monticello core and fuel cycle conditions.
- ? The BWRUE model is designed for use with higher enrichment factors.
- ? The BWRUE model is designed for four cycle burnup to achieve the extended burnup conditions.
- ? The BWRUE model is a relatively newer model as compared to other BWR models and it uses the updated cross-section libraries.

For computer runs with ORIGEN 2.1, only fuel conditions have been input as the fission products are of primary interest; composition of structural materials and impurities has not been input.

The purpose of the calculation is to derive a snapshot of the core inventory at the end of a cycle. The fuel is put through four cycles of burnup with a 24 month cycle (23 months operating and 1 month outage). At the end of a cycle, the core fuel inventory is a mixture of fuel that has been irradiated from one to four cycles. However, the reactor operating power during operation is maintained at 1918 MWt. Given the core power level of 1918 MWt, for the average burnup case (Case 1), the power level for the fuel in the ORIGEN model has been used at 21.65 MWt/MTIHM. Conservatively, the fuel is assumed to be in the core continuously for 1568.25 days to match the fuel average burnup of 33,960 MWD/MTIHM. Similarly, for the maximum burnup case (Case 2), the fuel is assumed to be in the core continuously 2493.68 days to match the maximum burnup of 54,000 MWD/MTIHM.

4. METHODOLOGY AND ACCEPTANCE CRITERIA

Alternative Source Term methodology defined in Regulatory Guide 1.183 (Reference 5) requires that the core inventory be determined using an appropriate isotope generation and depletion code such as ORIGEN 2 or ORIGEN-ARP. Consistent with the scope of this calculation, the ORIGEN 2.1 code was used for performing this calculation (Reference 6). ORIGEN 2.1 is a FORTRAN based computer code developed by the Oak Ridge National Laboratory that uses a matrix exponential method to solve a large system of coupled, linear, first-order ordinary differential equations with constant coefficients.

The ORIGEN 2.1 code provides various burnup models for PWR and BWR reactor cores. Of the available models for various BWR cores, model BWRUE is the most relevant to Monticello plant and the fuel and cycle conditions. This model and the appropriate cross-section libraries have been used in this calculation.

The code used in this calculation is S&L Program Number 03.7.533-2.1 (Reference 7), which was run on Sargent & Lundy Computer No. PC8809. Since the code is validated in accordance with the S&L QA program, no additional validation is provided in the calculation.

Two cases were modeled for the Monticello core. Case 1 is representative of the core average conditions at end of cycle and is the primary case. Conservative assumptions were made with respect to the Initial Heavy Metal (IHM) content of the fuel and continuous irradiation of the fuel was modeled for a time period to achieve the average burnup conditions of 33,960 MWD/MTIHM. After the fuel discharge and in addition to the data at discharge point, the data are also computed at decay intervals at the following points in accordance with NMC DIT No.18739: 2 minutes, 1 hour, 6 hours, 1 day, 4 days, 7



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days, and 30 days. Additional points were included at following decay intervals: 1 minute, 14 days, and 21 days. The data at the fuel discharge point are of primary use for the Alternative Source Term evaluations. The data at other points may be relevant to accident conditions such as LOCA and fuel handling accidents.

Case 2 was modeled with maximum assembly burnup conditions of 54,000 MWD/MTIHM. The fuel is modeled as continuously irradiated for a time period to match the burnup conditions. This case is specifically modeled to determine the inventory in the maximum irradiated fuel assembly.

The data at discharge point at the end of cycle is used for computing radionuclides inventories of interest. The radionuclides of interest for the Alternative Source Term are the sixty nuclides for which the data have been reported in Tables 2 and 3. The mass for iodine isotopes has also been computed and reported both for the average burnup conditions as well as for the maximum burnup case.

The data generated in this calculation are meant as input to the Alternative Source Term evaluation. Thus, the data are reported for the set of sixty nuclides required to perform the radiological analysis for the Alternative Source Term. There are no acceptance criteria specified.

5. CALCULATIONS

The calculation has been performed using the computer code ORIGEN 2.1. Attachments B1 and B2 provide the ORIGEN files for Case 1 and Case 2.

The radionuclide inventory for the Alternative Source Term is derived from the Ci content for each radionuclide that is calculated by the code on a per MTIHM basis for the core and fuel conditions used. Monticello reactor core uses 484 assemblies with the uranium content of the assemblies varying from 0.164 to 0.183 MTIHM/assembly. Conservatively, and in accordance with the NMC DIT No.18739 (Reference 2), the upper end value of this range has been used in the present calculation. Thus, the Core Isotopic Inventory has been computed using this value and the ORIGEN 2.1 results.

Full loading for the core is calculated using the upper end of the MTIHM value per assembly using Equation 1.

$$\text{Equation 1} \quad 484 \text{ assemblies} * 0.183 \text{ MTIHM/Assembly} = 88.572 \text{ MTIHM}$$

The power level for ORIGEN input is determined from core power value of 1918 MWt and the full core loading as described in Equation 2.

$$\text{Equation 2} \quad 1918 \text{ MWt} / 88.572 \text{ MTIHM} = 21.65 \text{ MWt/MTIHM}$$

The number of days for which the continuous irradiation is modeled in the ORIGEN is calculated from Equation 3 for Case 1 and Equation 4 for Case 2.

$$\text{Equation 3} \quad 33960 \text{ (MWD/MTIHM)} * 88.572 \text{ MTIHM} / 1918 \text{ MWt} = 1568.25 \text{ D} \\ \text{(Case1)}$$



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Equation 4 54000 (MWD/MTIHM) * 88.572 MTIHM /1918 MWt = 2493.68 D
 (Case 2)

The calculations done by ORIGEN 2.1 are on a basis of per metric ton of IHM for the given core and fuel cycle conditions. Thus, the output data from ORIGEN 2.1 provides radionuclide inventory in curies on a per MTIHM basis. These data must be normalized to the full core loading for determining the Core Isotopic Inventory for the full core. Generally, the data for Alternative Source Term evaluation purpose are reported on a per MW thermal basis. Thus, the ORIGEN output data must be normalized to the per MWt basis.

For the average burnup and end of cycle conditions, the data for the nuclides of interest are reported in Table 2. This table provides the data as computed by ORIGEN 2.1 in terms of Ci/MTIHM basis at the fuel discharge point. From these data, the data for the full core inventory are calculated using the total core loading value of 88.572 MTIHM. The Core Isotopic Inventory on a Ci/MWt basis is calculated using the ORIGEN 2.1 generated data for these nuclides and dividing it by the power level of 21.65 (MWt/MTIHM).

Similar to Table 2, the data for each nuclide of interest are reported in Table 3 for the maximum assembly burnup conditions in three columns providing the data on the bases of Ci per MTIHM, full core inventory in Ci, and the Core Isotopic Inventory in Ci per MWt.

A complete listing of the data for the two cases are provided in Attachments A1 (Table A1) and A2 (Table A2). These data are reported for all fission products and at various decay intervals after the discharge.



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Table 2: Alternative Source Term – Core Isotopic Inventory for Average Burnup and End of Cycle (33,960 MWD/MTIHM; ORIGEN 2.1 Run Case 1)

Nuclide No.	Nuclide	ORIGEN 2.1 Results Ci per 1 MTIHM	Core Isotopic Inventory Full Core, Ci	Core Isotopic Inventory Ci/MWt
1	Co-58	Note ¹	Note ¹	Note ¹
2	Co-60	Note ¹	Note ¹	Note ¹
3	Kr-85	9.41E+03	8.34E+05	4.35E+02
4	Kr-85M	1.44E+05	1.27E+07	6.64E+03
5	Kr-87	2.75E+05	2.43E+07	1.27E+04
6	Kr-88	3.86E+05	3.42E+07	1.78E+04
7	Rb-86	1.38E+03	1.22E+05	6.36E+01
8	Sr-89	5.22E+05	4.62E+07	2.41E+04
9	Sr-90	7.60E+04	6.73E+06	3.51E+03
10	Sr-91	6.54E+05	5.79E+07	3.02E+04
11	Sr-92	7.12E+05	6.30E+07	3.29E+04
12	Y-90	7.80E+04	6.90E+06	3.60E+03
13	Y-91	6.79E+05	6.01E+07	3.13E+04
14	Y-92	7.15E+05	6.33E+07	3.30E+04
15	Y-93	8.32E+05	7.37E+07	3.84E+04
16	Zr-95	9.46E+05	8.38E+07	4.37E+04
17	Zr-97	9.41E+05	8.34E+07	4.35E+04
18	Nb-95	9.69E+05	8.58E+07	4.47E+04
19	Mo-99	1.06E+06	9.42E+07	4.91E+04
20	Tc-99M	9.31E+05	8.25E+07	4.30E+04
21	Ru-103	8.97E+05	7.95E+07	4.14E+04
22	Ru-105	6.20E+05	5.49E+07	2.86E+04
23	Ru-106	3.87E+05	3.43E+07	1.79E+04
24	Rh-105	5.92E+05	5.25E+07	2.74E+04
25	Sb-127	6.24E+04	5.53E+06	2.88E+03
26	Sb-129	1.85E+05	1.64E+07	8.53E+03
27	Te-127	6.21E+04	5.50E+06	2.87E+03
28	Te-127M	8.55E+03	7.57E+05	3.95E+02
29	Te-129	1.82E+05	1.61E+07	8.40E+03
30	Te-129M	2.73E+04	2.42E+06	1.26E+03
31	Te-131M	8.23E+04	7.29E+06	3.80E+03
32	Te-132	8.03E+05	7.11E+07	3.71E+04
33	I-131	5.68E+05	5.03E+07	2.62E+04
34	I-132	8.16E+05	7.23E+07	3.77E+04
35	I-133	1.15E+06	1.02E+08	5.31E+04
36	I-134	1.26E+06	1.12E+08	5.82E+04
37	I-135	1.08E+06	9.53E+07	4.97E+04
38	Xe-133	1.15E+06	1.02E+08	5.32E+04



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Table 2 (Continued): Alternative Source Term – Core Isotopic Inventory for Average Burnup And End of Cycle (33,960 MWD/MTIHM; ORIGEN 2.1 Run Case 1)

Nuclide No.	Nuclide	ORIGEN 2.1 Results Ci per 1 MTIHM	Core Isotopic Inventory Full Core, Ci	Core Isotopic Inventory Ci/MWt
39	Xe-135	4.76E+05	4.22E+07	2.20E+04
40	Cs-134	1.55E+05	1.38E+07	7.17E+03
41	Cs-136	4.74E+04	4.20E+06	2.19E+03
42	Cs-137	1.05E+05	9.28E+06	4.84E+03
43	Ba-139	1.02E+06	9.05E+07	4.72E+04
44	Ba-140	9.84E+05	8.71E+07	4.54E+04
45	La-140	1.01E+06	8.97E+07	4.68E+04
46	La-141	9.32E+05	8.25E+07	4.30E+04
47	La-142	8.98E+05	7.96E+07	4.15E+04
48	Ce-141	9.32E+05	8.25E+07	4.30E+04
49	Ce-143	8.61E+05	7.62E+07	3.97E+04
50	Ce-144	8.05E+05	7.13E+07	3.72E+04
51	Pr-143	8.57E+05	7.59E+07	3.96E+04
52	Nd-147	3.75E+05	3.32E+07	1.73E+04
53	Np-239	1.17E+07	1.04E+09	5.40E+05
54	Pu-238	3.21E+03	2.84E+05	1.48E+02
55	Pu-239	3.45E+02	3.06E+04	1.59E+01
56	Pu-240	4.54E+02	4.02E+04	2.10E+01
57	Pu-241	1.44E+05	1.27E+07	6.63E+03
58	Am-241	2.23E+02	1.97E+04	1.03E+01
59	Cm-242	4.53E+04	4.01E+06	2.09E+03
60	Cm-244	2.34E+03	2.07E+05	1.08E+02

¹ No activated corrosion product concentrations were determined.



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Table 3: Alternative Source Term – Core Isotopic Inventory for Maximum Assembly Burnup (54,000 MWD/MTIHM; ORIGEN 2.1 Run Case 2)

Nuclide No.	Nuclide	ORIGEN 2.1 Results Ci per 1 MTIHM	Core Isotopic Inventory Full Core, Ci	Core Isotopic Inventory Ci/MWt
1	Co-58	Note ²	Note ²	Note ²
2	Co-60	Note ²	Note ²	Note ²
3	Kr-85	1.26E+04	1.12E+06	5.81E+02
4	Kr-85M	1.21E+05	1.07E+07	5.58E+03
5	Kr-87	2.23E+05	1.98E+07	1.03E+04
6	Kr-88	3.13E+05	2.77E+07	1.44E+04
7	Rb-86	2.58E+03	2.29E+05	1.19E+02
8	Sr-89	4.17E+05	3.69E+07	1.92E+04
9	Sr-90	1.04E+05	9.21E+06	4.82E+03
10	Sr-91	5.47E+05	4.84E+07	2.53E+04
11	Sr-92	6.16E+05	5.46E+07	2.84E+04
12	Y-90	1.08E+05	9.57E+06	4.98E+03
13	Y-91	5.63E+05	4.99E+07	2.60E+04
14	Y-92	6.20E+05	5.49E+07	2.86E+04
15	Y-93	7.50E+05	6.64E+07	3.46E+04
16	Zr-95	8.87E+05	7.86E+07	4.09E+04
17	Zr-97	9.33E+05	8.26E+07	4.31E+04
18	Nb-95	8.93E+05	7.91E+07	4.12E+04
19	Mo-99	1.12E+06	9.92E+07	5.15E+04
20	Tc-99M	9.76E+05	8.64E+07	4.51E+04
21	Ru-103	1.02E+06	9.03E+07	4.72E+04
22	Ru-105	7.75E+05	6.86E+07	3.58E+04
23	Ru-106	5.50E+05	4.87E+07	2.54E+04
24	Rh-105	7.31E+05	6.47E+07	3.37E+04
25	Sb-127	7.35E+04	6.51E+06	3.39E+03
26	Sb-129	2.06E+05	1.82E+07	9.53E+03
27	Te-127	7.31E+04	6.47E+06	3.37E+03
28	Te-127M	1.00E+04	8.86E+05	4.62E+02
29	Te-129	2.03E+05	1.80E+07	9.39E+03
30	Te-129M	3.03E+04	2.68E+06	1.40E+03
31	Te-131M	8.90E+04	7.88E+06	4.11E+03
32	Te-132	8.32E+05	7.37E+07	3.84E+04
33	I-131	5.96E+05	5.28E+07	2.75E+04
34	I-132	8.48E+05	7.51E+07	3.92E+04
35	I-133	1.16E+06	1.03E+08	5.35E+04
36	I-134	1.26E+06	1.12E+08	5.81E+04
37	I-135	1.09E+06	9.65E+07	5.02E+04
38	Xe-133	1.17E+06	1.04E+08	5.38E+04



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Table 3 (Continued): Alternative Source Term – Core Isotopic Inventory for Maximum Burnup (54,000 MWD/MTIHM; ORIGEN 2.1 Run Case 2)

Nuclide No.	Nuclide	ORIGEN 2.1 Results Ci per 1 MTIHM	Core Isotopic Inventory Full Core, Ci	Core Isotopic Inventory Ci/MWt
39	Xe-135	4.16E+05	3.68E+07	1.92E+04
40	Cs-134	3.34E+05	2.96E+07	1.54E+04
41	Cs-136	8.72E+04	7.72E+06	4.03E+03
42	Cs-137	1.62E+05	1.43E+07	7.47E+03
43	Ba-139	1.01E+06	8.95E+07	4.65E+04
44	Ba-140	9.68E+05	8.57E+07	4.47E+04
45	La-140	1.03E+06	9.12E+07	4.73E+04
46	La-141	9.14E+05	8.10E+07	4.22E+04
47	La-142	8.72E+05	7.72E+07	4.03E+04
48	Ce-141	9.21E+05	8.16E+07	4.25E+04
49	Ce-143	8.21E+05	7.27E+07	3.79E+04
50	Ce-144	7.55E+05	6.69E+07	3.49E+04
51	Pr-143	8.17E+05	7.24E+07	3.77E+04
52	Nd-147	3.77E+05	3.34E+07	1.74E+04
53	Np-239	1.49E+07	1.32E+09	6.86E+05
54	Pu-238	1.02E+04	9.03E+05	4.69E+02
55	Pu-239	4.12E+02	3.65E+04	1.90E+01
56	Pu-240	7.85E+02	6.95E+04	3.62E+01
57	Pu-241	1.76E+05	1.56E+07	8.13E+03
58	Am-241	3.30E+02	2.92E+04	1.52E+01
59	Cm-242	8.85E+04	7.84E+06	4.09E+03
60	Cm-244	1.73E+04	1.53E+06	7.98E+02

² No activated corrosion product concentrations were determined.



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The mass data for iodines is required for the Alternative Source Term evaluations since it is necessary for the evaluation of suppression pool pH. Mass data for iodine isotopes has also been calculated and reported both for the average burnup conditions as well as for the maximum burnup case. These data are reported in Table 4 and have been converted to g/MWt from the ORIGEN 2.1 output, where the data are computed in g/MTIHM. The total iodine mass is also given. For the average burnup conditions and the maximum assembly burnup conditions the values are 11.0 g/MWt and 17.8 g/MWt, respectively.

Table 4: Mass Data for Iodines

Iodine Isotopes	Case 1 (33,960 MWD/MTIHM) (Average Burnup) Iodine Isotope Mass g/MWt	Case 2 (54,000 MWD/MTIHM) (Max. Assembly Burnup) Iodine Isotope Mass g/MWt
I127	2.42E+00	4.08E+00
I128	6.10E-06	1.33E-05
I129	8.28E+00	1.34E+01
I130	4.73E-04	9.85E-04
I130M	2.23E-06	4.67E-06
I131	2.11E-01	2.22E-01
I132	3.65E-03	3.79E-03
I133	4.68E-02	4.72E-02
I133M	1.73E-07	4.21E-06
I134	2.18E-03	2.18E-03
I134M	1.52E-05	1.71E-05
I135	1.41E-02	1.43E-02
I136	2.35E-05	2.36E-05
I136M	7.68E-06	7.50E-06
I137	6.84E-06	6.66E-06
I138	8.89E-07	8.55E-07
Total Iodine	1.10E+01	1.78E+01

6. RESULTS

The core isotopic inventory for use in the Alternative Source Term evaluation is reported in Table 2 for the radionuclides of interest. These data are for the average burnup of 33,960 MWD/MTIHM, core power of 1918 MWt, and a conservative modeling of the fuel cycle. Table 5 lists the same data in Ci/MWt and compares it to the existing previous NMC calculation.

Previous NMC calculation done with MNGP code has reported bounding core isotopic values for the same radionuclides of interest (Reference 8). These results taken from Reference 8 are also shown in Table 5 and a variance has been calculated for each radionuclide. For most radionuclides of interest, there is significant reduction in the core isotopic inventory in the present calculation, even though conservative assumptions have been made in the modeling with ORIGEN 2.1.



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Table 5: Comparison of Isotopic Inventory Data

Nuclide No.	Nuclide	Ci/MWt ORIGEN 2.1 Analysis Cal. No. 2004-07600 (33,960 MWD/MTIHM)	Ci/MWt MNGP Calc No. 03-194 (Reference 8)	Variance ³ % (ORIGEN Calc data over MNGP Calc data)
1	Co-58	Note ⁴	Note ⁴	Note ⁴
2	Co-60	Note ⁴	Note ⁴	Note ⁴
3	Kr-85	4.35E+02	4.09E+02	6.4
4	Kr-85M	6.64E+03	9.07E+03	-26.8
5	Kr-87	1.27E+04	1.84E+04	-31.0
6	Kr-88	1.78E+04	2.59E+04	-31.3
7	Rb-86	6.36E+01	4.72E+01	34.7
8	Sr-89	2.41E+04	3.47E+04	-30.5
9	Sr-90	3.51E+03	3.75E+03	-6.4
10	Sr-91	3.02E+04	4.41E+04	-31.5
11	Sr-92	3.29E+04	4.52E+04	-27.2
12	Y-90	3.60E+03	3.85E+03	-6.5
13	Y-91	3.13E+04	4.26E+04	-26.5
14	Y-92	3.30E+04	4.55E+04	-27.5
15	Y-93	3.84E+04	3.33E+04	15.3
16	Zr-95	4.37E+04	5.20E+04	-16.0
17	Zr-97	4.35E+04	4.86E+04	-10.5
18	Nb-95	4.47E+04	5.13E+04	-12.9
19	Mo-99	4.91E+04	5.47E+04	-10.2
20	Tc-99M	4.30E+04	4.83E+04	-11.0
21	Ru-103	4.14E+04	4.48E+04	-7.6
22	Ru-105	2.86E+04	3.04E+04	-5.9
23	Ru-106	1.79E+04	1.64E+04	9.2
24	Rh-105	2.74E+04	2.82E+04	-2.8
25	Sb-127	2.88E+03	2.44E+03	18.0
26	Sb-129	8.53E+03	9.16E+03	-6.9
27	Te-127	2.87E+03	2.41E+03	19.1
28	Te-127M	3.95E+02	4.01E+02	-1.5
29	Te-129	8.40E+03	8.69E+03	-3.3
30	Te-129M	1.26E+03	1.76E+03	-28.4
31	Te-131M	3.80E+03	5.64E+03	-32.6
32	Te-132	3.71E+04	4.12E+04	-10.0
33	I-131	2.62E+04	2.86E+04	-8.4
34	I-132	3.77E+04	4.18E+04	-9.8
35	I-133	5.31E+04	6.02E+04	-11.8
36	I-134	5.82E+04	6.77E+04	-14.0
37	I-135	4.97E+04	5.70E+04	-12.8
38	Xe-133	5.32E+04	5.90E+04	-9.8



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Table 5 (Continued): Comparison of Isotopic Inventory Data

Nuclide No.	Nuclide	Ci/MWt ORIGEN 2.1 Analysis Cal. No. 2004-07600 (33,960 MWD/MTIHM)	Ci/MWt MNGP Calc No. 03-194 (Reference 8)	Variance ³ % (ORIGEN Calc data over MNGP Calc data)
39	Xe-135	2.20E+04	2.17E+04	1.4
40	Cs-134	7.17E+03	5.49E+03	30.6
41	Cs-136	2.19E+03	1.56E+03	40.4
42	Cs-137	4.84E+03	4.81E+03	0.6
43	Ba-139	4.72E+04	5.45E+04	-13.4
44	Ba-140	4.54E+04	5.45E+04	-16.7
45	La-140	4.68E+04	5.61E+04	-16.6
46	La-141	4.30E+04	4.99E+04	-13.8
47	La-142	4.15E+04	4.95E+04	-16.2
48	Ce-141	4.30E+04	5.01E+04	-14.2
49	Ce-143	3.97E+04	4.87E+04	-18.5
50	Ce-144	3.72E+04	3.83E+04	-2.9
51	Pr-143	3.96E+04	4.75E+04	-16.6
52	Nd-147	1.73E+04	1.99E+04	-13.1
53	Np-239	5.40E+05	5.67E+05	-4.8
54	Pu-238	1.48E+02	1.19E+02	24.4
55	Pu-239	1.59E+01	1.18E+01	34.7
56	Pu-240	2.10E+01	2.14E+01	-1.9
57	Pu-241	6.63E+03	4.16E+03	59.4
58	Am-241	1.03E+01	7.27E+00	41.7
59	Cm-242	2.09E+03	1.76E+03	18.8
60	Cm-244	1.08E+02	3.18E+03	-96.6

³ Variance was calculated for each nuclide by the following Equation:

$$\frac{[(\text{ORIGEN Value} - \text{MNGP Value}) / \text{MNGP Value}] * 100}{}$$

⁴ No activated corrosion product concentrations were determined.



Calcs. For	
Alternative Source Term – Core Isotopic Inventory	
<input checked="" type="checkbox"/>	Safety Related
<input type="checkbox"/>	Non-Safety Related

Calc No.	2004-07600		
Rev.	0	Date	
Page	15	of	16

Client	Nuclear Management Company		
Project	Monticello Nuclear Generating Plant		
Proj. No	11163-013	Equip. No.	N/A

Prepared by	Date
Reviewed by	Date
Approved by	Date

7. REFERENCES

1. Monticello Updated Safety Analysis Report, Rev. 20.
2. Nuclear Management Company, Design Information Transmittal, DIT No. 18739, October 5 2004.
3. USNRC Regulatory Guide 1.49, Power Levels of Nuclear Power Plants, Rev.1, December 1973.
4. Monticello Nuclear Generating Plant, Design Inputs for Alternate Source Term (AST) Radiological Analysis, DIR CA-03-190, Rev.0, 2004.
5. USNRC Regulatory Guide 1.183, Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors, July 2000.
6. S&L Proposal No. 00270-319, Rev.5, Letter from M.A. Pressburger to Scott Quiggle, Letter No. SLMON-2004-142, July 23, 2004.
7. S&L Program Number 03.7.533-2.1, ORIGEN2, Version 2.1 (8/1/91), Isotope Generation and Depletion Code – Matrix Exponential Method, March 3 1994.
8. Monticello Calculation, MNGP CALC 03-194, Alternate Source Term Core Isotopic Inventory, Rev.0.



Calcs. For	
Alternative Source Term – Core Isotopic Inventory	
<input checked="" type="checkbox"/> Safety Related	<input type="checkbox"/> Non-Safety Related

Calc No.	2004-07600		
Rev.	0	Date	
Page	16	of	16

Client	Nuclear Management Company		
Project	Monticello Nuclear Generating Plant		
Proj. No	11163-013	Equip. No.	N/A

Prepared by	Date
Reviewed by	Date
Approved by	Date

Attachments

Attachment A1 (Pages A1-1 to A1-20)
 Table A1: Core Isotopic Inventory (data in Ci per MWt) - Case 1
 Average Burnup

Attachment A2 (Pages A2-1 to A2-20)
 Table A2: Core Isotopic Inventory (data in Ci per MWt) - Case 2
 Maximum Assembly Burnup

Attachment B1 (Pages B1-1 to B1-167)
 ORIGEN 2.1 File for Case 1

Attachment B2 (Pages B2-1 to B2-291)
 ORIGEN 2.1 File for Case 2

Isotope	BOC	Discharge	1m	2m	1h	6h	1D	4D	7D	14D	21D	30D
SR92	0.00E+00	3.29E+04	3.27E+04	3.26E+04	2.55E+04	7.09E+03	7.10E+01	7.13E-07	7.17E-15	1.56E-33	0.00E+00	0.00E+00
Y92	0.00E+00	3.30E+04	3.30E+04	3.30E+04	3.23E+04	2.02E+04	1.05E+03	9.56E-04	7.19E-10	3.68E-24	0.00E+00	0.00E+00
BR93	0.00E+00	3.36E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
KR93	0.00E+00	2.89E+03	1.74E-11	1.04E-25	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RB93	0.00E+00	1.88E+04	1.50E+01	1.16E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SR93	0.00E+00	3.75E+04	3.44E+04	3.14E+04	1.47E+02	1.34E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Y93	0.00E+00	3.84E+04	3.84E+04	3.84E+04	3.63E+04	2.58E+04	7.49E+03	5.35E+01	3.83E-01	3.76E-06	3.70E-11	1.35E-17
ZR93	0.00E+00	8.73E-02	8.73E-02	8.73E-02	8.73E-02	8.74E-02	8.74E-02	8.74E-02	8.74E-02	8.74E-02	8.74E-02	8.74E-02
NB93M	0.00E+00	8.99E-03	8.99E-03	8.99E-03	8.99E-03	9.00E-03	9.00E-03	9.03E-03	9.06E-03	9.13E-03	9.21E-03	9.30E-03
BR94	0.00E+00	2.81E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
KR94	0.00E+00	1.04E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RB94	0.00E+00	9.87E+03	1.92E-03	3.71E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SR94	0.00E+00	3.55E+04	2.06E+04	1.19E+04	1.66E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Y94	0.00E+00	3.89E+04	3.85E+04	3.77E+04	4.69E+03	8.77E-02	8.35E-19	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NB94M	0.00E+00	3.00E-02	2.69E-02	2.40E-02	3.91E-05	1.46E-19	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BR95	0.00E+00	2.21E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
KR95	0.00E+00	1.33E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RB95	0.00E+00	4.92E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SR95	0.00E+00	3.29E+04	6.66E+03	1.35E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Y95	0.00E+00	4.19E+04	4.03E+04	3.79E+04	8.26E+02	2.07E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ZR95	0.00E+00	4.37E+04	4.37E+04	4.37E+04	4.37E+04	4.36E+04	4.32E+04	4.19E+04	4.05E+04	3.76E+04	3.48E+04	3.16E+04
NB95	0.00E+00	4.47E+04	4.47E+04	4.47E+04	4.47E+04	4.47E+04	4.47E+04	4.46E+04	4.44E+04	4.37E+04	4.27E+04	4.12E+04
NB95M	0.00E+00	3.09E+02	3.09E+02	3.09E+02	3.09E+02	3.09E+02	3.08E+02	3.03E+02	2.97E+02	2.78E+02	2.58E+02	2.34E+02
BR96	0.00E+00	1.17E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
KR96	0.00E+00	2.06E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RB96	0.00E+00	1.42E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SR96	0.00E+00	2.29E+04	7.01E-01	2.14E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Y96	0.00E+00	3.99E+04	3.00E+04	2.22E+04	5.69E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NB96	0.00E+00	6.59E+01	6.59E+01	6.59E+01	6.40E+01	5.52E+01	3.23E+01	3.81E+00	4.50E-01	3.07E-03	2.10E-05	3.46E-08
KR97	0.00E+00	1.21E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RB97	0.00E+00	2.70E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SR97	0.00E+00	1.21E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Y97	0.00E+00	3.44E+04	1.99E-12	1.06E-28	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ZR97	0.00E+00	4.35E+04	4.34E+04	4.34E+04	4.17E+04	3.40E+04	1.62E+04	8.47E+02	4.42E+01	4.51E-02	4.58E-05	6.50E-09
NB97	0.00E+00	4.39E+04	4.39E+04	4.38E+04	4.32E+04	3.64E+04	1.63E+04	8.52E+02	4.44E+01	4.53E-02	4.61E-05	7.01E-09
NB97M	0.00E+00	4.12E+04	4.12E+04	4.11E+04	3.95E+04	3.22E+04	1.54E+04	8.03E+02	4.19E+01	4.27E-02	4.34E-05	6.16E-09

Isotope	BOC	Discharge	1m	2m	1h	6h	1D	4D	7D	14D	21D	30D
PD111	0.00E+00	1.89E+03	1.87E+03	1.84E+03	3.16E+02	9.73E+00	1.00E+00	1.15E-04	1.32E-08	8.42E-18	5.38E-27	0.00E+00
PD111M	0.00E+00	2.84E+01	2.83E+01	2.83E+01	2.50E+01	1.33E+01	1.38E+00	1.58E-04	1.81E-08	1.16E-17	7.37E-27	0.00E+00
AG111	0.00E+00	1.90E+03	1.90E+03	1.90E+03	1.90E+03	1.86E+03	1.74E+03	1.32E+03	9.95E+02	5.19E+02	2.71E+02	1.17E+02
AG111M	0.00E+00	1.89E+03	1.88E+03	1.87E+03	3.37E+02	1.39E+01	1.44E+00	1.65E-04	1.89E-08	1.21E-17	7.72E-27	0.00E+00
CD111M	0.00E+00	7.04E-01	6.94E-01	6.84E-01	3.00E-01	4.19E-03	8.84E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MO112	0.00E+00	2.96E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TC112	0.00E+00	7.83E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RU112	0.00E+00	5.81E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RH112	0.00E+00	9.24E+02	1.48E-01	2.13E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PD112	0.00E+00	9.88E+02	9.88E+02	9.87E+02	9.55E+02	8.04E+02	4.32E+02	3.61E+01	3.01E+00	9.18E-03	2.80E-05	1.63E-08
AG112	0.00E+00	9.91E+02	9.91E+02	9.91E+02	9.86E+02	9.04E+02	5.11E+02	4.27E+01	3.57E+00	1.09E-02	3.31E-05	1.93E-08
MO113	0.00E+00	2.10E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TC113	0.00E+00	2.06E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RU113	0.00E+00	3.10E+02	9.27E-05	2.74E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RH113	0.00E+00	6.48E+02	1.37E-04	4.06E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PD113	0.00E+00	7.79E+02	5.02E+02	3.16E+02	7.24E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
AG113	0.00E+00	7.02E+02	7.02E+02	7.01E+02	6.19E+02	3.22E+02	3.06E+01	2.49E-03	2.03E-07	5.81E-17	1.67E-26	0.00E+00
AG113M	0.00E+00	7.90E+01	7.12E+01	5.62E+01	2.71E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CD113M	0.00E+00	2.47E+00	2.47E+00	2.47E+00	2.47E+00	2.47E+00	2.47E+00	2.47E+00	2.47E+00	2.47E+00	2.47E+00	2.46E+00
MO114	0.00E+00	2.15E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TC114	0.00E+00	4.61E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RU114	0.00E+00	1.39E+02	3.70E-02	9.86E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RH114	0.00E+00	3.72E+02	5.58E-02	1.49E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PD114	0.00E+00	5.36E+02	4.08E+02	3.06E+02	1.62E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
AG114	0.00E+00	5.43E+02	4.22E+02	3.16E+02	1.68E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
IN114	0.00E+00	3.28E-01	2.37E-01	1.86E-01	1.21E-01	1.20E-01	1.19E-01	1.14E-01	1.09E-01	9.92E-02	8.99E-02	7.93E-02
IN114M	0.00E+00	1.26E-01	1.26E-01	1.26E-01	1.26E-01	1.26E-01	1.24E-01	1.19E-01	1.14E-01	1.04E-01	9.40E-02	8.28E-02
MO115	0.00E+00	1.43E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TC115	0.00E+00	9.74E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RU115	0.00E+00	6.47E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RH115	0.00E+00	2.79E+02	2.88E-01	2.91E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PD115	0.00E+00	5.09E+02	1.89E+02	6.31E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
AG115	0.00E+00	3.82E+02	3.77E+02	3.67E+02	4.94E+01	1.51E-03	8.36E-20	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
AG115M	0.00E+00	1.47E+02	8.03E+01	2.98E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CD115	0.00E+00	5.04E+02	5.04E+02	5.04E+02	4.99E+02	4.68E+02	3.71E+02	1.46E+02	5.74E+01	6.50E+00	7.36E-01	4.48E-02
CD115M	0.00E+00	4.87E+01	4.87E+01	4.87E+01	4.87E+01	4.85E+01	4.80E+01	4.58E+01	4.37E+01	3.92E+01	3.51E+01	3.06E+01

Isotope	BOC	Discharge	1m	2m	1h	6h	1D	4D	7D	14D	21D	30D
IN115M	0.00E+00	5.05E+02	5.05E+02	5.05E+02	5.04E+02	4.92E+02	4.02E+02	1.59E+02	6.24E+01	7.07E+00	8.03E-01	5.08E-02
TC116	0.00E+00	6.01E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RU116	0.00E+00	1.45E+01	2.02E-12	2.82E-25	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RH116	0.00E+00	1.33E+02	4.97E-12	6.93E-25	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PD116	0.00E+00	3.85E+02	2.03E+01	1.04E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
AG116	0.00E+00	2.15E+02	1.80E+02	1.39E+02	4.26E+05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
AG116M	0.00E+00	2.15E+02	2.93E+01	1.83E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
IN116	0.00E+00	3.02E+02	1.58E+01	8.28E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
IN116M	0.00E+00	2.17E+02	2.14E+02	2.12E+02	1.01E+02	2.17E+00	2.15E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TC117	0.00E+00	2.56E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RU117	0.00E+00	2.16E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RH117	0.00E+00	7.46E+01	1.23E-15	2.04E-32	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PD117	0.00E+00	3.42E+02	8.85E-02	2.16E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
AG117	0.00E+00	2.11E+02	1.27E+02	7.20E+01	3.52E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
AG117M	0.00E+00	2.11E+02	5.25E-01	3.14E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CD117	0.00E+00	2.80E+02	2.80E+02	2.79E+02	2.16E+02	5.69E+01	4.69E-01	2.16E-09	9.97E-18	3.90E-37	0.00E+00	0.00E+00
CD117M	0.00E+00	1.52E+02	1.52E+02	1.51E+02	1.24E+02	4.48E+01	1.14E+00	4.82E-07	2.03E-13	2.72E-28	0.00E+00	0.00E+00
IN117	0.00E+00	2.59E+02	2.59E+02	2.59E+02	2.50E+02	1.25E+02	2.21E+00	6.46E-07	2.70E-13	3.61E-28	0.00E+00	0.00E+00
IN117M	0.00E+00	3.27E+02	3.27E+02	3.27E+02	3.16E+02	1.53E+02	2.73E+00	5.02E-07	2.08E-13	2.78E-28	0.00E+00	0.00E+00
SN117M	0.00E+00	2.79E+00	2.79E+00	2.79E+00	2.79E+00	2.76E+00	2.66E+00	2.29E+00	1.98E+00	1.40E+00	9.88E-01	6.33E-01
RU118	0.00E+00	1.41E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RH118	0.00E+00	1.11E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PD118	0.00E+00	2.81E+02	4.42E-04	6.59E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
AG118	0.00E+00	2.81E+02	2.85E-02	4.36E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
AG118M	0.00E+00	1.93E+02	1.81E-03	3.24E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CD118	0.00E+00	4.26E+02	4.21E+02	4.15E+02	1.87E+02	2.99E+00	1.03E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
IN118	0.00E+00	4.26E+02	4.22E+02	4.16E+02	1.87E+02	3.00E+00	1.03E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
IN118M	0.00E+00	1.76E-01	1.51E-01	1.29E-01	1.54E-05	7.81E-26	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RH119	0.00E+00	8.85E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PD119	0.00E+00	2.04E+02	5.83E-09	1.64E-19	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
AG119	0.00E+00	3.86E+02	4.57E-01	4.47E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CD119	0.00E+00	2.12E+02	1.99E+02	1.85E+02	2.56E+00	6.33E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CD119M	0.00E+00	2.12E+02	1.76E+02	1.42E+02	4.96E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
IN119	0.00E+00	1.22E+02	1.20E+02	1.14E+02	3.00E+00	3.18E-05	2.76E-23	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
IN119M	0.00E+00	3.18E+02	3.17E+02	3.15E+02	5.43E+01	5.49E-04	4.76E-22	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SN119M	0.00E+00	7.31E+00	7.31E+00	7.31E+00	7.31E+00	7.31E+00	7.29E+00	7.23E+00	7.17E+00	7.03E+00	6.89E+00	6.71E+00

Isotope	BOC	Discharge	1m	2m	1h	6h	1D	4D	7D	14D	21D	30D
PR148	0.00E+00	1.37E+04	1.21E+04	9.74E+03	2.70E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PM148	0.00E+00	7.26E+03	7.26E+03	7.26E+03	7.22E+03	7.03E+03	6.39E+03	4.36E+03	2.98E+03	1.24E+03	5.29E+02	1.93E+02
PM148M	0.00E+00	1.28E+03	1.28E+03	1.28E+03	1.28E+03	1.28E+03	1.26E+03	1.20E+03	1.14E+03	1.01E+03	9.02E+02	7.75E+02
BA149	0.00E+00	2.32E+01	4.78E-19	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
LA149	0.00E+00	7.49E+02	3.75E-04	1.85E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CE149	0.00E+00	6.81E+03	5.76E-04	2.84E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PR149	0.00E+00	9.55E+03	7.12E+03	5.26E+03	1.35E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ND149	0.00E+00	1.01E+04	1.01E+04	1.01E+04	6.92E+03	9.33E+02	6.89E-01	2.04E-13	6.04E-26	0.00E+00	0.00E+00	0.00E+00
PM149	0.00E+00	1.44E+04	1.44E+04	1.44E+04	1.44E+04	1.36E+04	1.08E+04	4.22E+03	1.65E+03	1.84E+02	2.05E+01	1.22E+00
CS150	0.00E+00	9.43E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BA150	0.00E+00	1.73E+00	1.54E-10	1.37E-20	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
LA150	0.00E+00	1.43E+02	2.41E-10	2.14E-20	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CE150	0.00E+00	3.14E+03	5.44E-10	4.83E-20	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PR150	0.00E+00	6.38E+03	2.33E+02	8.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PM150	0.00E+00	9.16E+01	9.12E+01	9.08E+01	7.07E+01	1.94E+01	1.85E-01	1.51E-09	1.23E-17	1.67E-36	0.00E+00	0.00E+00
LA151	0.00E+00	1.82E+01	2.09E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CE151	0.00E+00	9.40E+02	1.10E-15	7.31E-34	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PR151	0.00E+00	3.55E+03	1.18E-01	3.60E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ND151	0.00E+00	5.27E+03	5.01E+03	4.73E+03	1.85E+02	9.64E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PM151	0.00E+00	5.29E+03	5.29E+03	5.29E+03	5.20E+03	4.60E+03	2.97E+03	5.11E+02	8.81E+01	1.46E+00	2.41E-02	1.24E-04
SM151	0.00E+00	2.27E+01	2.27E+01	2.27E+01	2.27E+01	2.27E+01	2.28E+01	2.28E+01	2.29E+01	2.29E+01	2.29E+01	2.28E+01
BA152	0.00E+00	4.60E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
LA152	0.00E+00	2.04E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CE152	0.00E+00	2.07E+02	1.07E+01	5.50E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PR152	0.00E+00	1.57E+03	3.34E+01	1.40E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ND152	0.00E+00	3.64E+03	3.45E+03	3.25E+03	9.85E+01	1.38E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PM152	0.00E+00	3.73E+03	3.70E+03	3.64E+03	1.53E+02	2.15E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PM152M	0.00E+00	6.91E+01	6.30E+01	5.75E+01	2.70E-01	2.46E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EU152	0.00E+00	6.80E-01	6.80E-01	6.80E-01	6.80E-01	6.80E-01	6.80E-01	6.79E-01	6.79E-01	6.78E-01	6.78E-01	6.77E-01
EU152M	0.00E+00	5.70E+00	5.70E+00	5.69E+00	5.30E+00	3.65E+00	9.57E-01	4.52E-03	2.14E-05	8.00E-11	3.00E-16	3.16E-23
LA153	0.00E+00	2.11E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CE153	0.00E+00	3.62E+01	1.23E-09	4.15E-20	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PR153	0.00E+00	5.00E+02	2.37E+00	1.10E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ND153	0.00E+00	2.15E+03	1.20E+03	6.47E+02	2.00E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PM153	0.00E+00	2.44E+03	2.35E+03	2.17E+03	1.37E+00	2.58E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SM153	0.00E+00	1.23E+04	1.23E+04	1.23E+04	1.21E+04	1.13E+04	8.64E+03	2.97E+03	1.02E+03	8.41E+01	6.95E+00	2.81E-01

Isotope	BOC	Discharge	1m	2m	1h	6h	1D	4D	7D	14D	21D	30D
SR92	0.00E+00	2.84E+04	2.83E+04	2.82E+04	2.20E+04	6.13E+03	6.14E+01	6.17E-07	6.20E-15	1.35E-33	0.00E+00	0.00E+00
Y92	0.00E+00	2.86E+04	2.86E+04	2.86E+04	2.80E+04	1.75E+04	9.05E+02	8.28E-04	6.23E-10	3.19E-24	0.00E+00	0.00E+00
BR93	0.00E+00	3.21E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
KR93	0.00E+00	2.56E+03	1.54E-11	9.21E-26	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RB93	0.00E+00	1.60E+04	1.28E+01	9.88E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SR93	0.00E+00	3.36E+04	3.08E+04	2.81E+04	1.32E+02	1.20E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Y93	0.00E+00	3.46E+04	3.46E+04	3.46E+04	3.27E+04	2.32E+04	6.75E+03	4.82E+01	3.45E-01	3.39E-06	3.33E-11	1.22E-17
ZR93	0.00E+00	1.28E-01	1.28E-01	1.28E-01	1.28E-01	1.28E-01	1.28E-01	1.28E-01	1.28E-01	1.28E-01	1.28E-01	1.28E-01
NB93M	0.00E+00	2.06E-02	2.06E-02	2.06E-02	2.06E-02	2.06E-02	2.06E-02	2.06E-02	2.07E-02	2.08E-02	2.09E-02	2.10E-02
BR94	0.00E+00	2.84E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
KR94	0.00E+00	7.99E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RB94	0.00E+00	8.65E+03	1.68E-03	3.25E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SR94	0.00E+00	3.22E+04	1.87E+04	1.08E+04	1.50E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Y94	0.00E+00	3.58E+04	3.54E+04	3.47E+04	4.32E+03	8.07E-02	7.68E-19	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NB94M	0.00E+00	3.83E-02	3.43E-02	3.07E-02	4.98E-05	1.87E-19	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BR95	0.00E+00	2.65E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
KR95	0.00E+00	1.48E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RB95	0.00E+00	4.24E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SR95	0.00E+00	3.00E+04	6.07E+03	1.23E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Y95	0.00E+00	3.95E+04	3.79E+04	3.57E+04	7.77E+02	1.95E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ZR95	0.00E+00	4.09E+04	4.09E+04	4.09E+04	4.09E+04	4.08E+04	4.05E+04	3.92E+04	3.80E+04	3.52E+04	3.26E+04	2.96E+04
NB95	0.00E+00	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.10E+04	4.04E+04	3.96E+04	3.82E+04
NB95M	0.00E+00	2.90E+02	2.90E+02	2.90E+02	2.90E+02	2.90E+02	2.90E+02	2.85E+02	2.78E+02	2.60E+02	2.42E+02	2.19E+02
BR96	0.00E+00	1.42E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
KR96	0.00E+00	2.26E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RB96	0.00E+00	1.36E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SR96	0.00E+00	2.09E+04	6.40E-01	1.95E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Y96	0.00E+00	3.78E+04	2.84E+04	2.10E+04	5.39E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NB96	0.00E+00	8.17E+01	8.17E+01	8.16E+01	7.93E+01	6.84E+01	4.01E+01	4.73E+00	5.58E-01	3.81E-03	2.60E-05	4.28E-08
KR97	0.00E+00	1.46E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RB97	0.00E+00	2.65E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SR97	0.00E+00	1.12E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Y97	0.00E+00	3.29E+04	1.90E-12	1.01E-28	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ZR97	0.00E+00	4.31E+04	4.30E+04	4.30E+04	4.13E+04	3.37E+04	1.61E+04	8.40E+02	4.38E+01	4.48E-02	4.56E-05	6.48E-09
NB97	0.00E+00	4.35E+04	4.35E+04	4.35E+04	4.28E+04	3.61E+04	1.62E+04	8.44E+02	4.40E+01	4.50E-02	4.58E-05	6.98E-09
NB97M	0.00E+00	4.09E+04	4.08E+04	4.08E+04	3.92E+04	3.19E+04	1.52E+04	7.96E+02	4.15E+01	4.24E-02	4.32E-05	6.14E-09

Isotope	BOC	Discharge	1m	2m	1h	6h	1D	4D	7D	14D	21D	30D
PD111	0.00E+00	2.49E+03	2.48E+03	2.44E+03	4.20E+02	1.42E+01	1.46E+00	1.68E-04	1.92E-08	1.23E-17	7.82E-27	0.00E+00
PD111M	0.00E+00	4.13E+01	4.12E+01	4.11E+01	3.64E+01	1.94E+01	2.01E+00	2.30E-04	2.64E-08	1.68E-17	1.07E-26	0.00E+00
AG111	0.00E+00	2.54E+03	2.54E+03	2.54E+03	2.53E+03	2.48E+03	2.32E+03	1.75E+03	1.33E+03	6.91E+02	3.60E+02	1.56E+02
AG111M	0.00E+00	2.50E+03	2.49E+03	2.47E+03	4.48E+02	2.03E+01	2.09E+00	2.41E-04	2.76E-08	1.76E-17	1.12E-26	0.00E+00
CD111M	0.00E+00	3.15E+00	3.10E+00	3.06E+00	1.34E+00	1.87E-02	3.95E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MO112	0.00E+00	3.76E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TC112	0.00E+00	9.92E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RU112	0.00E+00	7.40E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RH112	0.00E+00	1.18E+03	1.90E-01	2.73E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PD112	0.00E+00	1.27E+03	1.27E+03	1.27E+03	1.22E+03	1.03E+03	5.54E+02	4.62E+01	3.86E+00	1.18E-02	3.58E-05	2.09E-08
AG112	0.00E+00	1.27E+03	1.27E+03	1.27E+03	1.27E+03	1.16E+03	6.55E+02	5.48E+01	4.57E+00	1.39E-02	4.25E-05	2.47E-08
MO113	0.00E+00	2.67E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TC113	0.00E+00	2.60E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RU113	0.00E+00	3.90E+02	1.17E-04	3.44E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RH113	0.00E+00	8.18E+02	1.73E-04	5.10E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PD113	0.00E+00	9.86E+02	6.34E+02	3.99E+02	9.15E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
AG113	0.00E+00	8.88E+02	8.88E+02	8.87E+02	7.83E+02	4.07E+02	3.87E+01	3.15E-03	2.56E-07	7.36E-17	2.11E-26	0.00E+00
AG113M	0.00E+00	1.00E+02	9.00E+01	7.11E+01	3.43E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CD113M	0.00E+00	5.44E+00	5.44E+00	5.44E+00	5.44E+00	5.44E+00	5.44E+00	5.44E+00	5.44E+00	5.44E+00	5.43E+00	5.43E+00
MO114	0.00E+00	2.73E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TC114	0.00E+00	5.83E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RU114	0.00E+00	1.74E+02	4.63E-02	1.23E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RH114	0.00E+00	4.60E+02	6.98E-02	1.86E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PD114	0.00E+00	6.62E+02	5.05E+02	3.78E+02	2.01E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
AG114	0.00E+00	6.72E+02	5.21E+02	3.91E+02	2.07E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
IN114	0.00E+00	1.26E+00	9.16E-01	7.21E-01	4.73E-01	4.72E-01	4.67E-01	4.48E-01	4.29E-01	3.89E-01	3.53E-01	3.11E-01
IN114M	0.00E+00	4.95E-01	4.95E-01	4.95E-01	4.95E-01	4.93E-01	4.88E-01	4.68E-01	4.49E-01	4.07E-01	3.69E-01	3.25E-01
MO115	0.00E+00	1.82E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TC115	0.00E+00	1.23E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RU115	0.00E+00	8.14E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RH115	0.00E+00	3.46E+02	3.58E-01	3.61E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PD115	0.00E+00	6.27E+02	2.32E+02	7.78E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
AG115	0.00E+00	4.70E+02	4.64E+02	4.51E+02	6.07E+01	1.85E-03	1.03E-19	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
AG115M	0.00E+00	1.81E+02	9.90E+01	3.67E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CD115	0.00E+00	6.47E+02	6.47E+02	6.47E+02	6.40E+02	6.01E+02	4.76E+02	1.87E+02	7.36E+01	8.34E+00	9.44E-01	5.74E-02
CD115M	0.00E+00	6.18E+01	6.18E+01	6.18E+01	6.18E+01	6.16E+01	6.09E+01	5.81E+01	5.55E+01	4.97E+01	4.46E+01	3.88E+01

Isotope	BOC	Discharge	1m	2m	1h	6h	1D	4D	7D	14D	21D	30D
IN115M	0.00E+00	6.47E+02	6.47E+02	6.47E+02	6.47E+02	6.31E+02	5.16E+02	2.03E+02	8.00E+01	9.07E+00	1.03E+00	6.52E-02
TC116	0.00E+00	7.61E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RU116	0.00E+00	1.83E+01	2.55E-12	3.55E-25	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RH116	0.00E+00	1.64E+02	6.26E-12	8.73E-25	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PD116	0.00E+00	4.65E+02	2.45E+01	1.26E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
AG116	0.00E+00	2.60E+02	2.17E+02	1.68E+02	5.15E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
AG116M	0.00E+00	2.60E+02	3.54E+01	2.22E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
IN116	0.00E+00	3.95E+02	2.07E+01	1.08E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
IN116M	0.00E+00	2.84E+02	2.81E+02	2.77E+02	1.32E+02	2.84E+00	2.81E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TC117	0.00E+00	3.22E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RU117	0.00E+00	2.64E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RH117	0.00E+00	8.16E+01	1.35E-15	2.24E-32	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PD117	0.00E+00	4.05E+02	1.04E-01	2.55E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
AG117	0.00E+00	2.54E+02	1.53E+02	8.67E+01	4.23E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
AG117M	0.00E+00	2.54E+02	6.22E-01	3.71E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CD117	0.00E+00	3.39E+02	3.39E+02	3.38E+02	2.61E+02	6.89E+01	5.68E-01	2.62E-09	1.21E-17	3.90E-37	0.00E+00	0.00E+00
CD117M	0.00E+00	1.84E+02	1.83E+02	1.83E+02	1.50E+02	5.42E+01	1.38E+00	5.82E-07	2.46E-13	3.28E-28	0.00E+00	0.00E+00
IN117	0.00E+00	3.13E+02	3.13E+02	3.13E+02	3.03E+02	1.52E+02	2.68E+00	7.80E-07	3.26E-13	4.36E-28	0.00E+00	0.00E+00
IN117M	0.00E+00	3.96E+02	3.96E+02	3.96E+02	3.82E+02	1.86E+02	3.30E+00	6.06E-07	2.52E-13	3.36E-28	0.00E+00	0.00E+00
SN117M	0.00E+00	7.49E+00	7.49E+00	7.49E+00	7.47E+00	7.39E+00	7.13E+00	6.14E+00	5.30E+00	3.74E+00	2.65E+00	1.70E+00
RU118	0.00E+00	1.79E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RH118	0.00E+00	4.46E+02	5.45E-04	8.13E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PD118	0.00E+00	3.35E+02	3.49E-02	5.35E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
AG118	0.00E+00	2.34E+02	2.23E-03	3.99E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
AG118M	0.00E+00	5.10E+02	5.04E+02	4.97E+02	2.24E+02	3.58E+00	1.23E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CD118	0.00E+00	5.11E+02	5.05E+02	4.98E+02	2.24E+02	3.59E+00	1.23E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
IN118	0.00E+00	2.22E-01	1.90E-01	1.62E-01	1.93E-05	9.83E-26	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
IN118M	0.00E+00	1.13E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RH119	0.00E+00	2.55E+02	7.31E-09	2.06E-19	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PD119	0.00E+00	4.71E+02	5.61E-01	5.47E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
AG119	0.00E+00	2.55E+02	2.39E+02	2.22E+02	3.08E+00	7.62E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CD119	0.00E+00	2.55E+02	2.12E+02	1.71E+02	5.97E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CD119M	0.00E+00	1.47E+02	1.44E+02	1.37E+02	3.61E+00	3.83E-05	3.32E-23	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
IN119	0.00E+00	3.82E+02	3.81E+02	3.79E+02	6.53E+01	6.60E-04	5.72E-22	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
IN119M	0.00E+00	1.07E+01	1.07E+01	1.07E+01	1.07E+01	1.07E+01	1.06E+01	1.06E+01	1.05E+01	1.03E+01	1.01E+01	9.80E+00
SN119M	0.00E+00	1.07E+01	1.07E+01	1.07E+01	1.07E+01	1.07E+01	1.06E+01	1.06E+01	1.05E+01	1.03E+01	1.01E+01	9.80E+00

Isotope	BOC	Discharge	1m	2m	1h	6h	1D	4D	7D	14D	21D	30D
PR148	0.00E+00	1.39E+04	1.23E+04	9.90E+03	2.75E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PM148	0.00E+00	7.58E+03	7.58E+03	7.58E+03	7.54E+03	7.34E+03	6.67E+03	4.55E+03	3.10E+03	1.29E+03	5.46E+02	1.96E+02
PM148M	0.00E+00	1.17E+03	1.17E+03	1.17E+03	1.16E+03	1.16E+03	1.15E+03	1.09E+03	1.04E+03	9.21E+02	8.19E+02	7.04E+02
BA149	0.00E+00	2.76E+01	5.70E-19	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
LA149	0.00E+00	8.09E+02	4.06E-04	2.00E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CE149	0.00E+00	7.08E+03	6.23E-04	3.08E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PR149	0.00E+00	1.00E+04	7.45E+03	5.51E+03	1.41E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ND149	0.00E+00	1.10E+04	1.09E+04	1.09E+04	7.49E+03	1.01E+03	7.45E-01	2.21E-13	6.54E-26	0.00E+00	0.00E+00	0.00E+00
PM149	0.00E+00	1.63E+04	1.63E+04	1.63E+04	1.62E+04	1.53E+04	1.22E+04	4.75E+03	1.85E+03	2.07E+02	2.31E+01	1.37E+00
CS150	0.00E+00	1.19E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BA150	0.00E+00	2.12E+00	1.88E-10	1.67E-20	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
LA150	0.00E+00	1.62E+02	2.95E-10	2.62E-20	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CE150	0.00E+00	3.42E+03	6.65E-10	5.91E-20	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PR150	0.00E+00	6.98E+03	2.55E+02	8.90E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PM150	0.00E+00	1.31E+02	1.31E+02	1.30E+02	1.01E+02	2.78E+01	2.65E-01	2.16E-09	1.77E-17	2.35E-36	0.00E+00	0.00E+00
LA151	0.00E+00	2.15E+01	2.47E-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CE151	0.00E+00	1.06E+03	1.25E-15	7.31E-34	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PR151	0.00E+00	3.96E+03	1.32E-01	4.03E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ND151	0.00E+00	6.07E+03	5.76E+03	5.45E+03	2.13E+02	1.11E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PM151	0.00E+00	6.08E+03	6.08E+03	6.08E+03	5.98E+03	5.29E+03	3.41E+03	5.88E+02	1.01E+02	1.68E+00	2.77E-02	1.42E-04
SM151	0.00E+00	2.71E+01	2.71E+01	2.71E+01	2.71E+01	2.72E+01	2.72E+01	2.73E+01	2.73E+01	2.73E+01	2.73E+01	2.73E+01
BA152	0.00E+00	5.81E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
LA152	0.00E+00	2.51E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CE152	0.00E+00	2.39E+02	1.23E+01	6.35E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PR152	0.00E+00	1.79E+03	3.84E+01	1.62E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ND152	0.00E+00	4.18E+03	3.96E+03	3.73E+03	1.13E+02	1.59E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PM152	0.00E+00	4.28E+03	4.25E+03	4.18E+03	1.76E+02	2.46E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PM152M	0.00E+00	8.23E+01	7.50E+01	6.84E+01	3.22E-01	2.93E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EU152	0.00E+00	6.94E-01	6.94E-01	6.94E-01	6.94E-01	6.94E-01	6.94E-01	6.94E-01	6.93E-01	6.93E-01	6.92E-01	6.91E-01
EU152M	0.00E+00	6.85E+00	6.84E+00	6.84E+00	6.36E+00	4.39E+00	1.15E+00	5.43E-03	2.57E-05	9.61E-11	3.60E-16	3.79E-23
LA153	0.00E+00	2.66E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CE153	0.00E+00	4.40E+01	1.49E-09	5.04E-20	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PR153	0.00E+00	5.84E+02	2.77E+00	1.29E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ND153	0.00E+00	2.50E+03	1.39E+03	7.51E+02	2.32E-13	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PM153	0.00E+00	2.84E+03	2.73E+03	2.52E+03	1.59E+00	3.00E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SM153	0.00E+00	1.97E+04	1.97E+04	1.97E+04	1.94E+04	1.80E+04	1.38E+04	4.74E+03	1.63E+03	1.35E+02	1.11E+01	4.50E-01

Isotope	BOC	Discharge	1m	2m	1h	6h	1D	4D	7D	14D	21D	30D
ER167M	0.00E+00	3.67E-01	5.15E-09	7.23E-17	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ER169	0.00E+00	2.10E-02	2.10E-02	2.10E-02	2.09E-02	2.06E-02	1.95E-02	1.56E-02	1.25E-02	7.47E-03	4.46E-03	2.30E-03
TM170	0.00E+00	7.25E-03	7.25E-03	7.25E-03	7.25E-03	7.24E-03	7.21E-03	7.09E-03	6.98E-03	6.72E-03	6.47E-03	6.16E-03
TM170M	0.00E+00	6.57E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TM171	0.00E+00	1.75E-04	1.75E-04	1.75E-04	1.75E-04	1.75E-04	1.75E-04	1.75E-04	1.74E-04	1.73E-04	1.72E-04	1.70E-04
NP239	0.00E+00	6.86E+05	6.86E+05	6.86E+05	6.81E+05	6.41E+05	5.14E+05	2.13E+05	8.80E+04	1.12E+04	1.43E+03	1.04E+02
PU238	0.00E+00	4.69E+02	4.69E+02	4.69E+02	4.69E+02	4.69E+02	4.70E+02	4.71E+02	4.71E+02	4.72E+02	4.72E+02	4.73E+02
PU239	0.00E+00	1.90E+01	1.90E+01	1.90E+01	1.90E+01	1.90E+01	1.90E+01	1.91E+01	1.92E+01	1.92E+01	1.92E+01	1.92E+01
PU240	0.00E+00	3.62E+01	3.62E+01	3.62E+01	3.62E+01	3.62E+01	3.62E+01	3.63E+01	3.63E+01	3.63E+01	3.63E+01	3.63E+01
PU241	0.00E+00	8.13E+03	8.13E+03	8.13E+03	8.13E+03	8.13E+03	8.13E+03	8.12E+03	8.12E+03	8.11E+03	8.10E+03	8.10E+03
AM241	0.00E+00	1.52E+01	1.52E+01	1.52E+01	1.52E+01	1.52E+01	1.53E+01	1.54E+01	1.55E+01	1.57E+01	1.60E+01	1.63E+01
CM242	0.00E+00	4.09E+03	4.09E+03	4.09E+03	4.09E+03	4.09E+03	4.08E+03	4.04E+03	3.99E+03	3.87E+03	3.76E+03	3.61E+03
CM244	0.00E+00	7.98E+02	7.98E+02	7.98E+02	7.98E+02	7.98E+02	7.98E+02	7.98E+02	7.98E+02	7.97E+02	7.97E+02	7.96E+02

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*****
*
* OOOO RRRR IIIII GGGG EEEE N N 2222
* O O R R I G E NN N 22 22
* O O RRRR I G GG EEEE N NN N 22
* O O R R I G E N NN 22
* OOOO R R IIIII GGGGG EEEE N N 222222
*
* Version 2.1 (8-1-91)
*
* OOOO AA K K
* O O A A K K
* O O AAAA KKK
* O O A A K K
* OOOO A A K K
*
* RRRR IIII DDDD GGGG EEEEE
* R R I D D G E
* RRRR I D D G GG EEEE
* R R I D D G G E
* R R III DDDD GGGGG EEEEE
*
* N N AA TTTT III OOOO N N AA L
* NN N A A T I O O NN N A A L
* N NN N AAAA T I O O N NN N AAAA L
* N NN A A T I O O N NN A A L
* N N A A T III OOOO N N A A LLLL
*
* L AA BBBB OOO RRRR AA TTTT OOO RRRR Y Y
* L A B B O O R R A A T O O R R Y Y
* L AAAA BBBB O O RRRR AAAA T O O RRRR Y
* L A B B O O R R A A T O O R R Y
* LLLL A A BBBB OOOO R R A A T OOOO R R Y
*
* RSIC CODE PACKAGE NUMBER (CCC-371)
*
* ORIGEN2 VERSION 2.1 (8-1-91) UPDATES THE FOLLOWING:
*
* CCC-371(A) - MAINFRAMES
* CCC-371(E) - IBM PC (80386 W/80387 OR 80486)
*
* ORIGEN2 RUN DATE: 10/14/04 TIME 11:32:21
*
*****
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 ***** ORIGEN2: A REVISED AND UPDATED VERSION OF THE ORIGEN COMPUTER CODE *****

INTRODUCTION

THIS TEXT IS INTENDED TO BE A BRIEF OUTLINE OF THE ORIGEN2 COMPUTER CODE, WHICH IS A REVISED AND UPDATED VERSION OF THE ORIGEN DOCUMENTED IN REPORT ORNL-4628 (MAY 1973). INCLUDED HERE ARE A BRIEF DESCRIPTION OF THE FUNCTIONS OF ORIGEN2, A LISTING OF THE MAJOR DATA SOURCES, A LISTING OF THE PUBLISHED DOCUMENTATION CONCERNING ORIGEN2, AND AN OUTLINE OF THE ORIGEN2 OUTPUT ORGANIZATION. ORIGEN2 IS AVAILABLE FROM THE ORNL RADIATION SHIELDING INFORMATION CENTER (RSIC) AT THE FOLLOWING ADDRESS:

CODES COORDINATOR
 RADIATION SHIELDING INFORMATION CENTER
 BLDG. 6025
 OAK RIDGE NATIONAL LABORATORY
 OAK RIDGE, TENNESSEE 37830
 PHONE: (615) 574-6176

QUESTIONS CONCERNING ORIGEN2 SHOULD BE ADDRESSED TO RSIC.

DESCRIPTION

ORIGEN2 IS A REVISION AND UPDATE OF THE ORIGEN COMPUTER CODE. SPECIFICALLY, THE INPUT, OUTPUT, CONTROL, AND DATA BASE ASPECTS OF ORIGEN HAVE BEEN SIGNIFICANTLY REVISED AND UPDATED TO REFLECT CURRENT INFORMATION AND NEEDS. IT SHOULD BE NOTED THAT THE MATHEMATICAL METHODS USED TO SOLVE THE NUCLIDE BUILDUP, DEPLETION, AND DECAY EQUATIONS ARE ESSENTIALLY UNCHANGED FROM THAT IN ORIGEN. ORIGEN2 IS A COMPUTER CODE DESIGNED TO CALCULATE THE COMPOSITION AND CHARACTERISTICS OF NUCLEAR MATERIALS AS A FUNCTION OF DECAY TIME AND THE CHANGES THE MATERIALS UNDERGO DURING VARIOUS FUEL CYCLE OPERATIONS. INPUT AND OUTPUT FEATURES HAVE BEEN DESIGNED TO FACILITATE FLEXIBILITY IN THE TYPE OF CASES THAT CAN BE CONSIDERED AND IN CONTROLLING THE DETAIL OF THE OUTPUT. FOR FURTHER INFORMATION, THE USER IS REFERRED TO THE DOCUMENTATION LISTED BELOW.

MAJOR DATA SOURCES

VIRTUALLY ALL ASPECTS OF THE DATA INPUT TO ORIGEN2 HAVE BEEN UPDATED OR REVISED TO REFLECT CURRENT INFORMATION. THE PRINCIPAL SOURCES OF CROSS SECTION DATA WERE THE ENDF/B-IV, ENDF/B-V, AND LENDL COMPILATIONS. DECAY AND PHOTON INFORMATION WERE PRIMARILY BASED ON THE EVALUATED NUCLEAR STRUCTURE DATA FILE (ENSDF) AT ORNL AND ENDF/B-IV. DATA CONCERNING REACTOR AND FUEL CHARACTERISTICS WERE OBTAINED FROM REFERENCE SAFETY ANALYSIS REPORTS AND, WHERE POSSIBLE, THE COMMERCIAL REACTOR VENDORS.

DOCUMENTATION

THE FOLLOWING ITEMS CONSTITUTE THE ORIGEN2 DOCUMENTATION PUBLISHED AS OF THE DATE OF THIS CODE PACKAGE:
 A.G. CROFF, "ORIGEN2 - A REVISED AND UPDATED VERSION OF THE OAK RIDGE ISOTOPE GENERATION AND DEPLETION CODE", ORNL-5621 (JULY 1980).
 A.G. CROFF, "A USER'S MANUAL FOR THE ORIGEN2 COMPUTER CODE", ORNL/TM-7175 (JULY 1980).
 A.G. CROFF, M.A. BJERKE, G.W. MORRISON, AND L.M. PETRIE, "REVISED URANIUM-PLUTONIUM CYCLE PWR AND BWR MODELS FOR THE ORIGEN COMPUTER CODE", ORNL/TM-6051 (SEPTEMBER 1978).
 A.G. CROFF AND M.A. BJERKE, "ALTERNATIVE FUEL CYCLE PWR MODELS FOR THE ORIGEN COMPUTER CODE", ORNL/TM-7005 (FEB 1980).
 A.G. CROFF, R.L. HAASE, AND N.B. GOVE, "UPDATED DECAY AND PHOTON LIBRARIES FOR THE ORIGEN CODE", ORNL/TM-6055 (FEB 1979).
 A.G. CROFF, "ORIGEN2: A REVISED AND UPDATED VERSION OF ORIGEN", TRANS. AM. NUCL. SOC., VOL. 34, P. 349-50 (JUNE 1980).

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

OUTPUT UNIT = 6 PAGE 2

 ***** ORIGEN2: A REVISED AND UPDATED VERSION OF THE ORIGEN COMPUTER CODE *****

ORGANIZATION OF ORIGEN2 OUTPUT
 PAST EXPERIENCE HAS INDICATED THAT MANY USERS ENCOUNTER CONSIDERABLE DIFFICULTY IN FINDING THE DESIRED INFORMATION IN A
 ORIGEN2 OUT PUT WHICH IS SOMETIMES RATHER MASSIVE. THIS SECTION IS INTENDED AS A BRIEF OUTLINE OF THE ORGANIZATION OF
 ORIGEN2 OUTPUT. FOR DETAILS REFER TO THE USER'S MANUAL (ORNL/TM-7175, SECT. 8.2). THE ORIGEN2 OUTPUT IS EXTREMELY
 HIERARCHICAL, AND IS ORGANIZED AS FOLLOWS:

CARD INPUT ECHO
 MISCELLANEOUS INPUT DATA (NEUTRON YIELDS, REPROCESSING LOSSES, ELEMENT CHEMICAL TOXICITIES
 LISTING OF ORIGEN2 COMMANDS CURRENTLY BEING EXECUTED
 LISTING OF ORIGEN2 DATA LIBRARIES (IF SPECIFIED)
 DECAY LIBRARY
 ACTIVATION PRODUCTS
 ACTINIDES
 FISSION PRODUCTS
 CROSS SECTION/FISSION PRODUCT YIELD LIBRARY
 ACTIVATION PRODUCTS, ACTINIDES, AND FISSION PRODUCTS
 PHOTON LIBRARY
 ACTIVATION PRODUCTS, ACTINIDES, AND FISSION PRODUCTS
 OUTPUT 1
 REACTIVITY AND BURNUP DATA
 ACTIVATION PRODUCT TABLES
 GRAM TABLES (NUCLIDE, ELEMENT, NUCLIDE SUMMARY, ELEMENT SUMMARY)
 CURIE TABLES (NUCLIDE, ELEMENT, NUCLIDE SUMMARY, ELEMENT SUMMARY)
 ETC. (DEPENDING ON THE OUTPUT OPTIONS SPECIFIED, MANY OF THESE TABLES MAY BE OMITTED

ACTINIDE TABLES
 SAME SUBHEADINGS POSSIBLE AS UNDER ACTIVATION PRODUCT TABLES
 FISSION PRODUCT TABLES
 SAME SUBHEADINGS POSSIBLE AS UNDER ACTIVATION PRODUCT TABLES
 NEUTRON PRODUCTION RATE TABLES: (ALPHA,N) AND SPONTANEOUS FISSION
 PHOTON TABLES
 ACTIVATION PRODUCTS (SUMMATION AND PRINCIPAL CONTRIBUTORS)
 ACTINIDES (SUMMATION AND PRINCIPAL CONTRIBUTORS)
 FISSION PRODUCTS (SUMMATION AND PRINCIPAL CONTRIBUTORS)
 OUTPUT 2
 SAME GENERAL CONTENT AND ORDER AS OUTPUT 1

OUTPUT N
 SAME GENERAL CONTENT AND ORDER AS OUTPUT 1
 TABLE OF CONTENTS (UNIT 12) FOR THE ABOVE (UNIT 6) OUTPUT
 VARIABLE CROSS SECTION INFORMATION OUTPUT (UNIT 16)
 DEBUGGING AND OTHER INTERNAL INFORMATION OUTPUT (UNIT 15)

THE SCENARIO LISTED ABOVE CONSTITUTES A TYPICAL ORIGEN2 OUTPUT FOR MANY CASES. ONE POSSIBLE MODIFICATION IS THE USE OF AN
 STP COMMAND TO EXECUTE AN ADDITIONAL SET OF INSTRUCTIONS AFTER THE FIRST SET HAS BEEN EXECUTED. IF THIS IS DONE, THE OUTPUT
 WILL BEGIN WITH "MISCELLANEOUS INPUT DATA" IF NSTP=1, "ORIGEN2COMMANDS CURRENTLY BEING EXECUTED" IF NSTP=2, OR "OUTPUT 1"

FOR NSTP=3. ANOTHER OFTEN-USED OPTION IS TO EMPLOY BOTH THE PRIMARY (UNIT 6) AND ALTERNATE (UNIT 11) OUTPUT UNITS. IF BOTH ARE ROUTED TO PAPER, THE TABLE OF CONTENTS FOR UNIT 11, WHICH IS ON UNIT 13, WILL IMMEDIATELY FOLLOW THE DEBUGGING AND INTERNAL INFORMATION (UNIT 15) OUTPUT. THE "OUTPUT N" TABLES FOR UNIT 11 WILL BE PRINTED FOLLOWING THE TABLE OF CONTENTS.

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21
 LISTING OF INPUT DATA ON UNIT = 5

INPUT UNIT	WRITE UNIT	CARD NUMBER	CARD IMAGE
5	50	-1	
5	50	-1	
5	50	-1	
5	50	4	RDA
5	50	5	RDA
5	50	6	RDA
5	50	7	RDA
5	50	8	RDA
5	50	9	RDA
5	50	10	CUT
5	50	11	LIP
5	50	12	RDA
5	50	13	LIB
5	50	14	RDA
5	50	15	PHO
5	50	16	TIT
5	50	17	RDA
5	50	18	INP
5	50	19	RDA
5	50	20	TIT
5	50	21	RDA
5	50	22	OPTL
5	50	23	OPTA
5	50	24	OPTF
5	50	25	MOV
5	50	26	RDA
5	50	27	BUP
5	50	28	IRP
5	50	29	IRP
5	50	30	IRP
5	50	31	IRP
5	50	32	IRP
5	50	33	IRP
5	50	34	IRP
5	50	35	BUP
5	50	36	HED
5	50	37	HED
5	50	38	OUT
5	50	39	RDA
5	50	40	RDA
5	50	41	RDA
5	50	42	TIT

Monticello Calc 2004-07600 End of Cycle Core Inventory 1918 MWt
 1 MTIHM, E=3.93%, 33960 MWD/MT (BWRUE), ONLY FUEL
 ** CROSS SECTION LIBRARY = BWRUE, 4 CYCLE
 -1 = FRESH BWR FUEL WITH IMPURITIES (1 MT = 1000 KG)
 WARNING: VECTORS ARE CHANGED WITH RESPECT TO CONTENT.
 THESE CHANGES WILL BE NOTED ON RDA CARDS.
 5 1.0E-10 7 1.0E-10 9 1.0E-10 -1
 0 0 0
 DECA LIB XSECT LIB VAR. XSECT
 0 1 2 3 657 658 659 9 50 0 1 42
 PHOTON LIB
 101 102 103 10
 INITIAL COMP. OF UNIT AMOUNTS OF FUEL AND STRUCTURAL MAT'LS
 READ FUEL COMPOSITION INCLUDING IMPURITIES (1000 KG)
 -1 1 -1 -1 1
 IRRADIATION OF ONE METRIC TON OF BWRU FUEL
 IRRADIATION OF ONE METRIC TON OF BWRU FUEL
 *****PRINT OUT CONTROL*****
 4*8 7 8 7 8 7 15*8
 4*8 7 8 7 8 7 15*8
 -1 1 0 1.0
 200.0 21.655 1 2 4 2 BURNUP= 4,331 MWD/MTIHM
 400.0 21.655 2 3 4 0 BURNUP= 8,662 MWD/MTIHM
 600.0 21.655 3 4 4 0 BURNUP=12,993 MWD/MTIHM
 800.0 21.655 4 5 4 0 BURNUP=17,324 MWD/MTIHM
 1000.0 21.655 5 6 4 0 BURNUP=21,655 MWD/MTIHM
 1200.0 21.655 6 7 4 0 BURNUP=25,986 MWD/MTIHM
 1568.25 21.655 7 8 4 0 BURNUP=33,960 MWD/MTIHM
 1 *BOC #1
 8 *EOC #1
 8 1 0 0
 8 = IRRADIATED U FUEL AT DISCHARGE
 ***** OUTPUT MODULE *****
 Monticello Calc 2004-07600 End of Cycle Core Inventory 1918 MWt

5	50	TIT	1	MTIHM, E=3.93%, 33960 MWD/MT (BWRUE)
5	50	RDA		ONLY FUEL
5	50	RDA		MOVE FUEL AT CHARGE TO 1, MOVE FUEL AT DISCHARGE TO 2
5	50	MOV	2	0 1.0
5	50	RDA		*****DECAY MODULE *****
5	50	RDA		DISCHARGED FUEL IN 2, DECAYED FUEL IN 3, 4, 5, ETC.
5	50	RDA		

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21
 LISTING OF INPUT DATA ON UNIT = 5

INPUT UNIT	WRITE UNIT	CARD NUMBER	CARD IMAGE
5	50	50	
5	50	51	6.9444E-4 2 3 4 2
5	50	52	1.3889E-3 3 4 4 0
5	50	53	4.1667E-2 4 5 4 0
5	50	54	2.5000E-1 5 6 4 0
5	50	55	1.0 6 7 4 0
5	50	56	4.0 7 8 4 0
5	50	57	7.0 8 9 4 0
5	50	58	14.0 9 10 4 0
5	50	59	21.0 10 11 4 0
5	50	60	30.0 11 12 4 0
5	50	61	2 DISCHARGE
5	50	62	3 FUEL 1m
5	50	63	4 FUEL 2m
5	50	64	5 FUEL 1h
5	50	65	6 FUEL 6h
5	50	66	7 FUEL 1D
5	50	67	8 FUEL 4D
5	50	68	9 FUEL 7D
5	50	69	10 FUEL 14D
5	50	70	11 FUEL 21D
5	50	71	12 FUEL 30D
5	50	72	RDA
5	50	73	OUT -1 0
5	50	74	END
5	50	75	2 922340 305.0 922350 39300.0 922380 960395.0 0.0 FUEL 3.93%
5	50	76	0

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21
 NEUTRON YIELD PER NEUTRON-INDUCED FISSION

NUCLIDE	YIELD	NUCLIDE	YIELD	NUCLIDE	YIELD	NUCLIDE	YIELD	NUCLIDE	YIELD
832090	0.0000	882230	0.0000	882260	0.0000	882280	0.0000	892270	0.0000
902280	0.0000	902290	2.0490	902300	0.0000	902320	2.4180	902330	0.0000

912310	0.0000	912320	0.0000	912330	2.6630	912341	0.0000	912340	0.0000	922300	0.0000
922310	0.0000	922320	0.0000	922330	2.4990	922340	2.6310	922350	2.4210	922360	2.7340
922370	0.0000	922380	2.8010	922390	0.0000	922400	0.0000	932360	0.0000	932370	3.0050
932380	0.0000	932390	0.0000	942360	2.8700	942370	0.0000	942380	2.8330	942390	2.8750
942400	3.1350	942410	2.9340	942420	3.2800	942430	0.0000	952410	3.2770	952421	3.1620
952420	3.3600	952430	3.7320	952441	0.0000	952440	0.0000	962420	3.7460	962430	3.4340
962440	3.7250	962450	3.8320	962460	3.8580	962470	3.5920	962480	3.7960	962490	0.0000
972490	3.7600	982490	4.0620	982500	3.9700	982510	4.1400	982520	4.1260	982530	4.1500
982540	0.0000	992530	0.0000	992541	0.0000	992540	0.0000	0	0.0000	0	0.0000

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21
 SPONTANEOUS FISSION NEUTRON YIELD, NEUT/FISSION

OUTPUT UNIT = 6

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NUCLIDE	NUCLIDE	NUCLIDE	NUCLIDE	NUCLIDE	NUCLIDE	NUCLIDE	NUCLIDE	NUCLIDE	NUCLIDE	NUCLIDE	NUCLIDE
922350	1.6950	922360	1.6500	922370	1.8720	922380	2.0000	922390	2.0480	932361	1.7900
932360	1.7830	932370	1.8730	932380	1.9630	932390	2.0530	942360	2.2200	942370	1.8860
942380	2.2800	942390	2.2400	942400	2.1600	942410	2.2500	942420	2.1500	942430	2.4300
942440	2.3000	952400	2.2900	952410	2.3830	952420	2.4750	952421	2.5900	952430	2.5200
952440	2.6570	952441	2.6650	962410	2.5000	962420	2.5900	962430	2.6870	962440	2.7600
962450	2.8720	962460	3.0000	962480	3.3200	962500	3.5600	972490	3.7200	982490	3.4400
982500	3.5600	982520	3.7250	982540	3.9000	992530	3.9200	992540	4.0400	992550	4.1600

THE REMAINING NEUTRON YIELDS ARE CALCULATED FROM THE EQUATION: NEUT/FISSION=(2.84+0.1225*(AT WT-244)

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21
 INDIVIDUAL ELEMENT FRACTIONAL RECOVERIES

OUTPUT UNIT = 6

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ELEMENT	SET NUMBER	SET NUMBER	SET NUMBER	SET NUMBER	SET NUMBER	SET NUMBER	SET NUMBER	SET NUMBER	SET NUMBER	SET NUMBER	SET NUMBER	SET NUMBER
	1	2	3	4	5	6	7	8	9	10		
1	0.0000000	0.0000000	0.0005000	0.0000000	1.0000000	1.0000000	0.0000000	0.0000000	0.9000000	1.0000000		
2	0.0000000	0.0000000	0.0005000	0.0000000	1.0000000	1.0000000	0.0000000	0.0000000	0.0000000	1.0000000		
3	0.0000000	1.0000000	0.0005000	0.0000000	1.0000000	1.0000000	1.0000000	0.0000000	0.0000000	1.0000000		
4	0.0000000	1.0000000	0.0005000	0.0000000	1.0000000	1.0000000	1.0000000	0.0000000	0.0000000	1.0000000		
5	0.0000000	1.0000000	0.0005000	0.0000000	1.0000000	1.0000000	1.0000000	0.0000000	0.0000000	1.0000000		
6	0.0000000	0.0000000	0.0005000	0.0000000	1.0000000	1.0000000	0.0000000	0.0000000	0.0000000	1.0000000		
7	0.0000000	0.0000000	0.0005000	0.0000000	1.0000000	1.0000000	0.0000000	0.0000000	0.0000000	1.0000000		
8	0.0000000	1.0000000	0.0005000	0.0000000	1.0000000	1.0000000	1.0000000	0.0000000	0.0000000	1.0000000		
9	0.0000000	0.0010000	0.0005000	0.0000000	1.0000000	1.0000000	1.0000000	0.0000000	0.0000000	1.0000000		
10	0.0000000	0.0000000	0.0005000	0.0000000	1.0000000	1.0000000	1.0000000	0.0000000	0.0000000	1.0000000		
11	0.0000000	1.0000000	0.0005000	0.0000000	1.0000000	1.0000000	1.0000000	0.0000000	0.0000000	1.0000000		
12	0.0000000	1.0000000	0.0005000	0.0000000	1.0000000	1.0000000	1.0000000	0.0000000	0.0000000	1.0000000		
13	0.0000000	1.0000000	0.0005000	0.0000000	1.0000000	1.0000000	1.0000000	0.0000000	0.0000000	1.0000000		

5	0.0000000	1.0000000	0.0000000	0.0500000	0.0500000	0.0500000	0.0500000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
6	0.9950000	1.0000000	0.0005000	0.9999000	1.0000000	1.0000000	0.0200000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
7	0.0000000	1.0000000	0.0005000	0.0000000	0.0010000	0.0010000	0.0010000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
8	0.0000000	1.0000000	0.0005000	0.0000000	0.0010000	0.0010000	0.0010000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
9	0.0000000	1.0000000	0.0005000	0.0000000	0.0010000	0.0010000	0.0010000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
10	0.0000000	1.0000000	0.0005000	0.0000000	0.0010000	0.0010000	0.0010000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
11	0.0000000	1.0000000	0.0005000	0.0000000	0.0010000	0.0010000	0.0010000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
12	0.0000000	0.0010000	0.0005000	0.0000000	1.0000000	1.0000000	1.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
13	0.0000000	0.0000000	0.0005000	0.0000000	1.0000000	1.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
14	0.0000000	0.0000000	0.0005000	0.0000000	1.0000000	1.0000000	1.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
15	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
16	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
17	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
18	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
19	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
20	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000

OUTPUT UNIT = 6

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ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21
 ELEMENT ASSIGNMENTS TO FRACTIONAL RECOVERY GROUPS

ELEM GROUP	ELEM GROUP	ELEM GROUP	ELEM GROUP	ELEM GROUP	ELEM GROUP	ELEM GROUP	ELEM GROUP	ELEM GROUP	ELEM GROUP	ELEM GROUP	ELEM GROUP	ELEM GROUP	ELEM GROUP	ELEM GROUP	ELEM GROUP		
1	14	2	13	3	1	4	1	5	1	6	13	7	13	8	1	9	12
10	13	11	1	12	1	13	1	14	1	15	1	16	1	17	12	18	13
19	1	20	1	21	1	22	1	23	1	24	1	25	1	26	1	27	1
28	1	29	1	30	1	31	1	32	1	33	1	34	1	35	12	36	13
37	1	38	1	39	1	40	1	41	1	42	1	43	1	44	1	45	1
46	1	47	1	48	1	49	1	50	1	51	1	52	1	53	12	54	13
55	1	56	1	57	1	58	1	59	1	60	1	61	1	62	1	63	1
64	1	65	1	66	1	67	1	68	1	69	1	70	1	71	1	72	1
73	1	74	1	75	1	76	1	77	1	78	1	79	1	80	1	81	1
82	1	83	1	84	1	85	1	86	13	87	1	88	1	89	1	90	2
91	3	92	4	93	5	94	6	95	7	96	8	97	9	98	10	99	11

OUTPUT UNIT = 6

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ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21
 CHEMICAL TOXICITIES, GRAMS PER M**3 WATER

NUCLIDE	TOXICITY	NUCLIDE	TOXICITY	NUCLIDE	TOXICITY	NUCLIDE	TOXICITY	NUCLIDE	TOXICITY	NUCLIDE	TOXICITY	NUCLIDE	TOXICITY	NUCLIDE	TOXICITY	TOXICITY
1	3.50E+03	2	2.00E-01	3	5.00E+00	4	1.00E+00	5	1.00E+00	6	4.00E+02					
7	1.00E-02	8	9.45E+05	9	1.00E+00	10	1.00E+00	11	1.00E+03	12	1.00E+01					
13	1.00E-02	14	5.00E+00	15	1.00E-02	16	5.00E+01	17	1.50E-01	18	1.00E+01					
19	1.00E+03	20	3.00E+01	21	5.00E-01	22	1.00E-01	23	1.00E-01	24	2.00E-02					
25	1.00E-02	26	5.00E-02	27	5.00E-02	28	5.00E-02	29	1.00E-02	30	5.00E-02					
31	2.00E-01	32	5.00E-01	33	1.00E-01	34	1.00E-02	35	3.00E+00	36	4.00E+01					
37	5.00E+01	38	1.00E+01	39	1.00E-03	40	1.00E+00	41	2.00E-02	42	5.00E-01					
43	1.00E-02	44	1.00E+00	45	5.00E-02	46	5.00E-02	47	1.00E-03	48	1.00E-02					
49	2.00E-02	50	5.00E-02	51	5.00E-02	52	2.00E-01	53	1.00E+01	54	1.50E+02					
55	5.00E+00	56	5.00E-01	57	1.00E+00	58	2.00E+00	59	1.00E+00	60	2.00E-01					
61	1.00E+00	62	2.00E-01	63	2.00E-01	64	2.00E-01	65	5.00E-01	66	1.00E+00					
67	1.00E+00	68	1.00E-01	69	2.00E-01	70	1.00E-01	71	1.00E-01	72	5.00E-02					

73	1.00E+00	74	1.00E+02	75	1.00E+01	76	1.00E+00	77	8.00E-01	78	3.00E-01
79	2.00E-02	80	2.00E-03	81	5.00E-03	82	1.00E-02	83	1.00E-01	84	2.00E-01
85	1.00E+01	86	5.00E+02	87	5.00E+00	88	1.00E-03	89	2.00E-02	90	5.00E-04
91	5.00E-03	92	5.00E-01	93	8.00E-03	94	8.00E-04	95	4.00E-02	96	5.00E-01
97	5.00E-03	98	1.00E-02	99	1.00E-02						
ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21 Monticello Calc 2004-07600 End of Cycle Core Inventory 1918 MWt 1 0 RDA * RDA 1 MTHM, E=3.93%, 33960 MWD/MT (BWRUE), ONLY FUEL 2 0 RDA * RDA ** CROSS SECTION LIBRARY = BWRUE, 4 CYCLE 3 0 RDA * RDA -1 = FRESH BWR FUEL WITH IMPURITIES (1 MT = 1000 KG) 4 0 RDA * RDA WARNING: VECTORS ARE CHANGED WITH RESPECT TO CONTENT. 5 0 RDA * RDA THESE CHANGES WILL BE NOTED ON RDA CARDS. 6 0 RDA * RDA 5 1.0E-10 7 1.0E-10 9 1.0E-10 -1 7 0 CUT * CUT 0 0 8 0 LIP * LIP 0 0 9 0 RDA * RDA DECA LIB XSECT LIB VAR. XSECT 10 0 LIB * LIB 0 1 2 3 657 658 659 9 50 0 1 42 11 0 RDA * RDA PHOTON LIB 12 0 PHO * PHO 101 102 103 10 13 0 TIT * TIT INITIAL COMP. OF UNIT AMOUNTS OF FUEL AND STRUCTURAL MAT'LS 14 0 RDA * RDA READ FUEL COMPOSITION INCLUDING IMPURITIES (1000 KG) 15 0 INP * INP -1 1 -1 -1 1 16 0 RDA * RDA IRRADIATION OF ONE METRIC TON OF BWRU FUEL 17 0 TIT * TIT IRRADIATION OF ONE METRIC TON OF BWRU FUEL 18 0 RDA * RDA *****PRINT OUT CONTROL***** 19 0 OPTL * OPTL 4*8 7 8 7 8 7 15*8 20 0 OPTA * OPTA 4*8 7 8 7 8 7 15*8 21 0 OPTF * OPTF 4*8 7 8 7 8 7 15*8 22 0 MOV * MOV -1 1 0 1.0 23 0 RDA * RDA 24 0 BUP * BUP 25 0 IRP * IRP 200.0 21.655 1 2 4 2 BURNUP= 4,331 MWD/MTIHM 26 0 IRP * IRP 400.0 21.655 2 3 4 0 BURNUP= 8,662 MWD/MTIHM 27 0 IRP * IRP 600.0 21.655 3 4 4 0 BURNUP=12,993 MWD/MTIHM 28 0 IRP * IRP 800.0 21.655 4 5 4 0 BURNUP=17,324 MWD/MTIHM 29 0 IRP * IRP 1000.0 21.655 5 6 4 0 BURNUP=21,655 MWD/MTIHM 30 0 IRP * IRP 1200.0 21.655 6 7 4 0 BURNUP=25,986 MWD/MTIHM 31 0 IRP * IRP 1568.25 21.655 7 8 4 0 BURNUP=33,960 MWD/MTIHM 32 0 BUP * BUP 33 0 HED * HED 1 *BOC #1 34 0 HED * HED 8 *EOC #1 35 0 OUT * OUT 8 1 0 0 36 0 RDA * RDA 8 = IRRADIATED U FUEL AT DISCHARGE 37 0 RDA * RDA 38 0 RDA * RDA ***** OUTPUT MODULE ***** 39 0 TIT * TIT Monticello Calc 2004-07600 End of Cycle Core Inventory 1918 MWt 40 0 TIT * TIT 1 MTHM, E=3.93%, 33960 MWD/MT (BWRUE) 41 0 RDA * RDA ONLY FUEL 42 0 RDA * RDA MOVE FUEL AT CHARGE TO 1, MOVE FUEL AT DISCHARGE TO 2 43 0 MOV * MOV 8 2 0 1.0 44 0 RDA * RDA *****DECAY MODULE *****											

Calc. No. 2004-07600
Project No. 11163-013
Attachment B1

45	0	RDA	*	RDA	DISCHARGED FUEL IN 2, DECAYED FUEL IN 3, 4, 5, ETC.	*
46	0	RDA	*	RDA		*
47	0	DEC	*	DEC	6.9444E-4 2 3 4 2	*
48	0	DEC	*	DEC	1.3889E-3 3 4 4 0	*
49	0	DEC	*	DEC	4.1667E-2 4 5 4 0	*

OUTPUT UNIT = 6

OUTPUT UNIT = 6

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

50	0	DEC	*	DEC	2.5000E-1 5 6 4 0	*
51	0	DEC	*	DEC	1.0 6 7 4 0	*
52	0	DEC	*	DEC	4.0 7 8 4 0	*
53	0	DEC	*	DEC	7.0 8 9 4 0	*
54	0	DEC	*	DEC	14.0 9 10 4 0	*
55	0	DEC	*	DEC	21.0 10 11 4 0	*
56	0	DEC	*	DEC	30.0 11 12 4 0	*
57	0	RDA	*	RDA		*
58	0	HED	*	HED	2 DISCHARGE	*
59	0	HED	*	HED	3 FUEL 1m	*
60	0	HED	*	HED	4 FUEL 2m	*
61	0	HED	*	HED	5 FUEL 1h	*
62	0	HED	*	HED	6 FUEL 6h	*
63	0	HED	*	HED	7 FUEL 1d	*
64	0	HED	*	HED	8 FUEL 4d	*
65	0	HED	*	HED	9 FUEL 7d	*
66	0	HED	*	HED	10 FUEL 14d	*
67	0	HED	*	HED	11 FUEL 21d	*
68	0	HED	*	HED	12 FUEL 30d	*
69	0	RDA	*	RDA		*
70	0	OUT	*	OUT	12 1 -1 0	*
71	0	END	*	END		*

OUTPUT UNIT = 6

OUTPUT UNIT = 6

SUM OF YIELDS FOR EACH FISSION ISOTOPE: 0.0000E+00 0.0000E+00 2.0003E+00 1.9997E+00 2.0006E+00 2.0001E+00

ISOTOPE FOR WHICH YIELDS ARE EXPLICITLY ACCOUNTED FOR: 922350 922380 942390 942410

OUTPUT UNIT = 6

OUTPUT UNIT = 6

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
POWER= 2.16550E+01 MW, BURNUP= 3.39605E+04 MWD, FLUX= 2.07E+14 N/CM**2-SEC

REACTIVITY AND BURNUP DATA

BASIS=

TIME, SEC	BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
NEUT. FLUX	0.00E+00	1.73E+07	3.46E+07	5.18E+07	6.91E+07	8.64E+07	1.04E+08	1.35E+08
SP POW,MWD	0.00E+00	1.87E+14	1.87E+14	1.92E+14	1.98E+14	2.09E+14	2.18E+14	2.36E+14
BURNUP,MWD	0.00E+00	2.17E+01	2.17E+01	2.17E+01	2.17E+01	2.17E+01	2.17E+01	2.17E+01
K INFINITY	0.00000	1.31088	1.26062	1.23706	1.19870	1.18776	1.15896	1.12869
NEUT PRODN	0.00E+00	8.99E+03	9.03E+03	8.94E+03	8.77E+03	8.58E+03	8.37E+03	7.99E+03
NEUT DESTN	0.00E+00	6.86E+03	7.16E+03	7.23E+03	7.32E+03	7.22E+03	7.22E+03	7.08E+03

Calc. No. 2004-07600
 Project No. 11163-013
 Attachment B1

SUMTOT 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
 TOTAL 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00

CUMULATIVE TABLE TOTALS

AP+FP 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
 ACT+FP 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
 AP+ACT+FP 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
 SUMTOT 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
 TOTAL 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21 OUTPUT UNIT = 6 PAGE 17

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
 ACTIVATION PRODUCTS
 POWER= 2.16550E+01 MW, BURNUP= 3.39605E+04 MWD, FLUX= 2.07E+14 N/CM**2-SEC

9 SUMMARY TABLE: THERMAL POWER, WATTS

BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
SUMTOT	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TOTAL	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

CUMULATIVE TABLE TOTALS

AP+FP 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
 ACT+FP 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
 AP+ACT+FP 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21 OUTPUT UNIT = 6 PAGE 18

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
 ACTINIDES+DAUGHTERS
 POWER= 2.16550E+01 MW, BURNUP= 3.39605E+04 MWD, FLUX= 2.07E+14 N/CM**2-SEC

5 SUMMARY TABLE: CONCENTRATIONS, GRAMS

HE	4	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
HE 4	0.000E+00	3.754E-04	2.539E-03	1.151E-02	3.691E-02	9.081E-02	1.853E-01	4.961E-01
TH230	0.000E+00	4.351E-04	8.138E-04	1.139E-03	1.414E-03	1.639E-03	1.818E-03	2.030E-03
TH232	0.000E+00	7.810E-06	2.955E-05	6.309E-05	1.067E-04	1.588E-04	2.179E-04	3.408E-04
PA231	0.000E+00	3.325E-05	8.636E-05	1.536E-04	2.296E-04	3.111E-04	3.933E-04	5.353E-04
U232	0.000E+00	1.210E-05	3.359E-05	7.180E-05	1.334E-04	2.256E-04	3.537E-04	7.004E-04
U233	0.000E+00	3.777E-04	6.743E-04	9.149E-04	1.109E-03	1.269E-03	1.397E-03	1.574E-03
U234	3.050E+02	2.876E+02	2.712E+02	2.553E+02	2.400E+02	2.248E+02	2.102E+02	1.842E+02
U235	3.930E+04	3.442E+04	3.016E+04	2.633E+04	2.288E+04	1.974E+04	1.691E+04	1.244E+04
U236	0.000E+00	9.575E+02	1.769E+03	2.474E+03	3.081E+03	3.607E+03	4.051E+03	4.671E+03

Calc. No. 2004-07600
Project No. 11163-013
Attachment B1

U237	0.000E+00	1.856E+00	2.879E+00	3.886E+00	4.825E+00	5.830E+00	6.749E+00	8.291E+00
U238	9.604E+05	9.577E+05	9.550E+05	9.523E+05	9.495E+05	9.465E+05	9.434E+05	9.373E+05
U239	0.000E+00	2.834E-01	2.817E-01	2.804E-01	2.796E-01	2.792E-01	2.797E-01	2.802E-01
NP236	0.000E+00	5.665E-06	2.757E-05	6.932E-05	1.323E-04	2.164E-04	3.194E-04	5.504E-04
NP237	0.000E+00	3.372E+01	6.762E+01	1.278E+02	2.010E+02	2.857E+02	3.788E+02	5.653E+02
NP238	0.000E+00	3.498E-02	9.948E-02	1.937E-01	3.141E-01	4.707E-01	6.521E-01	1.052E+00
NP239	0.000E+00	4.081E+01	4.057E+01	4.168E+01	4.286E+01	4.503E+01	4.691E+01	5.043E+01
NP240	0.000E+00	4.449E-04	4.409E-04	4.666E-04	4.948E-04	5.480E-04	5.966E-04	6.941E-04
P236	0.000E+00	8.317E-06	4.298E-05	1.146E-04	2.302E-04	3.977E-04	6.194E-04	1.180E-03
P237	0.000E+00	1.205E-06	4.625E-06	1.200E-05	2.520E-05	4.718E-05	7.953E-05	1.894E-04
P238	0.000E+00	9.388E-01	5.106E+00	1.439E+01	3.059E+01	5.577E+01	9.124E+01	1.874E+02
P239	0.000E+00	1.866E+03	3.026E+03	4.830E+03	7.435E+03	1.081E+04	1.581E+04	2.202E+04
P240	0.000E+00	1.500E+02	4.198E+02	7.160E+02	9.831E+02	1.264E+03	1.511E+03	1.990E+03
P241	0.000E+00	3.441E+01	1.854E+02	3.886E+02	6.478E+02	8.634E+02	1.090E+03	1.392E+03
P242	0.000E+00	9.271E-01	1.051E+01	3.618E+01	8.268E+01	1.482E+02	2.313E+02	4.130E+02
P243	0.000E+00	1.508E-04	1.702E-03	5.896E-03	1.385E-02	2.563E-02	4.157E-02	7.865E-02
P244	0.000E+00	1.385E-06	3.863E-05	2.590E-04	9.168E-04	2.695E-03	6.135E-03	2.018E-02
AM241	0.000E+00	2.300E-01	2.491E+00	8.184E+00	1.746E+01	2.920E+01	4.210E+01	6.490E+01
AM242M	0.000E+00	2.716E-03	5.148E-02	2.332E-01	5.927E-01	1.131E+00	1.778E+00	3.033E+00
AM242	0.000E+00	2.998E-04	3.226E-03	1.034E-02	2.257E-02	3.786E-02	5.628E-02	8.922E-02
AM243	0.000E+00	2.100E-02	4.887E-01	2.681E+00	8.371E+00	1.942E+01	3.731E+01	9.070E+01
AM244M	0.000E+00	4.167E-07	9.671E-06	5.466E-05	1.760E-04	4.304E-04	8.642E-04	2.273E-03
AM244	0.000E+00	5.105E-07	1.185E-05	6.695E-05	2.156E-04	5.272E-04	1.058E-03	2.784E-03
CM242	0.000E+00	9.515E-03	1.896E-01	8.686E-01	2.314E+00	4.533E+00	7.469E+00	1.368E+01
CM243	0.000E+00	2.934E-05	1.203E-03	8.912E-03	3.294E-02	8.510E-02	1.743E-01	4.471E-01
CM244	0.000E+00	5.827E-04	2.801E-02	2.481E-01	1.087E+00	3.348E+00	8.160E+00	2.893E+01
CM245	0.000E+00	3.352E-06	3.156E-04	4.214E-03	2.455E-02	9.422E-02	2.740E-01	1.253E+00
CM246	0.000E+00	2.557E-08	4.956E-06	1.043E-04	8.566E-04	4.348E-03	1.607E-02	1.075E-01
CM247	0.000E+00	2.788E-11	1.091E-08	3.534E-07	3.996E-06	2.623E-05	1.202E-04	1.119E-03
SUMTOT	1.000E+06	9.955E+05	9.910E+05	9.865E+05	9.821E+05	9.776E+05	9.731E+05	9.650E+05
TOTAL	1.000E+06	9.955E+05	9.910E+05	9.865E+05	9.821E+05	9.776E+05	9.731E+05	9.650E+05

OUTPUT UNIT = 6

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ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
ACTINIDES+DAUGHTERS
POWER= 2.16550E+01 MW, BURNUP= 3.39605E+04 MWD, FLUX= 2.07E+14 N/CM**2-SEC

5 SUMMARY TABLE: CONCENTRATIONS, GRAMS

BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
HE	0.000E+00	3.754E-04	2.539E-03	1.151E-02	3.691E-02	9.081E-02	1.853E-01
TH	0.000E+00	4.572E-04	8.579E-04	1.217E-03	1.536E-03	1.814E-03	2.053E-03
PA	0.000E+00	3.393E-05	8.853E-05	1.579E-04	2.365E-04	3.211E-04	4.067E-04
U	1.000E+06	9.934E+05	9.872E+05	9.814E+05	9.757E+05	9.701E+05	9.646E+05
NP	0.000E+00	6.457E+01	1.083E+02	1.697E+02	2.441E+02	3.312E+02	4.264E+02
PU	0.000E+00	2.052E+03	3.646E+03	4.985E+03	6.095E+03	7.113E+03	8.004E+03
AM	0.000E+00	2.540E-01	3.034E+00	1.111E+01	2.644E+01	4.979E+01	8.125E+01
CM	0.000E+00	1.013E-02	2.191E-01	1.130E+00	3.459E+00	8.065E+00	1.609E+01
SUMTOT	1.000E+06	9.955E+05	9.910E+05	9.865E+05	9.821E+05	9.776E+05	9.731E+05

TOTAL 1.000E+06 9.955E+05 9.910E+05 9.865E+05 9.821E+05 9.776E+05 9.731E+05 9.650E+05

CUMULATIVE TABLE TOTALS

AP+FP 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00

ACT+FP 1.000E+06 9.955E+05 9.910E+05 9.865E+05 9.821E+05 9.776E+05 9.731E+05 9.650E+05

AP+ACT+FP 1.000E+06 9.955E+05 9.910E+05 9.865E+05 9.821E+05 9.776E+05 9.731E+05 9.650E+05

OUTPUT UNIT = 6

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL

ACTINIDES+DAUGHTERS

POWER= 2.16550E+01 MW, BURNUP= 3.39605E+04 MWD, FLUX= 2.07E+14 N/CM*2-SEC

7 SUMMARY TABLE: RADIOACTIVITY, CURIES

BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
PB212	0.000E+00	2.150E-05	9.850E-05	2.655E-04	5.732E-04	1.082E-03	1.859E-03
BI212	0.000E+00	2.150E-05	9.850E-05	2.655E-04	5.732E-04	1.082E-03	1.859E-03
PO212	0.000E+00	1.378E-05	6.311E-05	1.701E-04	3.673E-04	6.935E-04	1.191E-03
PO216	0.000E+00	2.150E-05	9.850E-05	2.655E-04	5.732E-04	1.082E-03	1.859E-03
RN220	0.000E+00	2.150E-05	9.850E-05	2.655E-04	5.732E-04	1.082E-03	1.859E-03
RA224	0.000E+00	2.150E-05	9.850E-05	2.655E-04	5.732E-04	1.082E-03	1.859E-03
TH228	0.000E+00	2.150E-05	9.838E-05	2.649E-04	5.717E-04	1.079E-03	1.853E-03
TH231	0.000E+00	2.092E-01	3.164E-01	4.192E-01	5.133E-01	6.094E-01	6.934E-01
TH233	0.000E+00	2.857E-04	1.078E-03	2.371E-03	4.135E-03	6.486E-03	9.305E-03
TH234	0.000E+00	3.212E-01	3.213E-01	3.204E-01	3.195E-01	3.185E-01	3.175E-01
PA232	0.000E+00	2.636E-02	6.829E-02	1.251E-01	1.930E-01	2.756E-01	3.641E-01
PA233	0.000E+00	1.268E-02	4.169E-02	8.284E-02	1.339E-01	1.936E-01	2.600E-01
PA234M	0.000E+00	3.213E-01	3.217E-01	3.211E-01	3.206E-01	3.201E-01	3.198E-01
PA234	0.000E+00	5.126E-04	7.311E-04	1.059E-03	1.486E-03	2.047E-03	2.704E-03
U232	0.000E+00	2.590E-04	7.193E-04	1.537E-03	2.856E-03	4.830E-03	7.573E-03
U234	1.907E+00	1.798E+00	1.695E+00	1.596E+00	1.500E+00	1.405E+00	1.314E+00
U235	8.498E+02	7.444E+02	6.523E+02	5.693E+02	4.948E+02	4.268E+02	3.658E+02
U236	0.000E+00	6.197E-02	1.145E-01	1.601E-01	1.994E-01	2.335E-01	2.622E-01
U237	0.000E+00	1.515E+05	2.351E+05	3.173E+05	3.940E+05	4.761E+05	5.511E+05
U238	3.230E+01	3.221E-01	3.212E-01	3.203E-01	3.193E-01	3.183E-01	3.173E-01
U239	0.000E+00	9.478E+06	9.422E+06	9.679E+06	9.952E+06	1.046E+07	1.089E+07
U240	0.000E+00	4.715E+00	4.673E+00	4.945E+00	5.244E+00	5.808E+00	6.323E+00
NP235	0.000E+00	7.920E-05	3.687E-04	9.007E-04	1.674E-03	2.703E-03	3.957E-03
NP236M	0.000E+00	1.758E-01	4.998E-01	9.734E-01	1.579E+00	2.367E+00	3.280E+00
NP237	0.000E+00	1.673E-02	4.769E-02	9.012E-02	1.417E-01	2.015E-01	2.672E-01
NP238	0.000E+00	9.070E+03	2.579E+04	5.022E+04	8.145E+04	1.220E+05	1.691E+05
NP239	0.000E+00	9.471E+06	9.416E+06	9.945E+06	1.045E+07	1.089E+07	1.170E+07
NP240M	0.000E+00	9.616E+02	9.530E+02	1.008E+03	1.069E+03	1.185E+03	1.290E+03
NP240	0.000E+00	5.365E+03	5.317E+03	5.626E+03	5.966E+03	6.608E+03	7.194E+03
Pu236	0.000E+00	4.421E-03	2.284E-02	6.094E-02	1.223E-01	2.114E-01	3.292E-01
Pu237	0.000E+00	1.456E-02	5.591E-02	1.451E-01	3.046E-01	5.703E-01	9.613E-01
Pu238	0.000E+00	1.608E+01	8.744E+01	2.465E+02	5.239E+02	9.551E+02	1.563E+03
Pu239	0.000E+00	1.160E+02	1.881E+02	2.381E+02	2.706E+02	2.973E+02	3.160E+02

Calc. No. 2004-07600
Project No. 11163-013
Attachment B1

PU240	0.000E+00	3.420E+01	9.570E+01	1.632E+02	2.241E+02	2.881E+02	3.444E+02	4.537E+02
PU241	0.000E+00	3.547E+03	1.911E+04	4.005E+04	6.676E+04	8.899E+04	1.123E+05	1.435E+05
PU242	0.000E+00	3.541E-03	4.016E-02	1.382E-01	3.158E-01	5.660E-01	8.834E-01	1.577E+00
PU243	0.000E+00	3.925E+02	4.430E+03	1.535E+04	3.606E+04	6.674E+04	1.082E+05	2.048E+05
PU245	0.000E+00	1.870E-05	5.198E-04	3.590E-03	1.385E-02	4.062E-02	9.662E-02	3.439E-01
AM240	0.000E+00	8.046E-04	8.702E-03	2.952E-02	6.503E-02	1.148E-01	1.732E-01	2.888E-01
AM241	0.000E+00	7.895E-01	8.551E+00	2.810E+01	5.994E+01	1.003E+02	1.445E+02	2.228E+02
AM242M	0.000E+00	2.640E-02	5.005E-01	2.267E+00	5.763E+00	1.100E+01	1.729E+01	2.949E+01
AM242	0.000E+00	2.425E+02	2.609E+03	8.365E+03	1.826E+04	3.062E+04	4.551E+04	7.215E+04
AM243	0.000E+00	4.187E-03	9.747E-02	5.347E-01	1.669E+00	3.873E+00	7.441E+00	1.809E+01
AM244M	0.000E+00	1.236E+01	2.868E+02	1.621E+03	5.219E+03	1.276E+04	2.562E+04	6.740E+04
AM244	0.000E+00	6.494E-01	1.507E+01	8.518E+01	2.743E+02	6.707E+02	1.347E+03	3.541E+03
AM245	0.000E+00	1.870E-05	5.198E-04	3.590E-03	1.385E-02	4.062E-02	9.662E-02	3.439E-01
CM241	0.000E+00	2.334E-06	6.837E-05	3.852E-04	1.153E-03	2.523E-03	4.505E-03	1.033E-02
CM242	0.000E+00	3.147E+01	6.271E+02	2.873E+03	7.655E+03	1.499E+04	2.471E+04	4.526E+04
CM243	0.000E+00	1.515E-03	6.211E-02	4.602E-01	1.701E+00	4.395E+00	9.002E+00	2.309E+01
CM244	0.000E+00	4.717E-02	2.267E+00	2.008E+01	8.794E+01	2.710E+02	6.605E+02	2.342E+03
CM245	0.000E+00	5.758E-07	5.422E-05	7.238E-04	4.216E-03	1.618E-02	4.706E-02	2.153E-01

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

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* IRRADIATION OF ONE METRIC TON OF BWRU FUEL

ACTINIDES+DAUGHTERS

POWER= 2.16550E+01 MW, BURNUP= 3.39605E+04 MWD, FLUX= 2.07E+14 N/CM**2-SEC

7 SUMMARY TABLE: RADIOACTIVITY, CURIES

BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
CM246	0.000E+00	7.858E-09	1.523E-06	3.207E-05	2.632E-04	1.336E-03	4.939E-03
CM249	0.000E+00	1.096E-11	8.694E-09	4.493E-07	7.277E-06	6.583E-05	3.957E-04
SUMTOT	2.315E+00	1.912E+07	1.913E+07	1.979E+07	2.052E+07	2.173E+07	2.283E+07
TOTAL	2.315E+00	1.912E+07	1.913E+07	1.979E+07	2.052E+07	2.173E+07	2.283E+07

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

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* IRRADIATION OF ONE METRIC TON OF BWRU FUEL

ACTINIDES+DAUGHTERS

POWER= 2.16550E+01 MW, BURNUP= 3.39605E+04 MWD, FLUX= 2.07E+14 N/CM**2-SEC

7 SUMMARY TABLE: RADIOACTIVITY, CURIES

BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
PB	0.000E+00	2.152E-05	9.857E-05	2.657E-04	5.736E-04	1.083E-03	1.860E-03
BI	0.000E+00	2.152E-05	9.857E-05	2.657E-04	5.736E-04	1.083E-03	1.860E-03
PO	0.000E+00	3.530E-05	1.617E-04	4.358E-04	9.409E-04	1.776E-03	3.051E-03
RN	0.000E+00	2.152E-05	9.856E-05	2.656E-04	5.735E-04	1.083E-03	1.860E-03
RA	0.000E+00	2.152E-05	9.857E-05	2.657E-04	5.736E-04	1.083E-03	1.860E-03
TH	0.000E+00	5.307E-01	6.390E-01	7.422E-01	8.375E-01	9.355E-01	1.022E+00
PA	0.000E+00	3.609E-01	4.324E-01	5.301E-01	6.489E-01	7.915E-01	9.466E-01

U	2.315E+00	9.629E+06	9.657E+06	9.996E+06	1.035E+07	1.093E+07	1.145E+07	1.239E+07
NP	0.000E+00	9.487E+06	9.448E+06	9.729E+06	1.003E+07	1.058E+07	1.106E+07	1.198E+07
PU	0.000E+00	4.106E+03	2.391E+04	5.605E+04	1.038E+05	1.573E+05	2.227E+05	3.522E+05
AM	0.000E+00	2.563E+02	2.920E+03	1.010E+04	2.382E+04	4.417E+04	7.265E+04	1.434E+05
CM	0.000E+00	3.152E+01	6.294E+02	2.894E+03	7.744E+03	1.527E+04	2.537E+04	4.763E+04
BK	0.000E+00	9.563E-13	1.414E-09	1.026E-07	2.090E-06	2.232E-05	1.528E-04	2.629E-03
SUMTOT	2.315E+00	1.912E+07	1.913E+07	1.979E+07	2.052E+07	2.173E+07	2.283E+07	2.492E+07

CUMULATIVE TABLE TOTALS

AP+FP	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ACT+FP	2.315E+00	1.912E+07	1.913E+07	1.979E+07	2.052E+07	2.173E+07	2.283E+07	2.492E+07
AP+ACT+FP	2.315E+00	1.912E+07	1.913E+07	1.979E+07	2.052E+07	2.173E+07	2.283E+07	2.492E+07

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21
 OUTPUT UNIT = 6

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
 ACTINIDES+DAUGHTERS
 POWER= 2.16550E+01 MW, BURNUP= 3.39605E+04 MWD, FLUX= 2.07E+14 N/CM**2-SEC

9 SUMMARY TABLE: THERMAL POWER, WATTS

	BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
TL208	0.000E+00	1.818E-07	8.328E-07	2.245E-06	4.847E-06	9.152E-06	1.572E-05	3.547E-05
PB212	0.000E+00	4.094E-08	1.875E-07	5.054E-07	1.091E-06	2.061E-06	3.540E-06	7.987E-06
BI212	0.000E+00	3.657E-07	1.675E-06	4.515E-06	9.749E-06	1.841E-05	3.162E-05	7.134E-05
PO212	0.000E+00	7.301E-07	3.344E-06	9.103E-06	1.946E-05	3.675E-05	6.313E-05	1.424E-04
PO216	0.000E+00	8.803E-07	4.032E-06	1.087E-05	2.347E-05	4.431E-05	7.611E-05	1.717E-04
RN220	0.000E+00	8.164E-07	3.740E-06	1.008E-05	2.117E-05	4.109E-05	7.059E-05	1.593E-04
RA224	0.000E+00	7.380E-07	3.381E-06	9.111E-06	1.967E-05	3.715E-05	6.381E-05	1.440E-04
TH228	0.000E+00	7.032E-07	3.217E-06	8.663E-06	1.870E-05	3.529E-05	6.059E-05	1.369E-04
TH231	0.000E+00	1.174E-04	1.775E-04	1.775E-04	2.880E-04	3.419E-04	3.891E-04	4.605E-04
TH233	0.000E+00	7.233E-07	2.728E-06	6.000E-06	1.047E-05	1.642E-05	2.355E-05	3.985E-05
TH234	0.000E+00	1.302E-04	1.303E-04	1.299E-04	1.295E-04	1.291E-04	1.287E-04	1.279E-04
PA232	0.000E+00	1.724E-04	4.465E-04	8.182E-04	1.262E-03	1.802E-03	2.381E-03	3.505E-03
PA233	0.000E+00	2.878E-05	9.462E-05	1.880E-04	3.039E-04	4.395E-04	5.901E-04	9.367E-04
PA234M	0.000E+00	1.588E-03	1.590E-03	1.587E-03	1.584E-03	1.582E-03	1.580E-03	1.578E-03
PA234	0.000E+00	7.363E-06	1.050E-05	1.521E-05	2.135E-05	2.940E-05	3.884E-05	6.242E-05
U232	0.000E+00	8.315E-06	2.309E-05	4.936E-05	9.168E-05	1.551E-04	2.431E-04	4.815E-04
U234	5.491E-02	5.178E-02	4.883E-02	4.597E-02	4.320E-02	4.048E-02	3.784E-02	3.316E-02
U235	2.226E-03	1.949E-03	1.708E-03	1.491E-03	1.296E-03	1.118E-03	9.579E-04	7.044E-04
U236	0.000E+00	1.679E-03	3.101E-03	4.337E-03	5.402E-03	6.325E-03	7.102E-03	8.190E-03
U237	0.000E+00	2.867E+02	4.448E+02	6.004E+02	7.454E+02	9.008E+02	1.043E+03	1.281E+03
U238	8.193E-03	8.170E-03	8.147E-03	8.124E-03	8.100E-03	8.075E-03	8.048E-03	7.996E-03
U239	0.000E+00	2.551E+04	2.536E+04	2.605E+04	2.679E+04	2.815E+04	2.932E+04	3.153E+04
U240	0.000E+00	3.868E-03	3.833E-03	4.057E-03	4.302E-03	4.765E-03	5.188E-03	6.035E-03
NP236M	0.000E+00	1.389E-04	3.949E-04	7.691E-04	1.248E-03	1.870E-03	2.592E-03	4.186E-03
NP237	0.000E+00	5.112E-04	1.457E-03	2.754E-03	4.331E-03	6.159E-03	8.165E-03	1.218E-02
NP238	0.000E+00	4.344E+01	1.235E+02	2.405E+02	3.901E+02	5.845E+02	8.098E+02	1.307E+03

Calc. No. 2004-07600
 Project No. 11163-013
 Attachment B1

NP239	0.000E+00	2.289E+04	2.276E+04	2.338E+04	2.404E+04	2.526E+04	2.631E+04	2.829E+04
NP240M	0.000E+00	5.572E+00	5.523E+00	5.844E+00	6.197E+00	6.864E+00	7.473E+00	8.693E+00
NP240	0.000E+00	5.686E+01	5.635E+01	5.963E+01	6.324E+01	7.004E+01	7.625E+01	8.870E+01
PU236	0.000E+00	1.538E-04	7.950E-04	2.121E-03	4.258E-03	7.358E-03	1.146E-02	2.182E-02
PU237	0.000E+00	5.368E-06	2.061E-05	5.350E-05	1.123E-04	2.103E-04	3.544E-04	8.439E-04
PU238	0.000E+00	5.328E-01	2.898E+00	8.168E+00	1.736E+01	3.165E+01	5.179E+01	1.064E+02
PU239	0.000E+00	3.575E+00	5.798E+00	7.339E+00	8.333E+00	9.163E+00	9.738E+00	1.064E+01
PU240	0.000E+00	1.065E+00	2.980E+00	5.082E+00	6.978E+00	8.969E+00	1.072E+01	1.413E+01
PU241	0.000E+00	1.100E-01	5.924E-01	1.242E+00	2.107E+00	2.759E+00	3.481E+00	4.448E+00
PU242	0.000E+00	1.046E-04	1.186E-03	4.081E-03	9.327E-03	1.672E-02	2.609E-02	4.658E-02
PU243	0.000E+00	4.530E-01	5.113E+00	1.772E+01	4.162E+01	7.702E+01	1.249E+02	2.363E+02
PU245	0.000E+00	4.434E-08	1.233E-06	8.513E-06	3.283E-05	6.630E-05	2.291E-04	8.155E-04
AM240	0.000E+00	5.266E-06	5.695E-05	1.932E-04	4.256E-04	7.513E-04	1.133E-03	1.890E-03
AM241	0.000E+00	2.623E-02	2.841E-01	9.334E-01	1.991E+00	3.331E+00	4.802E+00	7.402E+00
AM242M	0.000E+00	1.043E-05	1.977E-04	8.956E-04	2.276E-03	4.345E-03	6.830E-03	1.165E-02
AM242	0.000E+00	2.752E-01	2.962E+00	9.495E+00	2.072E+01	3.476E+01	5.166E+01	8.190E+01
AM243	0.000E+00	1.346E-04	3.133E-03	1.719E-02	5.367E-02	1.245E-01	2.392E-01	5.814E-01
AM244M	0.000E+00	3.738E-02	8.674E-01	4.903E+00	1.579E+01	3.860E+01	7.751E+01	2.039E+02
AM244	0.000E+00	3.403E-03	7.897E-02	4.633E-01	1.437E+00	3.514E+00	7.056E+00	1.856E+01
AM245	0.000E+00	3.469E-08	9.645E-07	6.661E-06	2.569E-05	7.536E-05	1.793E-04	6.381E-04
CM241	0.000E+00	9.594E-09	2.810E-07	1.583E-06	4.740E-06	1.037E-05	1.851E-05	4.244E-05
CM242	0.000E+00	1.160E+00	2.311E+01	1.059E+02	2.821E+02	5.525E+02	9.103E+02	1.668E+03
CM243	0.000E+00	5.558E-05	2.279E-03	1.688E-02	6.240E-02	1.612E-01	3.303E-01	8.470E-01
CM244	0.000E+00	1.650E-03	7.929E-02	7.024E-01	3.076E+00	9.478E+00	2.310E+01	8.190E+01
CM245	0.000E+00	1.911E-08	1.799E-06	2.402E-05	1.399E-04	5.370E-04	1.562E-03	7.144E-03

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

OUTPUT UNIT = 6

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL

ACTINIDES+DAUGHTERS

POWER= 2.16550E+01 MW, BURNUP= 3.39605E+04 MWD, FLUX= 2.07E+14 N/CM**2-SEC

9 SUMMARY TABLE: THERMAL POWER, WATTS

BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1	
CM246	0.000E+00	2.573E-10	4.986E-08	1.050E-06	8.618E-06	4.375E-05	1.617E-04	1.082E-03
CM249	0.000E+00	1.907E-14	1.513E-11	7.820E-10	1.266E-08	1.146E-07	6.887E-07	9.903E-06
BK250	0.000E+00	3.848E-15	5.684E-12	4.173E-10	8.614E-09	9.394E-08	6.541E-07	1.159E-05
SUMTOT	6.533E-02	4.881E+04	4.880E+04	5.050E+04	5.244E+04	5.574E+04	5.885E+04	6.493E+04
TOTAL	6.533E-02	4.881E+04	4.880E+04	5.050E+04	5.244E+04	5.574E+04	5.885E+04	6.493E+04

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

OUTPUT UNIT = 6

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL

ACTINIDES+DAUGHTERS

POWER= 2.16550E+01 MW, BURNUP= 3.39605E+04 MWD, FLUX= 2.07E+14 N/CM**2-SEC

9 SUMMARY TABLE: THERMAL POWER, WATTS

	BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
TL	0.000E+00	1.818E-07	8.330E-07	2.245E-06	4.848E-06	9.153E-06	1.572E-05	3.547E-05
PB	0.000E+00	4.098E-08	1.877E-07	5.059E-07	1.092E-06	2.062E-06	3.542E-06	7.991E-06
BI	0.000E+00	3.662E-07	1.677E-06	4.521E-06	9.760E-06	1.843E-05	3.165E-05	7.139E-05
PO	0.000E+00	1.611E-06	7.380E-06	1.989E-05	4.295E-05	8.108E-05	1.393E-04	3.142E-04
RN	0.000E+00	8.169E-07	3.742E-06	1.009E-05	2.178E-05	4.111E-05	7.062E-05	1.593E-04
RA	0.000E+00	7.385E-07	3.383E-06	9.117E-06	1.968E-05	3.716E-05	6.384E-05	1.440E-04
TH	0.000E+00	2.493E-04	3.143E-04	3.804E-04	4.475E-04	5.237E-04	6.030E-04	7.664E-04
PA	0.000E+00	1.796E-03	2.141E-03	2.608E-03	3.171E-03	3.854E-03	4.591E-03	6.083E-03
NP	0.000E+00	2.300E+04	2.295E+04	2.369E+04	2.450E+04	2.592E+04	2.721E+04	2.969E+04
PU	0.000E+00	5.736E+00	1.738E+01	3.959E+01	7.638E+01	1.296E+02	2.007E+02	3.720E+02
AM	0.000E+00	3.424E-01	4.196E+00	1.580E+01	3.999E+01	8.033E+01	1.413E+02	3.123E+02
CM	0.000E+00	1.161E+00	2.319E+01	1.066E+02	2.852E+02	5.621E+02	9.337E+02	1.750E+03
BK	0.000E+00	4.147E-15	6.126E-12	4.488E-10	9.246E-09	1.005E-07	6.977E-07	1.231E-05
SUMTOT	6.533E-02	4.881E+04	4.880E+04	5.050E+04	5.244E+04	5.574E+04	5.885E+04	6.493E+04
TOTAL	6.533E-02	4.881E+04	4.880E+04	5.050E+04	5.244E+04	5.574E+04	5.885E+04	6.493E+04

CUMULATIVE TABLE TOTALS

AP+FP	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ACT+FP	6.533E-02	4.881E+04	4.880E+04	5.050E+04	5.244E+04	5.574E+04	5.885E+04	6.493E+04
AP+ACT+FP	6.533E-02	4.881E+04	4.880E+04	5.050E+04	5.244E+04	5.574E+04	5.885E+04	6.493E+04

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21
OUTPUT UNIT = 6

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL

FISSION PRODUCTS

POWER= 2.16550E+01 MW, BURNUP= 3.39605E+04 MWD, FLUX= 2.07E+14 N/CM**2-SEC

5 SUMMARY TABLE: CONCENTRATIONS, GRAMS

	BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
H 3	0.000E+00	6.901E-03	1.396E-02	2.105E-02	2.815E-02	3.522E-02	4.228E-02	5.514E-02
LI 6	0.000E+00	5.296E-05	9.745E-05	1.342E-04	1.642E-04	1.875E-04	2.052E-04	2.238E-04
LI 7	0.000E+00	1.343E-06	2.681E-06	4.014E-06	5.342E-06	6.667E-06	7.988E-06	1.041E-05
BE 9	0.000E+00	2.590E-06	5.168E-06	7.736E-06	1.029E-05	1.284E-05	1.539E-05	2.004E-05
BE 10	0.000E+00	1.727E-05	3.446E-05	5.159E-05	6.866E-05	8.567E-05	1.027E-04	1.337E-04
C 14	0.000E+00	3.492E-06	6.969E-06	1.043E-05	1.388E-05	1.732E-05	2.075E-05	2.704E-05
ZN 68	0.000E+00	1.611E-04	3.198E-04	4.812E-04	6.460E-04	8.174E-04	9.945E-04	1.340E-03
ZN 70	0.000E+00	5.318E-04	1.079E-03	1.647E-03	2.236E-03	2.853E-03	3.495E-03	4.754E-03
ZN 72	0.000E+00	3.234E-05	3.362E-05	3.496E-05	3.630E-05	3.781E-05	3.931E-05	4.152E-05
GA 72	0.000E+00	9.822E-06	1.022E-05	1.063E-05	1.104E-05	1.150E-05	1.196E-05	1.263E-05
GE 72	0.000E+00	2.194E-03	4.562E-03	7.049E-03	9.645E-03	1.236E-02	1.518E-02	2.069E-02
GA 73	0.000E+00	8.120E-06	8.124E-06	8.212E-06	8.313E-06	8.479E-06	8.636E-06	8.830E-06
GE 73	0.000E+00	5.442E-03	1.091E-02	1.642E-02	2.196E-02	2.756E-02	3.319E-02	4.370E-02
GA 74	0.000E+00	4.863E-07	4.806E-07	4.791E-07	4.782E-07	4.807E-07	4.827E-07	4.813E-07
GE 74	0.000E+00	1.195E-02	2.396E-02	3.607E-02	4.826E-02	6.060E-02	7.307E-02	9.653E-02
GE 75	0.000E+00	1.117E-05	1.093E-05	1.082E-05	1.072E-05	1.070E-05	1.067E-05	1.050E-05
AS 75	0.000E+00	2.683E-02	5.321E-02	7.927E-02	1.050E-01	1.304E-01	1.556E-01	2.012E-01

Calc. No. 2004-07600
Project No. 11163-013
Attachment B1

GE 76	0.000E+00	7.110E-02	1.397E-01	2.065E-01	2.718E-01	3.358E-01	3.986E-01	5.116E-01
AS 76	0.000E+00	1.553E-06	3.038E-06	4.630E-06	6.298E-06	8.221E-06	1.023E-05	1.427E-05
SE 76	0.000E+00	9.811E-05	3.831E-04	8.600E-04	1.533E-03	2.425E-03	3.541E-03	6.255E-03
GE 77	0.000E+00	1.812E-04	1.758E-04	1.718E-04	1.679E-04	1.649E-04	1.618E-04	1.544E-04
GE 77M	0.000E+00	5.689E-07	5.425E-07	5.242E-07	5.074E-07	4.950E-07	4.821E-07	4.545E-07
AS 77	0.000E+00	1.782E-03	1.710E-03	1.660E-03	1.612E-03	1.577E-03	1.541E-03	1.459E-03
SE 77	0.000E+00	1.518E-01	2.995E-01	4.419E-01	5.791E-01	7.116E-01	8.392E-01	1.062E+00
GE 78	0.000E+00	1.366E-04	1.338E-04	1.316E-04	1.296E-04	1.280E-04	1.265E-04	1.219E-04
AS 78	0.000E+00	1.446E-04	1.421E-04	1.401E-04	1.382E-04	1.367E-04	1.353E-04	1.307E-04
SE 78	0.000E+00	3.169E-01	6.348E-01	9.521E-01	1.268E+00	1.583E+00	1.896E+00	2.470E+00
GE 79	0.000E+00	2.460E-06	2.384E-06	2.332E-06	2.285E-06	2.251E-06	2.217E-06	2.129E-06
AS 79	0.000E+00	3.689E-05	3.572E-05	3.487E-05	3.410E-05	3.350E-05	3.291E-05	3.143E-05
SE 79	0.000E+00	8.228E-01	1.629E+00	2.422E+00	3.199E+00	3.965E+00	4.717E+00	6.071E+00
SE 79M	0.000E+00	1.596E-05	1.546E-05	1.509E-05	1.476E-05	1.451E-05	1.426E-05	1.362E-05
BR 79	0.000E+00	2.737E-06	1.060E-05	2.322E-05	4.034E-05	6.170E-05	8.711E-05	1.437E-04
GE 80	0.000E+00	3.211E-06	3.022E-06	2.839E-06	2.769E-06	2.676E-06	2.580E-06	2.384E-06
AS 80	0.000E+00	2.577E-06	2.482E-06	2.410E-06	2.343E-06	2.288E-06	2.233E-06	2.107E-06
SE 80	0.000E+00	1.896E+00	3.750E+00	5.567E+00	7.343E+00	9.084E+00	1.079E+01	1.384E+01
KR 80	0.000E+00	1.387E-05	3.493E-05	6.004E-05	8.849E-05	1.190E-04	1.520E-04	2.178E-04
GE 81	0.000E+00	1.785E-06	1.646E-06	1.553E-06	1.469E-06	1.407E-06	1.342E-06	1.219E-06
AS 81	0.000E+00	8.253E-06	7.867E-06	7.590E-06	7.336E-06	7.136E-06	6.934E-06	6.497E-06
SE 81M	0.000E+00	3.005E-04	2.880E-04	2.789E-04	2.704E-04	2.637E-04	2.570E-04	2.419E-04
BR 81	0.000E+00	2.776E-05	2.635E-05	2.524E-05	2.417E-05	2.327E-05	2.235E-05	2.047E-05
GE 82	0.000E+00	4.443E-07	1.598E-06	3.320E-06	5.625E-06	8.508E-06	1.206E-05	2.055E-05
AS 82	0.000E+00	5.591E-06	5.145E-06	4.849E-06	4.585E-06	4.389E-06	4.184E-06	3.793E-06
AS 82M	0.000E+00	1.297E-06	1.223E-06	1.171E-06	1.123E-06	1.085E-06	1.046E-06	9.657E-07
SE 82	0.000E+00	5.106E+00	9.963E+00	1.464E+01	1.915E+01	2.352E+01	2.776E+01	3.522E+01
BR 82	0.000E+00	4.328E-04	8.006E-04	1.170E-03	1.547E-03	1.958E-03	2.381E-03	3.193E-03
BR 82M	0.000E+00	4.610E-07	8.547E-07	1.261E-06	1.675E-06	2.140E-06	2.613E-06	3.530E-06
KR 82	0.000E+00	2.149E-02	7.886E-02	1.697E-01	2.932E-01	4.507E-01	6.418E-01	1.086E+00
AS 83	0.000E+00	6.898E-06	6.277E-06	5.865E-06	5.498E-06	5.223E-06	4.934E-06	4.399E-06
SE 83	0.000E+00	3.441E-04	3.263E-04	3.138E-04	3.027E-04	2.940E-04	2.852E-04	2.664E-04

OUTPUT UNIT = 6

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
FISSION PRODUCTS
POWER= 2.16550E+01 MW, BURNUP= 3.39605E+04 MWD, FLUX= 2.07E+14 N/CM**2-SEC

5 SUMMARY TABLE: CONCENTRATIONS, GRAMS

BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
SE 83M	0.000E+00	2.902E-05	2.704E-05	2.570E-05	2.449E-05	2.356E-05	2.261E-05
BR 83	0.000E+00	5.818E-03	5.473E-03	5.234E-03	5.019E-03	4.853E-03	4.683E-03
KR 83	0.000E+00	8.090E+00	1.538E+01	2.199E+01	2.796E+01	3.333E+01	3.810E+01
KR 83M	0.000E+00	4.454E-03	4.190E-03	4.007E-03	3.844E-03	3.718E-03	3.589E-03
AS 84	0.000E+00	2.331E-06	2.123E-06	1.990E-06	1.874E-06	1.790E-06	1.702E-06
SE 84	0.000E+00	2.437E-04	2.257E-04	2.134E-04	2.023E-04	1.938E-04	1.850E-04
BR 84	0.000E+00	2.400E-03	2.229E-03	2.112E-03	2.006E-03	1.925E-03	1.841E-03

Calc. No. 2004-07600
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Attachment B1

BR 84M	0.000E+00	1.007E-05	1.066E-05	1.094E-05	1.117E-05	1.129E-05	1.145E-05	1.147E-05
KR 84	0.000E+00	1.608E+01	3.152E+01	4.662E+01	6.141E+01	7.607E+01	9.055E+01	1.170E+02
AS 85	0.000E+00	5.266E-07	4.739E-07	4.396E-07	4.091E-07	3.869E-07	3.633E-07	3.208E-07
SE 85	0.000E+00	3.020E-05	2.761E-05	2.585E-05	2.427E-05	2.305E-05	2.179E-05	1.942E-05
SE 85M	0.000E+00	1.067E-05	9.811E-06	9.217E-06	8.679E-06	8.260E-06	7.826E-06	7.000E-06
BR 85	0.000E+00	2.685E-04	2.489E-04	2.352E-04	2.228E-04	2.131E-04	2.031E-04	1.837E-04
KR 85	0.000E+00	4.094E+00	7.787E+00	1.117E+01	1.426E+01	1.711E+01	1.972E+01	2.398E+01
KR 85M	0.000E+00	2.546E-02	2.361E-02	2.232E-02	2.115E-02	2.023E-02	1.929E-02	1.746E-02
BR 85	0.000E+00	1.546E+01	3.003E+01	4.396E+01	5.731E+01	7.022E+01	8.263E+01	1.044E+02
SE 86	0.000E+00	2.684E-05	2.428E-05	2.257E-05	2.103E-05	1.986E-05	1.863E-05	1.638E-05
BR 86	0.000E+00	6.494E-05	5.965E-05	5.601E-05	5.272E-05	5.018E-05	4.754E-05	4.254E-05
BR 86M	0.000E+00	5.354E-06	4.915E-06	4.614E-06	4.341E-06	4.131E-06	3.912E-06	3.497E-06
KR 86	0.000E+00	3.113E+01	5.996E+01	8.730E+01	1.130E+02	1.376E+02	1.610E+02	2.014E+02
BR 86	0.000E+00	2.232E-03	4.114E-03	6.051E-03	8.023E-03	1.024E-02	1.251E-02	1.692E-02
SR 86	0.000E+00	7.820E-03	3.055E-02	6.775E-02	1.196E-01	1.876E-01	2.722E-01	4.770E-01
SE 87	0.000E+00	6.963E-06	6.363E-06	5.959E-06	5.595E-06	5.320E-06	5.032E-06	4.495E-06
BR 87	0.000E+00	1.518E-04	1.395E-04	1.309E-04	1.233E-04	1.173E-04	1.111E-04	9.946E-05
KR 87	0.000E+00	1.476E-02	1.357E-02	1.275E-02	1.200E-02	1.142E-02	1.082E-02	9.686E-03
BR 87	0.000E+00	4.019E+01	7.735E+01	1.124E+02	1.455E+02	1.771E+02	2.070E+02	2.585E+02
SR 87	0.000E+00	8.589E-05	2.392E-04	4.631E-04	7.779E-04	1.209E-03	1.791E-03	3.412E-03
SE 88	0.000E+00	7.199E-07	6.515E-07	6.079E-07	5.693E-07	5.421E-07	5.129E-07	4.601E-07
BR 88	0.000E+00	5.101E-05	4.629E-05	4.307E-05	4.016E-05	3.792E-05	3.557E-05	3.126E-05
KR 88	0.000E+00	4.710E-02	4.329E-02	4.065E-02	3.825E-02	3.638E-02	3.444E-02	3.077E-02
BR 88	0.000E+00	4.972E-03	4.575E-03	4.300E-03	4.050E-03	3.855E-03	3.653E-03	3.270E-03
SR 88	0.000E+00	5.785E+01	1.113E+02	1.617E+02	2.093E+02	2.546E+02	2.977E+02	3.715E+02
BR 89	0.000E+00	1.069E-05	9.573E-06	8.819E-06	8.138E-06	7.620E-06	7.074E-06	6.096E-06
KR 89	0.000E+00	1.117E-03	1.020E-03	9.531E-04	8.923E-04	8.451E-04	7.958E-04	7.041E-04
BR 89	0.000E+00	5.587E-03	5.129E-03	4.810E-03	4.520E-03	4.294E-03	4.059E-03	3.616E-03
SR 89	0.000E+00	2.562E+01	5.521E+01	2.376E+02	2.236E+01	2.125E+01	2.010E+01	1.796E+01
Y 89	0.000E+00	5.071E+01	1.214E+02	1.890E+02	2.526E+02	3.129E+02	3.701E+02	4.680E+02
BR 90	0.000E+00	2.558E-06	2.273E-06	2.082E-06	1.908E-06	1.777E-06	1.637E-06	1.391E-06
KR 90	0.000E+00	1.905E-04	1.736E-04	1.621E-04	1.516E-04	1.435E-04	1.351E-04	1.194E-04
BR 90	0.000E+00	9.337E-04	8.540E-04	7.990E-04	7.489E-04	7.100E-04	6.695E-04	5.937E-04
RB 90M	0.000E+00	3.348E-04	3.132E-04	2.976E-04	2.832E-04	2.717E-04	2.600E-04	2.366E-04
SR 90	0.000E+00	9.138E+01	1.745E+02	2.516E+02	3.231E+02	3.902E+02	4.526E+02	5.567E+02
Y 90	0.000E+00	2.329E-02	4.456E-02	6.433E-02	8.271E-02	1.000E-01	1.161E-01	1.432E-01
ZR 90	0.000E+00	7.241E-01	2.592E+00	5.517E+00	9.424E+00	1.425E+01	1.994E+01	3.251E+01
KR 91	0.000E+00	3.864E-05	3.511E-05	3.274E-05	3.061E-05	2.900E-05	2.731E-05	2.419E-05
RB 91	0.000E+00	4.305E-04	3.964E-04	3.730E-04	3.518E-04	3.353E-04	3.183E-04	2.857E-04
SR 91	0.000E+00	2.648E-01	2.451E-01	2.315E-01	2.191E-01	2.095E-01	1.995E-01	1.803E-01
Y 91	0.000E+00	3.617E+01	3.698E+01	3.626E+01	3.343E+01	3.197E+01	3.048E+01	2.765E+01
Y 91M	0.000E+00	1.340E-02	1.240E-02	1.172E-02	1.109E-02	1.060E-02	1.010E-02	9.128E-03
ZR 91	0.000E+00	5.949E+01	1.478E+02	2.340E+02	3.158E+02	3.937E+02	4.680E+02	5.965E+02
KR 92	0.000E+00	3.779E-06	3.454E-06	3.247E-06	3.068E-06	2.939E-06	2.805E-06	2.550E-06

OUTPUT UNIT = 6

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ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
FISSION PRODUCTS
POWER= 2.16550E+01 MW, BURNUP= 3.39605E+04 MWD, FLUX= 2.07E+14 N/CM**2-SEC

Calc. No. 2004-07600
 Project No. 11163-013
 Attachment B1

5 SUMMARY TABLE: CONCENTRATIONS, GRAMS

	BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
RB 92	0.000E+00	2.857E-05	2.638E-05	2.490E-05	2.358E-05	2.256E-05	2.151E-05	1.948E-05
SR 92	0.000E+00	7.918E-02	7.394E-02	7.030E-02	6.703E-02	6.447E-02	6.185E-02	5.660E-02
Y 92	0.000E+00	1.036E-01	9.684E-02	9.210E-02	8.784E-02	8.450E-02	8.108E-02	7.424E-02
ZR 92	0.000E+00	1.001E+02	1.943E+02	2.843E+02	3.704E+02	4.534E+02	5.332E+02	6.726E+02
KR 93	0.000E+00	9.308E-07	8.507E-07	8.028E-07	7.629E-07	7.364E-07	7.083E-07	6.546E-07
RB 93	0.000E+00	2.803E-05	2.586E-05	2.443E-05	2.318E-05	2.225E-05	2.129E-05	1.942E-05
SR 93	0.000E+00	3.990E-03	3.762E-03	3.604E-03	3.463E-03	3.353E-03	3.242E-03	3.008E-03
Y 93	0.000E+00	3.281E-01	3.099E-01	2.973E-01	2.860E-01	2.771E-01	2.682E-01	2.493E-01
ZR 93	0.000E+00	1.100E+02	2.146E+02	3.151E+02	4.116E+02	5.049E+02	5.949E+02	7.524E+02
NB 93	0.000E+00	1.257E-06	5.005E-06	1.166E-05	2.176E-05	3.573E-05	5.409E-05	1.008E-04
NB 93M	0.000E+00	1.338E-05	5.182E-05	1.133E-04	1.962E-04	2.990E-04	4.203E-04	6.886E-04
RB 94	0.000E+00	6.697E-06	6.192E-06	5.871E-06	5.599E-06	5.400E-06	5.197E-06	4.790E-06
SR 94	0.000E+00	6.280E-04	5.944E-04	5.711E-04	5.506E-04	5.345E-04	5.184E-04	4.835E-04
Y 94	0.000E+00	1.017E-02	9.686E-03	9.346E-03	9.046E-03	8.806E-03	8.569E-03	8.037E-03
ZR 94	0.000E+00	1.083E+02	2.126E+02	3.142E+02	4.132E+02	5.103E+02	6.052E+02	7.753E+02
NB 94	0.000E+00	3.499E-05	9.919E-05	1.795E-04	2.729E-04	3.736E-04	4.828E-04	6.978E-04
RB 95	0.000E+00	4.724E-07	4.315E-07	4.061E-07	3.844E-07	3.692E-07	3.532E-07	3.229E-07
SR 95	0.000E+00	2.028E-04	1.913E-04	1.836E-04	1.770E-04	1.720E-04	1.669E-04	1.560E-04
Y 95	0.000E+00	5.872E-03	5.627E-03	5.488E-03	5.312E-03	5.197E-03	5.085E-03	4.816E-03
ZR 95	0.000E+00	4.631E+01	5.002E+01	4.930E+01	4.817E+01	4.721E+01	4.626E+01	4.404E+01
NB 95	0.000E+00	2.217E+01	2.727E+01	2.728E+01	2.671E+01	2.618E+01	2.566E+01	2.476E+01
NB 95M	0.000E+00	1.838E-02	1.999E-02	1.972E-02	1.928E-02	1.891E-02	1.854E-02	1.756E-02
MO 95	0.000E+00	4.502E+01	1.451E+02	2.508E+02	3.535E+02	4.523E+02	5.474E+02	7.330E+02
SR 96	0.000E+00	2.195E-05	2.062E-05	1.976E-05	1.905E-05	1.853E-05	1.800E-05	1.686E-05
Y 96	0.000E+00	1.224E-03	1.174E-03	1.140E-03	1.111E-03	1.089E-03	1.067E-03	1.014E-03
ZR 96	0.000E+00	1.133E+02	2.236E+02	3.318E+02	4.378E+02	5.421E+02	6.447E+02	8.291E+02
NB 96	0.000E+00	5.709E-04	7.190E-04	7.760E-04	8.269E-04	8.819E-04	9.378E-04	1.021E-03
MO 96	0.000E+00	2.311E-01	1.518E+00	4.220E+00	8.417E+00	1.427E+01	2.181E+01	4.138E+01
SR 97	0.000E+00	5.825E-07	5.445E-07	5.216E-07	5.031E-07	4.905E-07	4.778E-07	4.501E-07
Y 97	0.000E+00	8.450E-06	8.105E-06	7.881E-06	7.701E-06	7.565E-06	7.437E-06	7.102E-06
ZR 97	0.000E+00	5.476E-01	5.345E-01	5.255E-01	5.186E-01	5.131E-01	5.085E-01	4.921E-01
NB 97	0.000E+00	3.915E-02	3.825E-02	3.763E-02	3.715E-02	3.677E-02	3.646E-02	3.531E-02
NB 97M	0.000E+00	5.118E-04	4.996E-04	4.913E-04	4.849E-04	4.798E-04	4.756E-04	4.603E-04
MO 97	0.000E+00	1.078E+02	2.147E+02	3.204E+02	4.247E+02	5.280E+02	6.302E+02	8.152E+02
SR 98	0.000E+00	9.697E-07	9.030E-07	8.657E-07	8.367E-07	8.195E-07	8.016E-07	7.629E-07
Y 98	0.000E+00	1.661E-06	1.583E-06	1.535E-06	1.497E-06	1.470E-06	1.445E-06	1.380E-06
ZR 98	0.000E+00	2.798E-04	2.740E-04	2.702E-04	2.674E-04	2.652E-04	2.634E-04	2.559E-04
NB 98	0.000E+00	2.553E-05	2.506E-05	2.473E-05	2.450E-05	2.432E-05	2.418E-05	2.351E-05
NB 98M	0.000E+00	1.719E-04	1.982E-04	2.135E-04	2.268E-04	2.357E-04	2.461E-04	2.572E-04
MO 98	0.000E+00	1.095E+02	2.182E+02	3.261E+02	4.333E+02	5.396E+02	6.452E+02	8.371E+02
TC 98	0.000E+00	7.923E-05	3.177E-04	7.230E-04	1.301E-03	2.073E-03	3.045E-03	5.427E-03
Y 99	0.000E+00	2.556E-06	2.418E-06	2.341E-06	2.285E-06	2.249E-06	2.216E-06	2.127E-06
ZR 99	0.000E+00	2.160E-05	2.112E-05	2.082E-05	2.063E-05	2.048E-05	2.037E-05	1.983E-05
NB 99	0.000E+00	1.324E-04	1.299E-04	1.283E-04	1.274E-04	1.266E-04	1.261E-04	1.230E-04
NB 99M	0.000E+00	4.239E-05	4.619E-05	4.836E-05	5.029E-05	5.152E-05	5.302E-05	5.428E-05
MO 99	0.000E+00	2.275E+00	2.249E+00	2.236E+00	2.233E+00	2.234E+00	2.241E+00	2.217E+00
TC 99	0.000E+00	1.102E+02	2.200E+02	3.266E+02	4.301E+02	5.301E+02	6.268E+02	7.942E+02
TC 99M	0.000E+00	1.816E-01	1.796E-01	1.786E-01	1.783E-01	1.784E-01	1.790E-01	1.770E-01
RU 99	0.000E+00	9.791E-05	3.917E-04	8.729E-04	1.533E-03	2.362E-03	3.350E-03	5.550E-03

Calc. No. 2004-07600
Project No. 11163-013
Attachment B1

Y100 0.000E+00 1.097E-06 1.033E-06 9.993E-07 9.748E-07 9.610E-07 9.476E-07 9.128E-07
ZR100 0.000E+00 6.015E-05 5.863E-05 5.769E-05 5.705E-05 5.657E-05 5.621E-05 5.460E-05

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OUTPUT UNIT = 6

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
FISSION PRODUCTS
POWER= 2.16550E+01 MW, BURNUP= 3.39605E+04 MWD, FLUX= 2.07E+14 N/CM**2-SEC

5 SUMMARY TABLE: CONCENTRATIONS, GRAMS

	BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
NB100	0.000E+00	1.216E-05	1.203E-05	1.194E-05	1.190E-05	1.186E-05	1.185E-05	1.161E-05
NB100M	0.000E+00	1.221E-05	1.208E-05	1.199E-05	1.195E-05	1.191E-05	1.190E-05	1.165E-05
MO100	0.000E+00	1.211E+02	2.428E+02	3.646E+02	4.865E+02	6.082E+02	7.300E+02	9.534E+02
TC100	0.000E+00	4.089E-06	8.133E-06	1.244E-05	1.689E-05	2.195E-05	2.712E-05	3.719E-05
RU100	0.000E+00	1.551E+00	6.216E+00	1.413E+01	2.541E+01	4.046E+01	5.938E+01	1.056E+02
Y101	0.000E+00	4.646E-07	4.344E-07	4.192E-07	4.088E-07	4.038E-07	3.989E-07	3.863E-07
ZR101	0.000E+00	1.851E-05	1.782E-05	1.744E-05	1.719E-05	1.704E-05	1.692E-05	1.643E-05
NB101	0.000E+00	5.776E-05	5.723E-05	5.698E-05	5.699E-05	5.701E-05	5.720E-05	5.645E-05
MO101	0.000E+00	7.494E-03	7.490E-03	7.499E-03	7.536E-03	7.566E-03	7.620E-03	7.568E-03
TC101	0.000E+00	7.280E-03	7.276E-03	7.285E-03	7.321E-03	7.351E-03	7.403E-03	7.353E-03
RU101	0.000E+00	1.005E+02	2.014E+02	3.023E+02	4.029E+02	5.030E+02	6.026E+02	7.834E+02
ZR102	0.000E+00	8.708E-05	8.401E-05	8.271E-05	8.218E-05	8.214E-05	8.229E-05	8.120E-05
NB102	0.000E+00	1.988E-05	1.990E-05	2.000E-05	2.021E-05	2.039E-05	2.065E-05	2.068E-05
MO102	0.000E+00	5.009E-03	5.108E-03	5.187E-03	5.283E-03	5.359E-03	5.457E-03	5.509E-03
TC102	0.000E+00	3.974E-05	4.053E-05	4.116E-05	4.193E-05	4.253E-05	4.331E-05	4.373E-05
TC102M	0.000E+00	1.174E-06	1.563E-06	1.797E-06	2.002E-06	2.144E-06	2.304E-06	2.508E-06
RU102	0.000E+00	8.827E+01	1.810E+02	2.771E+02	3.764E+02	4.788E+02	5.844E+02	7.866E+02
RH102	0.000E+00	9.767E-06	4.843E-05	1.163E-04	2.103E-04	3.299E-04	4.710E-04	7.829E-04
ZR103	0.000E+00	1.786E-06	1.747E-06	1.748E-06	1.768E-06	1.798E-06	1.834E-06	1.863E-06
NB103	0.000E+00	6.479E-05	6.645E-05	6.799E-05	6.992E-05	7.156E-05	7.353E-05	7.533E-05
MO103	0.000E+00	3.708E-04	3.964E-04	4.142E-04	4.326E-04	4.465E-04	4.630E-04	4.802E-04
TC103	0.000E+00	3.120E-04	3.343E-04	3.497E-04	3.655E-04	3.775E-04	3.916E-04	4.064E-04
RU103	0.000E+00	1.994E+01	2.229E+01	2.355E+01	2.474E+01	2.564E+01	2.667E+01	2.779E+01
RH103	0.000E+00	4.781E+01	1.135E+02	1.771E+02	2.369E+02	2.913E+02	3.406E+02	4.157E+02
RH103M	0.000E+00	1.781E-02	1.992E-02	2.104E-02	2.210E-02	2.291E-02	2.383E-02	2.483E-02
ZR104	0.000E+00	7.202E-07	7.208E-07	7.452E-07	7.847E-07	8.269E-07	8.740E-07	9.378E-07
NB104	0.000E+00	1.705E-06	1.782E-06	1.867E-06	1.975E-06	2.071E-06	2.181E-06	2.319E-06
MO104	0.000E+00	3.963E-04	4.434E-04	4.783E-04	5.147E-04	5.433E-04	5.762E-04	6.170E-04
TC104	0.000E+00	4.732E-03	5.341E-03	5.784E-03	6.238E-03	6.592E-03	6.998E-03	7.504E-03
RU104	0.000E+00	4.700E+01	1.027E+02	1.644E+02	2.317E+02	3.033E+02	3.796E+02	5.301E+02
RH104	0.000E+00	2.034E-05	4.815E-05	7.336E-05	1.067E-04	1.384E-04	1.691E-04	2.233E-04
RH104M	0.000E+00	8.171E-06	1.1935E-05	3.108E-05	4.288E-05	5.559E-05	6.793E-05	8.971E-05
PD104	0.000E+00	2.316E+00	1.195E+01	2.983E+01	5.607E+01	9.130E+01	1.353E+02	2.401E+02
NB105	0.000E+00	9.096E-07	9.726E-07	1.043E-06	1.131E-06	1.209E-06	1.299E-06	1.418E-06
MO105	0.000E+00	1.353E-04	1.589E-04	1.767E-04	1.951E-04	2.097E-04	2.263E-04	2.481E-04
TC105	0.000E+00	1.415E-03	1.705E-03	1.914E-03	2.125E-03	2.288E-03	2.474E-03	2.718E-03
RU105	0.000E+00	4.748E-02	5.739E-02	6.451E-02	7.117E-02	7.732E-02	8.368E-02	9.216E-02
RH105	0.000E+00	3.655E-01	4.415E-01	4.956E-01	5.501E-01	5.918E-01	6.393E-01	7.015E-01
RH105M	0.000E+00	3.744E-05	4.525E-05	5.087E-05	5.654E-05	6.096E-05	6.599E-05	7.267E-05

PD105	0.000E+00	2.882E+01	6.655E+01	1.099E+02	1.584E+02	2.106E+02	2.669E+02	3.781E+02
TC106	0.000E+00	1.226E-05	1.410E-05	1.615E-05	1.783E-05	1.974E-05	2.236E-05	2.480E-04
RH106	0.000E+00	5.986E-05	7.803E-05	9.178E-05	1.061E-04	1.175E-04	1.304E-04	1.480E-04
RH106	0.000E+00	1.408E+01	3.080E+01	4.722E+01	6.327E+01	7.802E+01	9.224E+01	1.156E+02
RH106	0.000E+00	1.548E-05	3.166E-05	4.752E-05	6.305E-05	7.740E-05	9.128E-05	1.141E-04
RH106M	0.000E+00	2.672E-04	3.221E-04	3.726E-04	4.265E-04	4.836E-04	5.460E-04	6.481E-04
PD106	0.000E+00	3.749E+00	1.417E+01	3.166E+01	5.615E+01	8.747E+01	1.254E+02	2.120E+02
MO107	0.000E+00	2.415E-06	2.878E-06	3.360E-06	3.956E-06	4.469E-06	5.055E-06	5.875E-06
TC107	0.000E+00	2.239E-05	2.985E-05	3.616E-05	4.321E-05	4.898E-05	5.554E-05	6.469E-05
RH107	0.000E+00	2.855E-04	4.055E-04	4.950E-04	5.874E-04	6.599E-04	7.419E-04	8.553E-04
RH107	0.000E+00	1.482E-03	2.107E-03	2.571E-03	3.051E-03	3.427E-03	3.853E-03	4.441E-03
PD107	0.000E+00	9.828E+00	2.638E+01	4.764E+01	7.345E+01	1.028E+02	1.359E+02	2.047E+02

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
 FISSION PRODUCTS
 POWER= 2.16550E+01 MW, BURNUP= 3.39605E+04 MWD, FLUX= 2.07E+14 N/CM**2-SEC

5 SUMMARY TABLE: CONCENTRATIONS, GRAMS

	BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
AG107	0.000E+00	2.499E-07	1.276E-06	3.386E-06	6.823E-06	1.178E-05	1.844E-05	3.561E-05
TC108	0.000E+00	2.313E-06	3.165E-06	3.847E-06	4.582E-06	5.175E-06	5.846E-06	6.784E-06
RH108	0.000E+00	1.945E-04	2.865E-04	3.558E-04	4.280E-04	4.847E-04	5.489E-04	6.380E-04
RH108	0.000E+00	1.221E-05	1.800E-05	2.236E-05	2.689E-05	3.045E-05	3.448E-05	4.007E-05
RH108M	0.000E+00	2.175E-06	3.594E-06	4.542E-06	5.447E-06	6.117E-06	6.873E-06	7.908E-06
PD108	0.000E+00	6.050E+00	1.694E+01	3.124E+01	4.885E+01	6.901E+01	9.191E+01	1.396E+02
CD108	0.000E+00	1.775E-06	9.407E-06	2.577E-05	5.320E-05	9.460E-05	1.520E-04	3.086E-04
TC109	0.000E+00	1.164E-05	1.577E-05	1.881E-05	2.188E-05	2.433E-05	2.706E-05	3.088E-05
RH109	0.000E+00	1.588E-05	2.343E-05	2.902E-05	3.475E-05	3.924E-05	4.431E-05	5.136E-05
RH109M	0.000E+00	1.168E-05	1.731E-05	2.149E-05	2.578E-05	2.914E-05	3.293E-05	3.822E-05
PD109	0.000E+00	2.321E-02	3.514E-02	4.466E-02	5.481E-02	6.370E-02	7.388E-02	9.056E-02
PD109M	0.000E+00	6.580E-05	9.759E-05	1.212E-04	1.455E-04	1.647E-04	1.863E-04	2.166E-04
AG109	0.000E+00	3.682E+00	1.014E+01	1.823E+01	2.773E+01	3.799E+01	4.907E+01	7.021E+01
AG109M	0.000E+00	1.896E-05	2.870E-05	3.648E-05	4.477E-05	5.203E-05	6.034E-05	7.397E-05
RH110	0.000E+00	3.631E-06	4.970E-06	6.012E-06	7.108E-06	7.993E-06	8.987E-06	1.038E-05
RH110	0.000E+00	6.950E-06	9.606E-06	1.166E-05	1.383E-05	1.557E-05	1.753E-05	2.027E-05
PD110	0.000E+00	2.263E+00	5.926E+00	1.063E+01	1.636E+01	2.293E+01	3.041E+01	4.617E+01
AG110	0.000E+00	8.977E-07	2.464E-06	4.584E-06	7.160E-06	1.034E-05	1.396E-05	2.162E-05
AG110M	0.000E+00	7.884E-03	3.636E-02	8.772E-02	1.611E-01	2.581E-01	3.759E-01	6.479E-01
CD110	0.000E+00	1.849E-01	9.887E-01	2.722E+00	5.634E+00	1.003E+01	1.612E+01	3.269E+01
RH111	0.000E+00	1.012E-05	1.284E-05	1.504E-05	1.740E-05	1.936E-05	2.154E-05	2.462E-05
PD111	0.000E+00	2.144E-04	2.731E-04	3.208E-04	3.718E-04	4.144E-04	4.620E-04	5.301E-04
PD111M	0.000E+00	3.470E-05	5.107E-05	6.367E-05	7.689E-05	8.787E-05	1.004E-04	1.196E-04
AG111	0.000E+00	1.048E-01	1.337E-01	1.572E-01	1.823E-01	2.034E-01	2.270E-01	2.610E-01
AG111M	0.000E+00	1.051E-05	1.340E-05	1.575E-05	1.826E-05	2.036E-05	2.271E-05	2.609E-05
CD111	0.000E+00	1.523E+00	3.733E+00	6.420E+00	9.588E+00	1.317E+01	1.721E+01	2.573E+01
RH112	0.000E+00	4.922E-07	5.639E-07	6.289E-07	6.997E-07	7.634E-07	8.328E-07	9.328E-07

PD112	0.000E+00	7.910E-03	9.164E-03	1.027E-02	1.147E-02	1.253E-02	1.370E-02	1.536E-02
AG112	0.000E+00	1.236E-03	1.431E-03	1.604E-03	1.791E-03	1.957E-03	2.138E-03	2.399E-03
CD112	0.000E+00	1.180E+00	2.622E+00	4.288E+00	6.187E+00	8.309E+00	1.067E+01	1.561E+01
PD113	0.000E+00	8.801E-06	9.818E-06	1.076E-05	1.178E-05	1.272E-05	1.374E-05	1.521E-05
AG113	0.000E+00	1.681E-03	1.876E-03	2.056E-03	2.251E-03	2.431E-03	2.625E-03	2.906E-03
AG113M	0.000E+00	6.509E-07	7.280E-07	7.986E-07	8.751E-07	9.453E-07	1.021E-06	1.130E-06
CD113	0.000E+00	1.363E-01	1.529E-01	1.630E-01	1.735E-01	1.82E-01	1.846E-01	1.899E-01
CD113M	0.000E+00	1.910E-02	4.144E-02	6.697E-02	9.600E-02	1.289E-01	1.660E-01	2.468E-01
IN113	0.000E+00	2.373E-04	9.966E-04	2.338E-03	4.320E-03	7.002E-03	1.045E-02	1.902E-02
PD114	0.000E+00	1.131E-05	1.211E-05	1.291E-05	1.378E-05	1.464E-05	1.555E-05	1.687E-05
CD114	0.000E+00	1.851E+00	4.068E+00	6.506E+00	9.165E+00	1.204E+01	1.513E+01	2.135E+01
IN114M	0.000E+00	6.730E-07	3.779E-06	1.202E-05	2.060E-05	3.642E-05	5.815E-05	1.180E-04
SN114	0.000E+00	2.189E-06	1.981E-05	7.362E-05	1.888E-04	3.991E-04	7.425E-04	1.898E-03
PD115	0.000E+00	3.113E-06	3.243E-06	3.404E-06	3.579E-06	3.773E-06	3.970E-06	4.268E-06
AG115	0.000E+00	7.329E-05	7.659E-05	8.048E-05	8.468E-05	8.930E-05	9.398E-05	1.010E-04
CD115	0.000E+00	1.487E-02	1.563E-02	1.652E-02	1.748E-02	1.855E-02	1.964E-02	2.140E-02
CD115M	0.000E+00	2.705E-02	2.994E-02	3.185E-02	3.380E-02	3.589E-02	3.802E-02	4.141E-02
IN115	0.000E+00	7.104E-01	1.208E+00	1.539E+00	1.763E+00	1.906E+00	2.003E+00	2.093E+00
IN115M	0.000E+00	1.198E-03	1.260E-03	1.331E-03	1.409E-03	1.494E-03	1.583E-03	1.724E-03
SN115	0.000E+00	3.232E-02	6.708E-02	1.037E-01	1.423E-01	1.830E-01	2.257E-01	3.097E-01
PD116	0.000E+00	9.387E-07	9.642E-07	9.999E-07	1.039E-06	1.085E-06	1.131E-06	1.200E-06
AG116	0.000E+00	5.889E-06	6.112E-06	6.368E-06	6.639E-06	6.941E-06	7.246E-06	7.693E-06

OUTPUT UNIT = 6

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ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL

FISSION PRODUCTS

POWER= 2.16550E+01 MW, BURNUP= 3.39605E+04 MWD, FLUX= 2.07E+14 N/CM**2-SEC

5 SUMMARY TABLE: CONCENTRATIONS, GRAMS

BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
CD116	0.000E+00	8.510E-01	1.749E+00	2.693E+00	3.681E+00	4.717E+00	5.800E+00
IN116M	0.000E+00	4.223E-05	7.159E-05	9.394E-05	1.110E-04	1.265E-04	1.389E-04
SN116	0.000E+00	1.959E-01	7.091E-01	1.457E+00	2.379E+00	3.455E+00	4.650E+00
AG117	0.000E+00	2.718E-06	2.806E-06	2.913E-06	3.024E-06	3.153E-06	3.281E-06
CD117	0.000E+00	4.550E-04	4.715E-04	4.905E-04	5.101E-04	5.326E-04	5.551E-04
CD117M	0.000E+00	3.218E-04	3.342E-04	3.480E-04	3.622E-04	3.781E-04	3.941E-04
IN117	0.000E+00	1.183E-04	1.227E-04	1.277E-04	1.329E-04	1.387E-04	1.446E-04
IN117M	0.000E+00	3.965E-04	4.111E-04	4.277E-04	4.449E-04	4.646E-04	4.841E-04
SN117	0.000E+00	8.655E-01	1.778E+00	2.736E+00	3.735E+00	4.782E+00	5.874E+00
SN117M	0.000E+00	1.649E-05	5.951E-05	1.260E-04	2.121E-04	3.247E-04	4.568E-04
CD118	0.000E+00	2.297E-04	2.371E-04	2.458E-04	2.549E-04	2.654E-04	2.759E-04
SN118	0.000E+00	8.850E-01	1.814E+00	2.781E+00	3.800E+00	4.860E+00	5.965E+00
CD119	0.000E+00	2.115E-05	2.193E-05	2.281E-05	2.372E-05	2.474E-05	2.576E-05
CD119M	0.000E+00	7.200E-06	7.467E-06	7.765E-06	8.074E-06	8.421E-06	8.768E-06
IN119	0.000E+00	3.244E-06	3.363E-06	3.496E-06	3.635E-06	3.790E-06	3.946E-06
IN119M	0.000E+00	6.081E-05	6.306E-05	6.557E-05	6.818E-05	7.110E-05	7.403E-05
SN119	0.000E+00	8.605E-01	1.773E+00	2.732E+00	3.735E+00	4.786E+00	5.884E+00
SN119M	0.000E+00	9.795E-03	1.623E-02	2.078E-02	2.429E-02	2.734E-02	3.017E-02
CD120	0.000E+00	3.859E-06	3.980E-06	4.125E-06	4.277E-06	4.452E-06	4.627E-06

Calc. No. 2004-07600
Project No. 11163-013
Attachment B1

INI20	0.000E+00	1.712E-06	1.770E-06	1.837E-06	1.906E-06	1.985E-06	2.064E-06	2.148E-06	2.231E-06
INI21	0.000E+00	8.947E-01	1.836E+00	2.822E+00	3.850E+00	4.925E+00	6.044E+00	7.231E+00	8.464E+00
CDI21	0.000E+00	9.780E-07	1.005E-06	1.040E-06	1.077E-06	1.120E-06	1.163E-06	1.226E-06	1.283E-06
INI21	0.000E+00	1.806E-06	1.864E-06	1.932E-06	2.003E-06	2.084E-06	2.165E-06	2.283E-06	2.429E-06
INI21M	0.000E+00	3.187E-06	3.310E-06	3.434E-06	3.559E-06	3.696E-06	3.834E-06	4.029E-06	4.282E-06
INI21	0.000E+00	7.782E-03	8.045E-03	8.341E-03	8.647E-03	8.996E-03	9.345E-03	9.852E-03	1.035E-02
INI21M	0.000E+00	2.518E-04	5.924E-04	9.811E-04	1.412E-03	1.865E-03	2.346E-03	2.828E-03	3.282E-03
SB121	0.000E+00	9.208E-01	1.881E+00	2.867E+00	3.875E+00	4.907E+00	5.958E+00	7.938E+00	9.961E+00
INI22	0.000E+00	8.052E-07	8.252E-07	8.518E-07	8.796E-07	9.136E-07	9.469E-07	9.961E-07	1.045E-06
INI22	0.000E+00	9.935E-01	2.037E+00	3.128E+00	4.263E+00	5.446E+00	6.675E+00	7.969E+00	9.306E+00
SB122	0.000E+00	3.222E-04	6.560E-04	1.030E-03	1.435E-03	1.917E-03	2.432E-03	3.507E-03	5.072E-03
TEI22	0.000E+00	7.816E-03	3.198E-02	7.401E-02	1.353E-01	2.189E-01	3.264E-01	5.979E-01	9.979E-01
CDI23	0.000E+00	6.198E-07	6.274E-07	6.440E-07	6.622E-07	6.870E-07	7.107E-07	7.470E-07	7.870E-07
INI23M	0.000E+00	1.296E-06	1.358E-06	1.414E-06	1.470E-06	1.529E-06	1.588E-06	1.671E-06	1.770E-06
INI23	0.000E+00	1.421E-01	1.979E-01	2.230E-01	2.370E-01	2.473E-01	2.564E-01	2.704E-01	2.870E-01
INI23M	0.000E+00	1.877E-04	1.937E-04	2.005E-04	2.075E-04	2.155E-04	2.235E-04	2.351E-04	2.500E-04
SB123	0.000E+00	9.890E-01	2.112E+00	3.305E+00	4.544E+00	5.822E+00	7.134E+00	9.637E+00	1.234E+01
TEI23	0.000E+00	2.082E-05	1.588E-04	5.135E-04	1.165E-03	2.201E-03	3.685E-03	7.864E-03	1.505E-02
INI23M	0.000E+00	5.085E-06	3.325E-05	9.716E-05	2.057E-04	3.752E-04	6.152E-04	1.305E-03	2.344E-03
CDI24	0.000E+00	1.195E-06	1.200E-06	1.226E-06	1.256E-06	1.300E-06	1.342E-06	1.407E-06	1.484E-06
INI24	0.000E+00	1.372E+00	2.813E+00	4.312E+00	5.865E+00	7.473E+00	9.135E+00	1.123E+01	1.388E+01
SB124	0.000E+00	2.761E-03	7.399E-03	1.289E-02	1.899E-02	2.616E-02	3.400E-02	5.070E-02	7.600E-02
TEI24	0.000E+00	2.515E-03	1.416E-02	3.775E-02	7.501E-02	1.282E-01	1.995E-01	3.882E-01	6.822E-01
INI25M	0.000E+00	5.431E-07	5.856E-07	6.196E-07	6.524E-07	6.832E-07	7.154E-07	7.600E-07	8.000E-07
INI25	0.000E+00	5.215E-02	5.658E-02	5.982E-02	6.278E-02	6.548E-02	6.830E-02	7.196E-02	7.569E-02
INI25M	0.000E+00	5.739E-05	6.202E-05	6.564E-05	6.911E-05	7.232E-05	7.569E-05	8.034E-05	8.468E-05
SB125	0.000E+00	1.661E+00	3.354E+00	4.970E+00	6.502E+00	7.941E+00	9.304E+00	1.162E+01	1.469E+01
TEI25	0.000E+00	9.952E-02	4.252E-01	9.772E-01	1.744E+00	2.714E+00	3.873E+00	6.468E+00	1.162E+01
INI25M	0.000E+00	1.353E-02	3.524E-02	5.695E-02	7.765E-02	9.715E-02	1.156E-01	1.469E-01	1.866E-01
SB126	0.000E+00	2.719E+00	5.749E+00	8.984E+00	1.240E+01	1.596E+01	1.967E+01	2.686E+01	3.525E+01
SB126M	0.000E+00	3.752E-03	4.497E-03	5.104E-03	5.681E-03	6.248E-03	6.833E-03	7.792E-03	8.833E-03
SB126M	0.000E+00	1.896E-06	2.360E-06	2.645E-06	2.893E-06	3.075E-06	3.276E-06	3.541E-06	3.822E-06

OUTPUT UNIT = 6

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ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
FISSION PRODUCTS
POWER= 2.16550E+01 MW, BURNUP= 3.39605E+04 MWD, FLUX= 2.07E+14 N/CM**2-SEC

5 SUMMARY TABLE: CONCENTRATIONS, GRAMS

BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
TEI26	0.000E+00	4.726E-02	1.137E-01	1.924E-01	2.830E-01	3.849E-01	4.994E-01
INI27	0.000E+00	2.442E-03	2.643E-03	2.792E-03	2.939E-03	3.063E-03	3.200E-03
INI27M	0.000E+00	3.702E-05	4.128E-05	4.397E-05	4.639E-05	4.820E-05	5.023E-05
SB127	0.000E+00	1.654E-01	1.819E-01	1.932E-01	2.038E-01	2.124E-01	2.219E-01
TEI27	0.000E+00	1.591E-02	1.800E-02	1.930E-02	2.044E-02	2.134E-02	2.231E-02
TEI27M	0.000E+00	4.276E-01	6.131E-01	7.038E-01	7.637E-01	8.066E-01	8.472E-01
I127	0.000E+00	4.848E+00	1.084E+01	1.735E+01	2.423E+01	3.134E+01	3.867E+01
INI28	0.000E+00	6.338E-07	6.364E-07	6.467E-07	6.619E-07	6.788E-07	6.976E-07
INI28	0.000E+00	3.301E-03	3.412E-03	3.489E-03	3.566E-03	3.631E-03	3.705E-03
INI28	0.000E+00	3.301E-03	3.412E-03	3.489E-03	3.566E-03	3.631E-03	3.705E-03

Calc. No. 2004-07600
Project No. 11163-013
Attachment B1

SB128	0.000E+00	1.825E-03	2.202E-03	2.428E-03	2.625E-03	2.764E-03	2.920E-03	3.110E-03
SB128M	0.000E+00	6.129E-04	6.402E-04	6.585E-04	6.762E-04	6.904E-04	7.068E-04	7.213E-04
TE128	0.000E+00	1.182E+01	2.469E+01	3.820E+01	5.226E+01	6.670E+01	8.158E+01	1.099E+02
I128	0.000E+00	9.728E-06	2.162E-05	3.560E-05	5.125E-05	6.983E-05	9.002E-05	1.322E-04
XE128	0.000E+00	3.497E-02	1.529E-01	3.708E-01	7.015E-01	1.166E+00	1.777E+00	3.359E+00
SN129	0.000E+00	2.634E-04	2.766E-04	2.862E-04	2.962E-04	3.044E-04	3.138E-04	3.235E-04
SN129M	0.000E+00	1.200E-04	1.204E-04	1.208E-04	1.216E-04	1.223E-04	1.233E-04	1.228E-04
SB129	0.000E+00	2.697E-02	2.849E-02	2.948E-02	3.045E-02	3.118E-02	3.203E-02	3.282E-02
TE129	0.000E+00	7.099E-03	7.522E-03	7.990E-03	8.047E-03	8.241E-03	8.468E-03	8.679E-03
TE129M	0.000E+00	7.105E-01	7.746E-01	8.078E-01	8.372E-01	8.582E-01	8.823E-01	9.056E-01
I129	0.000E+00	1.949E+01	4.127E+01	6.391E+01	8.720E+01	1.108E+02	1.347E+02	1.793E+02
XE129	0.000E+00	3.741E-04	2.215E-04	2.416E-04	1.836E-03	3.826E-03	7.073E-03	1.807E-02
XE129M	0.000E+00	2.506E-07	1.055E-06	7.616E-06	5.091E-06	8.910E-06	1.418E-05	2.898E-05
SN130	0.000E+00	4.899E-04	4.942E-04	4.984E-04	5.042E-04	5.093E-04	5.160E-04	5.178E-04
SB130	0.000E+00	1.292E-03	1.398E-03	1.463E-03	1.522E-03	1.564E-03	1.613E-03	1.659E-03
SB130M	0.000E+00	1.087E-03	1.104E-03	1.117E-03	1.132E-03	1.143E-03	1.159E-03	1.163E-03
TE130	0.000E+00	4.085E+01	8.397E+01	1.285E+02	1.741E+02	2.206E+02	2.679E+02	3.570E+02
I130	0.000E+00	9.444E-04	1.941E-03	3.048E-03	4.251E-03	5.653E-03	7.153E-03	1.024E-02
I130M	0.000E+00	4.365E-06	9.036E-06	1.427E-05	1.996E-05	2.660E-05	3.372E-05	4.836E-05
XE130	0.000E+00	1.341E-01	5.476E-01	1.272E+00	2.333E+00	3.785E+00	5.657E+00	1.041E+01
SN131	0.000E+00	1.366E-04	1.331E-04	1.316E-04	1.309E-04	1.308E-04	1.310E-04	1.291E-04
SB131	0.000E+00	7.714E-03	7.661E-03	7.635E-03	7.639E-03	7.644E-03	7.669E-03	7.570E-03
TE131	0.000E+00	8.596E-03	8.629E-03	8.656E-03	8.709E-03	8.748E-03	8.813E-03	8.755E-03
TE131M	0.000E+00	9.161E-02	9.516E-02	9.726E-02	9.929E-02	1.007E-01	1.024E-01	1.032E-01
I131	0.000E+00	4.446E+00	4.480E+00	4.504E+00	4.539E+00	4.564E+00	4.603E+00	4.580E+00
XE131	0.000E+00	6.767E+01	1.352E+02	1.973E+02	2.539E+02	3.042E+02	3.487E+02	4.143E+02
XE131M	0.000E+00	7.304E-02	7.360E-02	7.400E-02	7.459E-02	7.502E-02	7.570E-02	7.539E-02
SN132	0.000E+00	5.244E-05	4.955E-05	4.805E-05	4.699E-05	4.644E-05	4.591E-05	4.443E-05
SB132	0.000E+00	6.053E-04	5.865E-04	5.764E-04	5.700E-04	5.663E-04	5.636E-04	5.498E-04
SB132M	0.000E+00	5.733E-04	5.638E-04	5.585E-04	5.559E-04	5.541E-04	5.537E-04	5.428E-04
TE132	0.000E+00	2.645E+00	2.645E+00	2.646E+00	2.655E+00	2.661E+00	2.674E+00	2.644E+00
I132	0.000E+00	7.850E-02	7.865E-02	7.876E-02	7.912E-02	7.936E-02	7.983E-02	7.904E-02
XE132	0.000E+00	1.125E+02	2.364E+02	3.681E+02	5.074E+02	6.543E+02	8.087E+02	1.112E+03
CS132	0.000E+00	1.085E-04	2.177E-04	3.326E-04	4.500E-04	5.817E-04	7.145E-04	9.669E-04
BA132	0.000E+00	2.224E-05	9.217E-05	2.115E-04	3.813E-04	6.072E-04	8.902E-04	1.577E-03
SN133	0.000E+00	5.964E-07	5.567E-07	5.370E-07	5.230E-07	5.171E-07	5.107E-07	4.954E-07
SB133	0.000E+00	6.735E-04	6.360E-04	6.143E-04	5.980E-04	5.873E-04	5.770E-04	5.511E-04
TE133	0.000E+00	6.288E-03	6.169E-03	6.106E-03	6.076E-03	6.059E-03	6.056E-03	5.943E-03
TE133M	0.000E+00	1.957E-02	1.883E-02	1.830E-02	1.786E-02	1.749E-02	1.714E-02	1.627E-02
I133	0.000E+00	1.078E+00	1.062E+00	1.052E+00	1.046E+00	1.040E+00	1.038E+00	1.014E+00
I133M	0.000E+00	2.905E-06	3.168E-06	3.321E-06	3.458E-06	3.548E-06	3.656E-06	3.752E-06
XE133	0.000E+00	6.520E+00	6.429E+00	6.369E+00	6.335E+00	6.306E+00	6.293E+00	6.155E+00

OUTPUT UNIT = 6

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ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
FISSION PRODUCTS
POWER= 2.16550E+01 MW, BURNUP= 3.39605E+04 MWD, FLUX= 2.07E+14 N/CM**2-SEC

5 SUMMARY TABLE: CONCENTRATIONS, GRAMS

Calc. No. 2004-07600
 Project No. 11163-013
 Attachment B1

	BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
XE133M	0.000E+00	8.135E-02	8.120E-02	8.106E-02	8.115E-02	8.116E-02	8.140E-02	8.024E-03
CS133	0.000E+00	1.615E+02	3.247E+02	4.813E+02	6.314E+02	7.741E+02	9.097E+02	1.138E+03
SB134	0.000E+00	7.255E-06	7.008E-06	6.937E-06	6.942E-06	6.999E-06	7.070E-06	7.088E-06
SB134M	0.000E+00	6.573E-06	6.351E-06	6.284E-06	6.285E-06	6.330E-06	6.389E-06	6.392E-06
TE134	0.000E+00	3.434E-02	3.259E-02	3.151E-02	3.067E-02	3.006E-02	2.948E-02	2.803E-02
I134	0.000E+00	5.117E-02	5.010E-02	4.944E-02	4.902E-02	4.869E-02	4.848E-02	4.723E-02
I134M	0.000E+00	2.509E-04	2.724E-04	2.858E-04	2.985E-04	3.073E-04	3.179E-04	3.281E-04
XE134	0.000E+00	1.963E+02	3.911E+02	5.847E+02	7.773E+02	9.692E+02	1.161E+03	1.511E+03
CS134	0.000E+00	2.711E+00	1.023E+01	2.178E+01	3.666E+01	5.477E+01	7.547E+01	1.200E+02
CS134M	0.000E+00	4.378E-04	8.767E-04	1.338E-03	1.810E-03	2.339E-03	2.873E-03	3.887E-03
BA134	0.000E+00	1.695E-01	1.299E+00	4.193E+00	9.520E+00	1.787E+01	2.977E+01	6.263E+01
SB135	0.000E+00	7.709E-07	7.164E-07	6.875E-07	6.659E-07	6.545E-07	6.425E-07	6.160E-07
TE135	0.000E+00	1.330E-04	1.268E-04	1.233E-04	1.209E-04	1.193E-04	1.180E-04	1.138E-04
I135	0.000E+00	3.239E-01	3.190E-01	3.160E-01	3.145E-01	3.133E-01	3.128E-01	3.063E-01
XE135	0.000E+00	2.169E-01	2.162E-01	2.141E-01	2.086E-01	2.025E-01	1.980E-01	1.863E-01
XE135M	0.000E+00	2.372E-03	2.411E-03	2.433E-03	2.459E-03	2.476E-03	2.501E-03	2.493E-03
CS135	0.000E+00	7.812E+01	1.570E+02	2.348E+02	3.115E+02	3.862E+02	4.594E+02	5.894E+02
CS135M	0.000E+00	1.605E-05	4.367E-05	8.706E-05	1.453E-04	2.238E-04	3.184E-04	5.408E-04
BA135	0.000E+00	1.513E-04	1.922E-03	9.298E-03	2.875E-02	7.000E-02	1.452E-01	4.295E-01
BA135M	0.000E+00	3.814E-07	2.008E-06	6.258E-06	1.438E-05	2.823E-05	4.897E-05	1.111E-04
TE136	0.000E+00	8.311E-05	7.789E-05	7.486E-05	7.256E-05	7.103E-05	6.953E-05	6.603E-05
I136	0.000E+00	5.538E-04	5.377E-04	5.293E-04	5.247E-04	5.220E-04	5.206E-04	5.091E-04
I136M	0.000E+00	1.876E-04	1.822E-04	1.787E-04	1.762E-04	1.741E-04	1.724E-04	1.663E-04
XE136	0.000E+00	2.603E+02	5.218E+02	7.852E+02	1.051E+03	1.319E+03	1.589E+03	2.094E+03
CS136	0.000E+00	1.057E-01	1.815E-01	2.532E-01	3.275E-01	4.068E-01	4.896E-01	6.467E-01
BA136	0.000E+00	6.095E-01	2.105E+00	4.391E+00	7.469E+00	1.138E+01	1.616E+01	2.749E+01
TE137	0.000E+00	3.572E-06	3.377E-06	3.284E-06	3.224E-06	3.203E-06	3.182E-06	3.109E-06
I137	0.000E+00	1.723E-04	1.649E-04	1.607E-04	1.576E-04	1.556E-04	1.538E-04	1.482E-04
XE137	0.000E+00	2.999E-02	2.944E-02	2.910E-02	2.889E-02	2.873E-02	2.864E-02	2.796E-02
CS137	0.000E+00	1.596E+02	3.178E+02	4.740E+02	6.284E+02	7.810E+02	9.317E+02	1.204E+03
BA137	0.000E+00	1.025E+00	4.071E+00	9.106E+00	1.610E+01	2.504E+01	3.587E+01	6.075E+01
BA137M	0.000E+00	2.456E-05	4.878E-05	7.270E-05	9.634E-05	1.197E-04	1.428E-04	1.844E-04
I138	0.000E+00	2.328E-05	2.202E-05	2.130E-05	2.077E-05	2.042E-05	2.010E-05	1.925E-05
XE138	0.000E+00	1.132E-02	1.092E-02	1.066E-02	1.047E-02	1.032E-02	1.019E-02	9.788E-03
CS138	0.000E+00	2.796E-02	2.713E-02	2.658E-02	2.618E-02	2.586E-02	2.559E-02	2.469E-02
CS138M	0.000E+00	9.900E-05	1.019E-04	1.033E-04	1.047E-04	1.053E-04	1.064E-04	1.060E-04
BA138	0.000E+00	1.763E+02	3.491E+02	5.195E+02	6.877E+02	8.544E+02	1.019E+03	1.319E+03
LA138	0.000E+00	1.329E-03	2.467E-03	3.452E-03	4.293E-03	5.006E-03	5.593E-03	6.366E-03
I139	0.000E+00	4.013E-06	3.773E-06	3.633E-06	3.523E-06	3.454E-06	3.383E-06	3.223E-06
XE139	0.000E+00	4.270E-04	4.081E-04	3.963E-04	3.872E-04	3.805E-04	3.742E-04	3.575E-04
CS139	0.000E+00	7.806E-03	7.564E-03	7.409E-03	7.294E-03	7.205E-03	7.129E-03	6.876E-03
BA139	0.000E+00	6.985E-02	6.795E-02	6.672E-02	6.583E-02	6.513E-02	6.456E-02	6.246E-02
LA139	0.000E+00	1.691E+02	3.348E+02	4.981E+02	6.591E+02	8.181E+02	9.753E+02	1.259E+03
XE140	0.000E+00	8.047E-04	7.789E-04	7.630E-04	7.500E-04	7.404E-04	7.322E-04	7.055E-04
BA140	0.000E+00	1.508E+01	1.468E+01	1.442E+01	1.423E+01	1.408E+01	1.395E+01	1.348E+01
LA140	0.000E+00	1.984E+00	1.937E+00	1.909E+00	1.890E+00	1.877E+00	1.868E+00	1.820E+00
CE140	0.000E+00	1.482E+02	3.118E+02	4.737E+02	6.344E+02	7.943E+02	9.535E+02	1.245E+03
XE141	0.000E+00	4.509E-06	4.231E-06	4.071E-06	3.950E-06	3.871E-06	3.794E-06	3.612E-06
CS141	0.000E+00	2.425E-04	2.333E-04	2.273E-04	2.226E-04	2.190E-04	2.157E-04	2.066E-04
BA141	0.000E+00	1.429E-02	1.392E-02	1.366E-02	1.346E-02	1.330E-02	1.316E-02	1.269E-02

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL

FISSION PRODUCTS

POWER= 2.16550E+01 MW, BURNUP= 3.39605E+04 MWD, FLUX= 2.07E+14 N/CM**2-SEC

5 SUMMARY TABLE: CONCENTRATIONS, GRAMS

BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
LA141	0.000E+00	1.851E-01	1.804E-01	1.771E-01	1.746E-01	1.725E-01	1.707E-01
CE141	0.000E+00	3.622E+01	3.596E+01	3.571E+01	3.495E+01	3.456E+01	3.422E+01
PR141	0.000E+00	1.203E+02	2.743E+02	4.259E+02	5.750E+02	7.216E+02	8.657E+02
XE142	0.000E+00	1.116E-06	1.037E-06	9.948E-07	9.624E-07	9.444E-07	9.255E-07
CS142	0.000E+00	1.056E-05	1.000E-05	9.661E-06	9.389E-06	9.194E-06	9.007E-06
BA142	0.000E+00	8.187E-03	7.923E-03	7.744E-03	7.601E-03	7.487E-03	7.385E-03
LA142	0.000E+00	7.227E-02	7.004E-02	6.852E-02	6.730E-02	6.633E-02	6.546E-02
CE142	0.000E+00	1.567E+02	3.103E+02	4.613E+02	6.100E+02	7.569E+02	9.019E+02
PR142	0.000E+00	3.317E-03	7.538E-03	1.206E-02	1.679E-02	2.221E-02	2.785E-02
PR142M	0.000E+00	7.982E-06	1.814E-05	2.902E-05	4.041E-05	5.345E-05	6.703E-05
ND142	0.000E+00	2.398E-01	1.184E+00	2.908E+00	5.443E+00	8.896E+00	1.330E+01
CS143	0.000E+00	5.599E-06	5.222E-06	4.987E-06	4.793E-06	4.654E-06	4.514E-06
BA143	0.000E+00	1.578E-04	1.515E-04	1.473E-04	1.439E-04	1.412E-04	1.387E-04
LA143	0.000E+00	1.085E-02	1.043E-02	1.015E-02	9.913E-03	9.727E-03	9.554E-03
CE143	0.000E+00	1.541E+00	1.482E+00	1.442E+00	1.409E+00	1.383E+00	1.359E+00
PR143	0.000E+00	1.516E+01	1.458E+01	1.418E+01	1.386E+01	1.360E+01	1.336E+01
ND143	0.000E+00	1.366E+02	2.770E+02	4.052E+02	5.217E+02	6.268E+02	7.206E+02
CS144	0.000E+00	8.142E-07	7.769E-07	7.527E-07	7.495E-07	7.466E-07	7.443E-07
BA144	0.000E+00	1.021E-04	9.672E-05	9.324E-05	9.037E-05	8.819E-05	8.607E-05
LA144	0.000E+00	4.703E-04	4.494E-04	4.354E-04	4.239E-04	4.149E-04	4.062E-04
CE144	0.000E+00	1.144E+02	1.803E+02	2.178E+02	2.382E+02	2.487E+02	2.531E+02
PR144M	0.000E+00	4.870E-03	7.652E-03	9.236E-03	1.010E-02	1.054E-02	1.073E-02
ND144	0.000E+00	2.418E-05	3.810E-05	4.602E-05	5.032E-05	5.254E-05	5.347E-05
BA145	0.000E+00	3.497E+01	1.219E+02	2.423E+02	3.849E+02	5.439E+02	7.150E+02
LA145	0.000E+00	2.815E-05	2.690E-05	2.613E-05	2.552E-05	2.509E-05	2.468E-05
CE145	0.000E+00	2.400E-04	2.308E-04	2.247E-04	2.198E-04	2.161E-04	2.127E-04
PR145	0.000E+00	1.586E-03	1.530E-03	1.492E-03	1.462E-03	1.439E-03	1.417E-03
ND145	0.000E+00	1.898E-01	1.830E-01	1.785E-01	1.749E-01	1.721E-01	1.695E-01
BA146	0.000E+00	1.051E+02	2.048E+02	2.998E+02	3.904E+02	4.767E+02	5.586E+02
LA146	0.000E+00	3.618E-06	3.451E-06	3.316E-06	3.296E-06	3.260E-06	3.226E-06
CE146	0.000E+00	4.406E-05	4.245E-05	4.146E-05	4.072E-05	4.019E-05	3.972E-05
PR146	0.000E+00	5.842E-03	5.669E-03	5.588E-03	5.475E-03	5.412E-03	5.358E-03
ND146	0.000E+00	9.987E-03	9.694E-03	9.506E-03	9.365E-03	9.257E-03	9.166E-03
PM146	0.000E+00	8.425E+01	1.695E+02	2.564E+02	3.450E+02	4.361E+02	5.295E+02
SM146	0.000E+00	1.814E-04	6.513E-04	1.302E-03	2.055E-03	2.878E-03	3.724E-03
BA147	0.000E+00	2.048E-05	1.510E-04	4.716E-04	1.032E-03	1.876E-03	3.016E-03
LA147	0.000E+00	8.087E-07	7.734E-07	7.578E-07	7.480E-07	7.465E-07	7.447E-07
CE147	0.000E+00	2.549E-05	2.459E-05	2.408E-05	2.373E-05	2.352E-05	2.333E-05
PR147	0.000E+00	3.648E-04	3.556E-04	3.499E-04	3.460E-04	3.430E-04	3.408E-04
ND147	0.000E+00	3.844E-03	3.752E-03	3.694E-03	3.654E-03	3.624E-03	3.601E-03
	0.000E+00	5.083E+00	4.965E+00	4.893E+00	4.845E+00	4.810E+00	4.786E+00

Calc. No. 2004-07600
 Project No. 11163-013
 Attachment B1

PM147	0.000E+00	4.826E+01	8.288E+01	1.045E+02	1.175E+02	1.240E+02	1.266E+02	1.242E+02
SM147	0.000E+00	3.641E+00	1.308E+01	2.568E+01	3.965E+01	5.372E+01	6.708E+01	8.800E+01
LA148	0.000E+00	1.196E-06	1.159E-06	1.142E-06	1.133E-06	1.131E-06	1.130E-06	1.113E-06
CE148	0.000E+00	1.583E-04	1.554E-04	1.539E-04	1.532E-04	1.527E-04	1.526E-04	1.497E-04
PR148	0.000E+00	5.613E-04	5.530E-04	5.484E-04	5.464E-04	5.452E-04	5.453E-04	5.355E-04
ND148	0.000E+00	4.888E+01	9.749E+01	1.459E+02	1.941E+02	2.422E+02	2.902E+02	3.779E+02
PM148	0.000E+00	3.028E-01	5.219E-01	6.765E-01	7.814E-01	8.635E-01	9.153E-01	9.566E-01
PM148M	0.000E+00	4.591E-01	8.029E-01	1.029E+00	1.171E+00	1.260E+00	1.305E+00	1.300E+00
SM148	0.000E+00	4.863E+00	1.863E+01	3.905E+01	6.441E+01	9.393E+01	1.265E+02	1.932E+02
LA149	0.000E+00	6.075E-07	5.938E-07	5.917E-07	5.941E-07	6.008E-07	6.081E-07	6.128E-07

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21 OUTPUT UNIT = 6

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
 FISSION PRODUCTS
 POWER= 2.16550E+01 MW, BURNUP= 3.39605E+04 MWD, FLUX= 2.07E+14 N/CM**2-SEC

5 SUMMARY TABLE: CONCENTRATIONS, GRAMS

BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	ECC #1
CE149	0.000E+00	1.962E-06	1.939E-06	1.933E-06	1.938E-06	1.945E-06	1.959E-06
PR149	0.000E+00	3.705E-04	3.701E-04	3.707E-04	3.731E-04	3.753E-04	3.769E-04
ND149	0.000E+00	1.707E-02	1.713E-02	1.724E-02	1.743E-02	1.762E-02	1.787E-02
SM149	0.000E+00	5.863E-01	6.357E-01	6.755E-01	7.079E-01	7.387E-01	7.643E-01
CE150	0.000E+00	2.785E+00	3.032E+00	3.133E+00	3.191E+00	3.167E+00	3.145E+00
PR150	0.000E+00	8.206E-07	8.268E-07	8.376E-07	8.538E-07	8.695E-07	8.884E-07
ND150	0.000E+00	1.998E-05	2.046E-05	2.087E-05	2.139E-05	2.182E-05	2.234E-05
PM150	0.000E+00	2.040E+01	4.175E+01	6.376E+01	8.642E+01	1.096E+02	1.333E+02
SM150	0.000E+00	1.524E-01	1.654E-01	1.805E-01	1.946E-01	2.128E-01	2.293E-01
PR151	0.000E+00	3.108E+01	6.825E+01	1.073E+02	1.474E+02	1.880E+02	2.284E+02
SM151	0.000E+00	3.402E-06	3.524E-06	3.630E-06	3.755E-06	3.860E-06	3.985E-06
ND151	0.000E+00	8.906E-04	9.383E-04	9.758E-04	1.017E-03	1.051E-03	1.091E-03
PM151	0.000E+00	1.226E-01	1.293E-01	1.345E-01	1.402E-01	1.448E-01	1.503E-01
SM151	0.000E+00	7.891E+00	1.129E+01	1.316E+01	1.463E+01	1.575E+01	1.688E+01
EUI51	0.000E+00	9.973E-03	1.179E-02	2.166E-02	2.372E-02	2.449E-02	2.512E-02
CE152	0.000E+00	7.055E-07	7.096E-07	7.263E-07	7.502E-07	7.774E-07	8.067E-07
PR152	0.000E+00	3.019E-06	3.141E-06	3.257E-06	3.396E-06	3.517E-06	3.657E-06
ND152	0.000E+00	5.449E-04	5.842E-04	6.137E-04	6.455E-04	6.705E-04	6.998E-04
PM152	0.000E+00	1.980E-04	2.125E-04	2.235E-04	2.351E-04	2.443E-04	2.551E-04
SM152M	0.000E+00	5.541E-06	6.498E-06	7.102E-06	7.665E-06	8.065E-06	8.526E-06
SM152	0.000E+00	1.409E+01	3.260E+01	5.128E+01	6.896E+01	8.522E+01	1.000E+02
EUI52	0.000E+00	6.923E-03	2.494E-02	4.368E-02	5.890E-02	7.004E-02	7.769E-02
EUI52M	0.000E+00	1.719E-05	3.087E-05	3.834E-05	4.332E-05	4.713E-05	5.054E-05
GD152	0.000E+00	1.959E-03	8.273E-03	1.714E-02	2.729E-02	3.824E-02	4.959E-02
PR153	0.000E+00	8.626E-07	8.952E-07	9.331E-07	9.802E-07	1.024E-06	1.074E-06
ND153	0.000E+00	3.084E-05	3.308E-05	3.499E-05	3.690E-05	3.853E-05	4.043E-05
PM153	0.000E+00	1.653E-04	1.787E-04	1.931E-04	2.009E-04	2.095E-04	2.200E-04
SM153	0.000E+00	1.298E-01	1.945E-01	2.631E-01	3.329E-01	4.069E-01	4.800E-01
EUI53	0.000E+00	6.547E+00	1.628E+01	2.903E+01	4.433E+01	6.172E+01	8.058E+01
GD153	0.000E+00	2.018E-05	1.639E-04	4.903E-04	9.904E-04	1.665E-03	2.483E-03
ND154	0.000E+00	8.015E-06	9.029E-06	9.831E-06	1.070E-05	1.140E-05	1.220E-05

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PM154	0.000E+00	4.036E-05	4.610E-05	5.047E-05	5.508E-05	5.875E-05	6.295E-05	6.836E-05
PM154M	0.000E+00	3.914E-06	4.778E-06	5.361E-06	5.931E-06	6.354E-06	6.839E-06	7.458E-06
SM154	0.000E+00	2.981E+00	6.613E+00	1.070E+01	1.523E+01	2.010E+01	2.534E+01	3.579E+01
EU154	0.000E+00	4.384E-01	1.861E+00	4.453E+00	8.294E+00	1.348E+01	1.988E+01	3.447E+01
GD154	0.000E+00	6.325E-03	5.264E-02	1.849E-01	4.534E-01	9.104E-01	1.605E+00	3.645E+00
ND155	0.000E+00	1.894E-06	2.162E-06	2.394E-06	2.627E-06	2.829E-06	3.057E-06	3.364E-06
PM155	0.000E+00	5.014E-06	5.946E-06	6.646E-06	7.376E-06	7.954E-06	8.610E-06	9.479E-06
SM155	0.000E+00	2.022E-04	2.440E-04	2.757E-04	3.085E-04	3.355E-04	3.661E-04	4.099E-04
EU155	0.000E+00	1.113E+00	2.109E+00	3.194E+00	4.588E+00	6.371E+00	8.651E+00	1.409E+01
GD155	0.000E+00	3.458E-02	1.061E-01	1.937E-01	2.996E-01	4.276E-01	5.881E-01	9.738E-01
ND156	0.000E+00	1.271E-06	1.528E-06	1.746E-06	1.985E-06	2.187E-06	2.413E-06	2.729E-06
PM156	0.000E+00	8.315E-07	1.049E-06	1.216E-06	1.392E-06	1.532E-06	1.690E-06	1.906E-06
SM156	0.000E+00	2.817E-03	3.622E-03	4.214E-03	4.820E-03	5.296E-03	5.833E-03	6.564E-03
EU156	0.000E+00	2.011E-01	3.193E-01	4.447E-01	6.048E-01	8.180E-01	1.096E+00	1.755E+00
GD156	0.000E+00	1.130E+00	3.527E+00	7.066E+00	1.195E+01	1.861E+01	2.756E+01	5.245E+01
PM157	0.000E+00	1.910E-06	2.466E-06	2.912E-06	3.391E-06	3.781E-06	4.221E-06	4.834E-06
SM157	0.000E+00	2.401E-05	3.185E-05	3.778E-05	4.394E-05	4.883E-05	5.434E-05	6.194E-05
EU157	0.000E+00	2.966E-03	3.985E-03	4.798E-03	5.677E-03	6.485E-03	7.449E-03	9.160E-03
GD157	0.000E+00	1.877E-01	2.870E-01	3.575E-01	4.300E-01	4.914E-01	5.685E-01	7.343E-01
SM158	0.000E+00	6.668E-05	9.049E-05	1.090E-04	1.287E-04	1.443E-04	1.621E-04	1.867E-04

OUTPUT UNIT = 6

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ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL

FISSION PRODUCTS

POWER= 2.16550E+01 MW, BURNUP= 3.39605E+04 MWD, FLUX= 2.07E+14 N/CM**2-SEC

5 SUMMARY TABLE: CONCENTRATIONS, GRAMS

BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
EU158	0.000E+00	7.447E-05	1.013E-04	1.220E-04	1.439E-04	1.613E-04	1.811E-04
GD158	0.000E+00	5.672E-01	1.649E+00	3.094E+00	4.887E+00	7.033E+00	9.570E+00
SM159	0.000E+00	1.735E-06	2.450E-06	3.018E-06	3.628E-06	4.118E-06	4.672E-06
EU159	0.000E+00	1.414E-05	2.006E-05	2.468E-05	2.961E-05	3.354E-05	3.800E-05
GD159	0.000E+00	8.969E-04	1.299E-03	1.635E-03	2.003E-03	2.332E-03	2.712E-03
TB159	0.000E+00	1.138E-01	3.013E-01	5.421E-01	8.354E-01	1.170E+00	1.549E+00
SM160	0.000E+00	1.449E-06	2.011E-06	2.447E-06	2.907E-06	3.275E-06	3.691E-06
GD160	0.000E+00	5.428E-02	1.461E-01	2.652E-01	4.112E-01	5.790E-01	7.704E-01
TB160	0.000E+00	1.395E-03	4.867E-03	1.004E-02	1.681E-02	2.558E-02	3.607E-02
DY160	0.000E+00	8.966E-04	6.161E-03	1.843E-02	3.942E-02	7.070E-02	1.133E-01
GD161	0.000E+00	6.589E-07	9.537E-07	1.178E-06	1.410E-06	1.597E-06	1.807E-06
TB161	0.000E+00	1.789E-03	2.614E-03	3.265E-03	3.957E-03	4.554E-03	5.238E-03
DY161	0.000E+00	2.256E-02	6.002E-02	1.052E-01	1.575E-01	2.142E-01	2.770E-01
GD162	0.000E+00	9.541E-07	1.321E-06	1.585E-06	1.845E-06	2.051E-06	2.280E-06
TB162	0.000E+00	7.050E-07	9.771E-07	1.172E-06	1.365E-06	1.518E-06	1.687E-06
DY162	0.000E+00	1.471E-02	4.017E-02	7.352E-02	1.141E-01	1.605E-01	2.128E-01
TB163	0.000E+00	8.488E-07	1.151E-06	1.369E-06	1.581E-06	1.751E-06	1.938E-06
DY163	0.000E+00	7.506E-03	2.181E-02	4.301E-02	7.184E-02	1.089E-01	1.547E-01
DY164	0.000E+00	3.184E-03	7.875E-03	1.389E-02	2.156E-02	3.113E-02	4.307E-02
DY165	0.000E+00	2.509E-06	4.418E-06	6.770E-06	9.802E-06	1.386E-05	1.909E-05
HO165	0.000E+00	2.311E-03	6.964E-03	1.431E-02	2.496E-02	3.984E-02	6.005E-02

Calc. No. 2004-07600
Project No. 11163-013
Attachment B1

DY166	0.000E+00	3.042E-05	3.962E-05	4.649E-05	5.332E-05	5.907E-05	6.541E-05	7.487E-05
HO166	0.000E+00	1.113E-05	1.640E-05	2.242E-05	3.035E-05	4.099E-05	5.547E-05	9.586E-05
HO166M	0.000E+00	3.980E-06	2.038E-05	5.822E-05	1.292E-04	2.515E-04	4.474E-04	1.123E-03
ER166	0.000E+00	1.009E-03	2.691E-03	5.047E-03	8.257E-03	1.258E-02	1.841E-02	3.508E-02
ER167	0.000E+00	4.485E-04	9.299E-04	1.395E-03	1.846E-03	2.265E-03	2.679E-03	3.453E-03
ER168	0.000E+00	7.211E-05	2.987E-04	6.926E-04	1.258E-03	2.012E-03	2.957E-03	5.280E-03
TMI69	0.000E+00	6.447E-08	5.269E-07	1.819E-06	4.372E-06	8.698E-06	1.526E-05	3.518E-05
TMI70	0.000E+00	1.906E-09	2.658E-08	1.201E-07	3.433E-07	7.852E-07	1.538E-06	4.165E-06
YBI70	0.000E+00	4.215E-10	1.230E-08	8.313E-08	3.117E-07	8.947E-07	2.088E-06	7.328E-06
SUMTOT	0.000E+00	4.496E+03	8.981E+03	1.345E+04	1.792E+04	2.237E+04	2.682E+04	3.502E+04
TOTAL	0.000E+00	4.496E+03	8.981E+03	1.345E+04	1.792E+04	2.237E+04	2.682E+04	3.502E+04

OUTPUT UNIT = 6

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ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL

FISSION PRODUCTS

POWER= 2.16550E+01 MW, BURNUP= 3.39605E+04 MWD, FLUX= 2.07E+14 N/CM**2-SEC

5 SUMMARY TABLE: CONCENTRATIONS, GRAMS

	BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
H	0.000E+00	6.901E-03	1.396E-02	2.105E-02	2.815E-02	3.522E-02	4.228E-02	5.514E-02
LI	0.000E+00	5.431E-05	1.001E-04	1.383E-04	1.696E-04	1.942E-04	2.132E-04	2.342E-04
BE	0.000E+00	1.986E-05	3.963E-05	5.933E-05	7.895E-05	9.851E-05	1.180E-04	1.538E-04
C	0.000E+00	3.492E-06	6.969E-06	1.043E-05	1.388E-05	1.732E-05	2.075E-05	2.704E-05
ZN	0.000E+00	7.254E-04	1.432E-03	2.163E-03	2.919E-03	3.708E-03	4.529E-03	6.136E-03
GA	0.000E+00	1.933E-05	1.989E-05	2.067E-05	2.155E-05	2.267E-05	2.390E-05	2.626E-05
GE	0.000E+00	9.102E-02	1.794E-01	2.664E-01	3.519E-01	4.367E-01	5.204E-01	6.728E-01
AS	0.000E+00	2.882E-02	5.513E-02	8.114E-02	1.068E-01	1.322E-01	1.573E-01	2.029E-01
SE	0.000E+00	8.294E+00	1.628E+01	2.403E+01	3.154E+01	3.887E+01	4.600E+01	5.867E+01
BR	0.000E+00	3.274E+00	6.405E+00	9.421E+00	1.232E+01	1.511E+01	1.780E+01	2.246E+01
KR	0.000E+00	5.951E+01	1.148E+02	1.672E+02	2.170E+02	2.646E+02	3.101E+02	3.888E+02
RB	0.000E+00	5.567E+01	1.074E+02	1.564E+02	2.028E+02	2.473E+02	2.897E+02	3.630E+02
SR	0.000E+00	1.752E+02	3.114E+02	4.375E+02	5.552E+02	6.665E+02	7.709E+02	9.469E+02
Y	0.000E+00	8.736E+01	1.589E+02	2.247E+02	2.865E+02	3.454E+02	4.010E+02	4.961E+02
ZR	0.000E+00	5.387E+02	1.046E+03	1.535E+03	2.007E+03	2.466E+03	2.913E+03	3.703E+03
NB	0.000E+00	2.223E+01	2.733E+01	2.734E+01	2.677E+01	2.624E+01	2.572E+01	2.482E+01
MO	0.000E+00	3.859E+02	8.247E+02	1.268E+03	1.709E+03	2.145E+03	2.577E+03	3.382E+03
TC	0.000E+00	1.104E+02	2.202E+02	3.268E+02	4.303E+02	5.303E+02	6.270E+02	7.944E+02
RU	0.000E+00	2.714E+02	5.445E+02	8.287E+02	1.125E+03	1.429E+03	1.745E+03	2.349E+03
RH	0.000E+00	4.819E+01	1.140E+02	1.776E+02	2.374E+02	2.919E+02	3.413E+02	4.164E+02
PD	0.000E+00	5.305E+01	1.420E+02	2.610E+02	4.093E+02	5.842E+02	7.858E+02	1.221E+03
AG	0.000E+00	3.798E+00	1.031E+01	1.848E+01	2.807E+01	3.846E+01	4.968E+01	7.113E+01
CD	0.000E+00	5.788E+00	1.340E+01	2.291E+01	3.458E+01	4.863E+01	6.534E+01	1.038E+02
IN	0.000E+00	7.125E-01	1.211E+00	1.543E+00	1.769E+00	1.915E+00	2.016E+00	2.114E+00
SN	0.000E+00	9.037E+00	1.886E+01	2.388E+01	4.051E+01	5.223E+01	6.450E+01	8.852E+01
SB	0.000E+00	3.784E+00	7.584E+00	1.140E+01	1.520E+01	1.896E+01	2.271E+01	2.954E+01
TE	0.000E+00	5.680E+01	1.135E+02	1.723E+02	2.331E+02	2.953E+02	3.591E+02	4.798E+02
I	0.000E+00	3.032E+01	5.810E+01	8.726E+01	1.175E+02	1.482E+02	1.795E+02	2.378E+02
XE	0.000E+00	6.438E+02	1.292E+03	1.944E+03	2.599E+03	3.258E+03	3.922E+03	5.152E+03

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CS	0.000E+00	4.021E+02	8.099E+02	1.212E+03	1.608E+03	1.996E+03	2.377E+03	3.052E+03
BA	0.000E+00	1.933E+02	3.714E+02	5.517E+02	7.352E+02	9.229E+02	1.115E+03	1.484E+03
LA	0.000E+00	1.713E+02	3.371E+02	5.003E+02	6.612E+02	8.203E+02	9.775E+02	1.261E+03
CE	0.000E+00	4.571E+02	8.398E+02	1.190E+03	1.519E+03	1.836E+03	2.144E+03	2.696E+03
PR	0.000E+00	1.357E+02	2.891E+02	4.403E+02	5.890E+02	7.354E+02	8.793E+02	1.143E+03
ND	0.000E+00	4.355E+02	9.187E+02	1.421E+03	1.933E+03	2.449E+03	2.965E+03	3.911E+03
PM	0.000E+00	4.973E+01	8.497E+01	1.070E+02	1.203E+02	1.270E+02	1.297E+02	1.274E+02
SM	0.000E+00	6.746E+01	1.537E+02	2.506E+02	3.538E+02	4.603E+02	5.679E+02	7.640E+02
EU	0.000E+00	8.319E+00	2.062E+01	3.719E+01	5.791E+01	8.249E+01	1.103E+02	1.678E+02
GD	0.000E+00	1.983E+00	5.777E+00	1.118E+01	1.847E+01	2.809E+01	4.072E+01	7.449E+01
TB	0.000E+00	1.170E-01	3.088E-01	5.554E-01	8.561E-01	1.200E+00	1.590E+00	2.405E+00
DY	0.000E+00	4.889E-02	1.361E-01	2.541E-01	4.045E-01	5.855E-01	8.010E-01	1.290E+00
HO	0.000E+00	2.326E-03	7.001E-03	1.439E-02	2.512E-02	4.014E-02	6.056E-02	1.177E-01
ER	0.000E+00	1.530E-03	3.920E-03	7.135E-03	1.136E-02	1.685E-02	2.404E-02	4.381E-02
TM	0.000E+00	6.640E-08	5.540E-07	1.943E-06	4.728E-06	9.522E-06	1.689E-05	3.968E-05
YB	0.000E+00	4.239E-10	1.245E-08	8.461E-08	3.248E-07	9.229E-07	2.170E-06	7.727E-06
SUMTOT	0.000E+00	4.496E+03	8.981E+03	1.345E+04	1.792E+04	2.237E+04	2.682E+04	3.502E+04
TOTAL	0.000E+00	4.496E+03	8.981E+03	1.345E+04	1.792E+04	2.237E+04	2.682E+04	3.502E+04

CUMULATIVE TABLE TOTALS

AP+FP	0.000E+00	4.496E+03	8.981E+03	1.345E+04	1.792E+04	2.237E+04	2.682E+04	3.502E+04
ACT+FP	1.000E+06	1.000E+06	1.000E+06	1.000E+06	1.000E+06	1.000E+06	1.000E+06	1.000E+06
AP+ACT+FP	1.000E+06	1.000E+06	1.000E+06	1.000E+06	1.000E+06	1.000E+06	1.000E+06	1.000E+06

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

OUTPUT UNIT = 6

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* IRRADIATION OF ONE METRIC TON OF BWRU FUEL

FISSION PRODUCTS

POWER= 2.16550E+01 MW, BURNUP= 3.39605E+04 MWD, FLUX= 2.07E+14 N/CM**2-SEC

7 SUMMARY TABLE: RADIOACTIVITY, CURIES

	BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
H 3	0.000E+00	6.662E+01	1.347E+02	2.032E+02	2.718E+02	3.400E+02	4.082E+02	5.323E+02
CO 72	0.000E+00	7.669E-01	7.525E-01	7.640E-01	7.786E-01	8.101E-01	8.373E-01	8.867E-01
NI 72	0.000E+00	1.494E+01	1.472E+01	1.492E+01	1.518E+01	1.571E+01	1.618E+01	1.697E+01
CU 72	0.000E+00	2.735E+01	2.778E+01	2.856E+01	2.938E+01	3.049E+01	3.155E+01	3.316E+01
ZN 72	0.000E+00	3.029E+01	3.148E+01	3.274E+01	3.399E+01	3.541E+01	3.681E+01	3.888E+01
GA 72	0.000E+00	3.033E+01	3.155E+01	3.282E+01	3.409E+01	3.551E+01	3.693E+01	3.901E+01
CO 73	0.000E+00	2.299E-01	2.280E-01	2.341E-01	2.409E-01	2.532E-01	2.640E-01	2.837E-01
NI 73	0.000E+00	1.199E+01	1.177E+01	1.197E+01	1.223E+01	1.275E+01	1.321E+01	1.403E+01
CU 73	0.000E+00	4.194E+01	4.067E+01	4.068E+01	4.091E+01	4.188E+01	4.271E+01	4.405E+01
ZN 73	0.000E+00	6.934E+01	6.885E+01	6.931E+01	6.994E+01	7.122E+01	7.240E+01	7.386E+01
GA 73	0.000E+00	7.145E+01	7.149E+01	7.226E+01	7.315E+01	7.461E+01	7.600E+01	7.770E+01
GE 73M	0.000E+00	7.147E+01	7.152E+01	7.207E+01	7.319E+01	7.466E+01	7.605E+01	7.776E+01
CO 74	0.000E+00	5.119E-02	4.975E-02	5.007E-02	5.058E-02	5.224E-02	5.359E-02	5.614E-02
NI 74	0.000E+00	8.987E+00	8.575E+00	8.469E+00	8.407E+00	8.526E+00	8.601E+00	8.747E+00
CU 74	0.000E+00	6.690E+01	6.366E+01	6.228E+01	6.120E+01	6.118E+01	6.094E+01	6.035E+01
ZN 74	0.000E+00	1.466E+02	1.437E+02	1.426E+02	1.418E+02	1.422E+02	1.424E+02	1.415E+02

Calc. No. 2004-07600
Project No. 11163-013
Attachment B1

GA 74	0.000E+00	1.526E+02	1.508E+02	1.504E+02	1.501E+02	1.508E+02	1.515E+02	1.511E+02	1.511E+02
NI 75	0.000E+00	3.667E+00	3.491E+00	3.444E+00	3.415E+00	3.462E+00	3.490E+00	3.546E+00	3.546E+00
CU 75	0.000E+00	6.994E+00	6.576E+01	6.331E+01	6.223E+01	6.185E+01	6.122E+01	6.002E+01	6.002E+01
ZN 75	0.000E+00	2.960E+02	2.847E+02	2.786E+02	2.736E+02	2.715E+02	2.689E+02	2.623E+02	2.623E+02
GA 75	0.000E+00	3.366E+02	3.290E+02	3.250E+02	3.217E+02	3.208E+02	3.197E+02	3.143E+02	3.143E+02
GE 75	0.000E+00	3.383E+02	3.312E+02	3.276E+02	3.246E+02	3.240E+02	3.231E+02	3.181E+02	3.181E+02
GE 75M	0.000E+00	1.430E+01	1.427E+01	1.428E+01	1.430E+01	1.437E+01	1.444E+01	1.438E+01	1.438E+01
NI 76	0.000E+00	1.011E+00	9.529E-01	9.311E-01	9.152E-01	9.195E-01	9.192E-01	9.199E-01	9.199E-01
CU 76	0.000E+00	5.911E+01	5.462E+01	5.218E+01	5.013E+01	4.911E+01	4.899E+01	4.569E+01	4.569E+01
ZN 76	0.000E+00	6.046E+02	5.634E+02	5.158E+02	5.158E+02	5.013E+02	4.856E+02	4.550E+02	4.550E+02
GA 76	0.000E+00	8.467E+02	8.051E+02	7.785E+02	7.548E+02	7.548E+02	7.388E+02	7.219E+02	6.853E+02
AS 76	0.000E+00	2.435E+00	4.761E+00	4.761E+00	4.761E+00	4.872E+00	4.872E+00	4.872E+00	4.872E+00
NI 77	0.000E+00	1.642E-01	1.558E-01	1.533E-01	1.515E-01	1.533E-01	1.541E-01	1.560E-01	1.560E-01
CU 77	0.000E+00	2.684E+01	2.482E+01	2.375E+01	2.285E+01	2.244E+01	2.193E+01	2.104E+01	2.104E+01
ZN 77	0.000E+00	6.962E+02	6.434E+02	6.108E+02	5.820E+02	5.631E+02	5.424E+02	5.037E+02	5.037E+02
GA 77	0.000E+00	1.627E+03	1.534E+03	1.471E+03	1.414E+03	1.373E+03	1.329E+03	1.241E+03	1.241E+03
GE 77	0.000E+00	6.530E+02	6.336E+02	6.189E+02	6.049E+02	5.941E+02	5.832E+02	5.565E+02	5.565E+02
GE 77M	0.000E+00	1.536E+03	1.464E+03	1.415E+03	1.370E+03	1.336E+03	1.302E+03	1.227E+03	1.227E+03
AS 77	0.000E+00	1.870E+03	1.795E+03	1.741E+03	1.692E+03	1.655E+03	1.617E+03	1.531E+03	1.531E+03
SE 77M	0.000E+00	4.644E+00	4.474E+00	4.368E+00	4.284E+00	4.248E+00	4.227E+00	4.209E+00	4.209E+00
NI 78	0.000E+00	1.890E-02	1.796E-02	1.769E-02	1.753E-02	1.775E-02	1.789E-02	1.816E-02	1.816E-02
CU 78	0.000E+00	9.867E+00	9.078E+00	8.657E+00	8.304E+00	8.133E+00	7.926E+00	7.563E+00	7.563E+00
ZN 78	0.000E+00	7.581E+02	6.880E+02	6.442E+02	6.059E+02	5.796E+02	5.513E+02	4.999E+02	4.999E+02
GA 78	0.000E+00	3.148E+03	2.913E+03	2.756E+03	2.615E+03	2.511E+03	2.401E+03	2.190E+03	2.190E+03
GE 78	0.000E+00	3.786E+03	3.709E+03	3.649E+03	3.594E+03	3.548E+03	3.506E+03	3.379E+03	3.379E+03
AS 78	0.000E+00	3.844E+03	3.779E+03	3.725E+03	3.676E+03	3.635E+03	3.597E+03	3.475E+03	3.475E+03
CU 79	0.000E+00	2.147E+00	2.051E+00	2.030E+00	2.020E+00	2.056E+00	2.081E+00	2.129E+00	2.129E+00
ZN 79	0.000E+00	3.886E+02	3.606E+02	3.465E+02	3.350E+02	3.306E+02	3.248E+02	3.143E+02	3.143E+02
GA 79	0.000E+00	3.218E+03	2.992E+03	2.857E+03	2.741E+03	2.668E+03	2.588E+03	2.434E+03	2.434E+03
GE 79	0.000E+00	8.172E+03	7.922E+03	7.748E+03	7.594E+03	7.480E+03	7.368E+03	7.073E+03	7.073E+03
AS 79	0.000E+00	9.760E+03	9.451E+03	9.226E+03	9.021E+03	8.863E+03	8.706E+03	8.314E+03	8.314E+03
SE 79	0.000E+00	5.734E-02	1.136E-01	1.688E-01	2.230E-01	2.763E-01	3.287E-01	4.231E-01	4.231E-01
SE 79M	0.000E+00	9.766E+03	9.461E+03	9.239E+03	9.036E+03	8.800E+03	8.726E+03	8.339E+03	8.339E+03
BR 79M	0.000E+00	3.490E-03	5.467E-03	6.659E-03	7.692E-03	8.411E-03	9.213E-03	1.028E-02	1.028E-02
CU 80	0.000E+00	2.430E-01	2.299E-01	2.256E-01	2.226E-01	2.246E-01	2.254E-01	2.272E-01	2.272E-01

OUTPUT UNIT = 6

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ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

* IRRADIATION OF ONE METRIC TON OF BWR FUEL

FISSION PRODUCTS

POWER= 2.16550E+01 MW, BURNUP= 3.39605E+04 MWD, FLUX= 2.07E+14 N/CM**2-SEC

7 SUMMARY TABLE: RADIOACTIVITY, CURIES

	BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
ZN 80	0.000E+00	1.572E+02	1.439E+02	1.364E+02	1.300E+02	1.264E+02	1.233E+02	1.150E+02
GA 80	0.000E+00	3.789E+03	3.441E+03	3.218E+03	3.022E+03	2.882E+03	2.733E+03	2.462E+03
GE 80	0.000E+00	1.887E+04	1.776E+04	1.698E+04	1.628E+04	1.573E+04	1.516E+04	1.401E+04
AS 80	0.000E+00	2.204E+04	2.122E+04	2.061E+04	2.003E+04	1.956E+04	1.910E+04	1.802E+04
BR 80	0.000E+00	2.328E-01	3.040E-01	3.477E-01	3.868E-01	4.162E-01	4.500E-01	5.004E-01
BR 80M	0.000E+00	1.359E-01	1.881E-01	2.195E-01	2.468E-01	2.660E-01	2.877E-01	3.168E-01

Calc. No. 2004-07600
Project No. 11163-013
Attachment B1

CU 81	0.000E+00	1.666E-02	1.595E-02	1.583E-02	1.578E-02	1.609E-02	1.631E-02	1.674E-02
ZN 81	0.000E+00	3.240E+01	3.001E+01	2.880E+01	2.780E+01	2.743E+01	2.692E+01	2.604E+01
GA 81	0.000E+00	2.156E+03	1.957E+03	1.835E+03	1.727E+03	1.656E+03	1.578E+03	1.439E+03
GE 81	0.000E+00	2.462E+04	2.270E+04	2.142E+04	2.027E+04	1.942E+04	1.852E+04	1.682E+04
AS 81	0.000E+00	3.594E+04	3.426E+04	3.305E+04	3.194E+04	3.107E+04	3.019E+04	2.829E+04
SE 81	0.000E+00	3.773E+04	3.616E+04	3.501E+04	3.394E+04	3.310E+04	3.226E+04	3.036E+04
SE 81M	0.000E+00	1.125E+03	1.068E+03	1.023E+03	9.797E+02	9.430E+02	9.058E+02	8.298E+02
KR 81M	0.000E+00	4.415E-03	7.320E-03	9.422E-03	1.146E-02	1.329E-02	1.536E-02	1.905E-02
ZN 82	0.000E+00	3.857E+00	3.613E+00	3.511E+00	3.432E+00	3.429E+00	3.410E+00	3.380E+00
GA 82	0.000E+00	7.552E+02	6.876E+02	6.481E+02	6.142E+02	5.936E+02	5.705E+02	5.295E+02
GE 82	0.000E+00	2.285E+04	2.071E+04	1.933E+04	1.812E+04	1.724E+04	1.631E+04	1.461E+04
AS 82	0.000E+00	3.665E+04	3.372E+04	3.178E+04	3.005E+04	2.877E+04	2.742E+04	2.486E+04
AS 82M	0.000E+00	1.373E+04	1.295E+04	1.240E+04	1.189E+04	1.148E+04	1.107E+04	1.022E+04
BR 82	0.000E+00	4.687E+02	4.670E+02	4.670E+02	4.670E+02	4.670E+02	4.670E+02	4.670E+02
BR 82M	0.000E+00	1.725E+02	3.198E+02	4.718E+02	6.268E+02	8.007E+02	9.779E+02	1.321E+03
ZN 83	0.000E+00	3.409E-01	3.218E-01	3.149E-01	3.099E-01	3.120E-01	3.123E-01	3.136E-01
GA 83	0.000E+00	1.997E+02	1.826E+02	1.729E+02	1.647E+02	1.601E+02	1.548E+02	1.455E+02
GE 83	0.000E+00	1.684E+04	1.516E+04	1.410E+04	1.316E+04	1.250E+04	1.179E+04	1.051E+04
AS 83	0.000E+00	6.948E+04	6.323E+04	5.908E+04	5.538E+04	5.261E+04	4.970E+04	4.431E+04
SE 83	0.000E+00	3.466E+04	3.287E+04	3.161E+04	3.049E+04	2.961E+04	2.873E+04	2.683E+04
SE 83M	0.000E+00	5.637E+04	5.254E+04	4.932E+04	4.757E+04	4.577E+04	4.392E+04	4.024E+04
BR 83	0.000E+00	9.195E+04	8.649E+04	8.271E+04	7.932E+04	7.670E+04	7.402E+04	6.851E+04
KR 83M	0.000E+00	1.933E+04	1.848E+04	1.793E+04	1.734E+04	1.674E+04	1.609E+04	1.538E+04
GA 84	0.000E+00	1.892E+01	1.795E+01	1.767E+01	1.751E+01	1.774E+01	1.788E+01	1.814E+01
GE 84	0.000E+00	4.128E+03	3.813E+03	3.650E+03	3.521E+03	3.462E+03	3.392E+03	3.258E+03
AS 84	0.000E+00	5.400E+04	4.918E+04	4.610E+04	4.341E+04	4.148E+04	3.944E+04	3.565E+04
SE 84	0.000E+00	1.654E+05	1.531E+05	1.448E+05	1.373E+05	1.315E+05	1.255E+05	1.140E+05
BR 84	0.000E+00	1.690E+05	1.570E+05	1.487E+05	1.413E+05	1.356E+05	1.297E+05	1.181E+05
BR 84M	0.000E+00	3.759E+03	3.978E+03	4.085E+03	4.171E+03	4.214E+03	4.274E+03	4.281E+03
GE 85	0.000E+00	1.221E+03	1.107E+03	1.038E+03	9.791E+02	9.414E+02	8.995E+02	8.256E+02
AS 85	0.000E+00	3.445E+04	3.100E+04	2.875E+04	2.676E+04	2.531E+04	2.376E+04	2.098E+04
SE 85	0.000E+00	1.028E+05	9.400E+04	8.801E+04	8.262E+04	7.849E+04	7.419E+04	6.613E+04
SE 85M	0.000E+00	7.456E+04	6.856E+04	6.441E+04	6.066E+04	5.773E+04	5.469E+04	4.892E+04
BR 85	0.000E+00	2.073E+05	1.921E+05	1.816E+05	1.720E+05	1.645E+05	1.568E+05	1.418E+05
KR 85	0.000E+00	1.607E+03	3.056E+03	4.383E+03	5.596E+03	6.715E+03	7.740E+03	9.413E+03
KR 85M	0.000E+00	2.096E+05	1.943E+05	1.837E+05	1.741E+05	1.666E+05	1.588E+05	1.437E+05
GE 86	0.000E+00	2.256E+02	2.049E+02	1.928E+02	1.822E+02	1.757E+02	1.685E+02	1.557E+02
AS 86	0.000E+00	1.896E+04	1.696E+04	1.567E+04	1.451E+04	1.368E+04	1.278E+04	1.119E+04
SE 86	0.000E+00	2.122E+05	1.920E+05	1.784E+05	1.662E+05	1.570E+05	1.473E+05	1.295E+05
BR 86	0.000E+00	1.550E+05	1.423E+05	1.336E+05	1.258E+05	1.197E+05	1.134E+05	1.015E+05
BR 86M	0.000E+00	1.562E+05	1.433E+05	1.346E+05	1.266E+05	1.205E+05	1.141E+05	1.020E+05
RB 86	0.000E+00	1.817E+02	3.350E+02	4.927E+02	6.531E+02	8.339E+02	1.018E+03	1.377E+03
RB 86M	0.000E+00	3.073E+01	4.736E+01	6.228E+01	7.700E+01	9.246E+01	1.084E+02	1.382E+02
GE 87	0.000E+00	3.416E+01	3.078E+01	2.859E+01	2.680E+01	2.556E+01	2.417E+01	2.178E+01
AS 87	0.000E+00	1.034E+04	9.172E+03	8.391E+03	7.680E+03	7.147E+03	6.579E+03	5.583E+03

ORIGEN2 V2.1 (8-91), Run on 10/14/04 at 11:32:21 OUTPUT UNIT =

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
FISSION PRODUCTS
POWER= 2.16550E+01 MW, BURNUP= 3.39605E+04 MWD, FLUX= 2.07E+14 N/CM**2-SEC

Calc. No. 2004-07600
 Project No. 11163-013
 Attachment B1

7 SUMMARY TABLE: RADIOACTIVITY, CURIES

	BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
SE 87	0.000E+00	1.613E+05	1.474E+05	1.380E+05	1.296E+05	1.238E+05	1.166E+05	1.041E+05
BR 87	0.000E+00	3.530E+05	3.242E+05	3.044E+05	2.866E+05	2.728E+05	2.584E+05	2.312E+05
KR 87	0.000E+00	4.182E+05	3.845E+05	3.612E+05	3.401E+05	3.237E+05	3.067E+05	2.745E+05
SR 87M	0.000E+00	5.306E-01	8.330E-01	1.135E+00	1.506E+00	1.968E+00	2.558E+00	4.009E+00
GE 88	0.000E+00	8.335E-01	7.942E-01	7.844E-01	7.785E-01	7.904E-01	7.979E-01	8.1130E-01
AS 88	0.000E+00	5.755E+02	5.290E+02	5.037E+02	4.822E+02	4.713E+02	4.583E+02	4.355E+02
SE 88	0.000E+00	6.156E+04	5.570E+04	5.197E+04	4.868E+04	4.635E+04	4.386E+04	3.934E+04
BR 88	0.000E+00	4.014E+05	3.642E+05	3.389E+05	3.160E+05	2.984E+05	2.799E+05	2.460E+05
KR 88	0.000E+00	5.911E+05	5.433E+05	5.102E+05	4.800E+05	4.566E+05	4.322E+05	3.861E+05
RB 88	0.000E+00	5.970E+05	5.494E+05	5.164E+05	4.863E+05	4.630E+05	4.387E+05	3.927E+05
AS 89	0.000E+00	5.452E+01	5.075E+01	4.898E+01	4.754E+01	4.716E+01	4.655E+01	4.553E+01
SE 89	0.000E+00	1.701E+04	1.541E+04	1.443E+04	1.357E+04	1.300E+04	1.238E+04	1.127E+04
BR 89	0.000E+00	3.013E+05	2.698E+05	2.485E+05	2.293E+05	2.147E+05	1.994E+05	1.718E+05
KR 89	0.000E+00	7.447E+05	6.801E+05	6.355E+05	5.949E+05	5.634E+05	5.306E+05	4.695E+05
RB 89	0.000E+00	7.768E+05	7.131E+05	6.689E+05	6.286E+05	5.971E+05	5.644E+05	5.028E+05
SR 89	0.000E+00	7.445E+05	7.327E+05	6.907E+05	6.498E+05	6.176E+05	5.843E+05	5.219E+05
Y 89M	0.000E+00	1.296E-01	1.780E-01	2.068E-01	2.315E-01	2.486E-01	2.677E-01	2.922E-01
SE 90	0.000E+00	5.675E+03	5.089E+03	4.716E+03	4.382E+03	4.149E+03	3.896E+03	3.454E+03
BR 90	0.000E+00	2.005E+05	1.782E+05	1.632E+05	1.496E+05	1.392E+05	1.283E+05	1.090E+05
KR 90	0.000E+00	7.393E+05	6.737E+05	6.289E+05	5.883E+05	5.569E+05	5.242E+05	4.635E+05
RB 90	0.000E+00	7.653E+05	7.000E+05	6.549E+05	6.139E+05	5.820E+05	5.488E+05	4.866E+05
RB 90M	0.000E+00	1.627E+05	1.522E+05	1.446E+05	1.377E+05	1.321E+05	1.264E+05	1.150E+05
SR 90	0.000E+00	1.247E+04	2.381E+04	3.434E+04	4.410E+04	5.324E+04	6.176E+04	7.596E+04
Y 90	0.000E+00	1.268E+04	2.425E+04	3.502E+04	4.502E+04	5.444E+04	6.322E+04	7.795E+04
Y 90M	0.000E+00	4.293E+00	5.661E+00	6.538E+00	7.316E+00	7.916E+00	8.572E+00	9.513E+00
SE 91	0.000E+00	6.897E+02	6.304E+02	5.966E+02	5.669E+02	5.505E+02	5.311E+02	4.979E+02
BR 91	0.000E+00	6.549E+04	5.846E+04	5.384E+04	4.968E+04	4.664E+04	4.338E+04	3.764E+04
KR 91	0.000E+00	5.509E+05	5.005E+05	4.667E+05	4.364E+05	4.134E+05	3.893E+05	3.448E+05
RB 91	0.000E+00	9.174E+05	8.448E+05	7.948E+05	7.496E+05	7.146E+05	6.782E+05	6.089E+05
SR 91	0.000E+00	9.601E+05	8.889E+05	8.395E+05	7.946E+05	7.597E+05	7.236E+05	6.538E+05
Y 91	0.000E+00	8.874E+05	9.074E+05	8.651E+05	8.203E+05	7.845E+05	7.479E+05	6.785E+05
Y 91M	0.000E+00	5.570E+05	5.157E+05	4.871E+05	4.611E+05	4.409E+05	4.200E+05	3.795E+05
SE 92	0.000E+00	2.461E+01	2.375E+01	2.377E+01	2.393E+01	2.460E+01	2.515E+01	2.615E+01
BR 92	0.000E+00	4.632E+03	4.339E+03	4.211E+03	4.120E+03	4.108E+03	4.084E+03	4.028E+03
KR 92	0.000E+00	2.520E+05	2.303E+05	2.165E+05	2.045E+05	1.960E+05	1.870E+05	1.700E+05
RB 92	0.000E+00	7.824E+05	7.225E+05	6.819E+05	6.456E+05	6.178E+05	5.891E+05	5.334E+05
SR 92	0.000E+00	9.957E+05	9.298E+05	8.841E+05	8.429E+05	8.107E+05	7.777E+05	7.117E+05
Y 92	0.000E+00	9.980E+05	9.325E+05	8.869E+05	8.458E+05	8.137E+05	7.808E+05	7.149E+05
BR 93	0.000E+00	9.743E+02	8.931E+02	8.485E+02	8.116E+02	7.918E+02	7.691E+02	7.278E+02
KR 93	0.000E+00	8.894E+04	8.130E+04	7.671E+04	7.291E+04	7.037E+04	6.769E+04	6.255E+04
RB 93	0.000E+00	5.865E+05	5.410E+05	5.111E+05	4.851E+05	4.656E+05	4.456E+05	4.063E+05
SR 93	0.000E+00	1.076E+06	1.015E+06	9.7340E+05	9.340E+05	9.043E+05	8.743E+05	8.112E+05
Y 93	0.000E+00	1.095E+06	1.034E+06	9.922E+05	9.546E+05	9.250E+05	8.953E+05	8.321E+05
ZR 93	0.000E+00	2.765E-01	5.395E-01	7.920E-01	1.035E+00	1.269E+00	1.495E+00	1.891E+00
NB 93M	0.000E+00	3.783E-03	1.465E-02	3.203E-02	5.547E-02	8.453E-02	1.189E-01	1.947E-01
BR 94	0.000E+00	7.557E+01	6.993E+01	6.712E+01	6.489E+01	6.404E+01	6.293E+01	6.091E+01
KR 94	0.000E+00	3.726E+04	3.340E+04	3.092E+04	2.874E+04	2.714E+04	2.546E+04	2.242E+04
RB 94	0.000E+00	2.989E+05	2.764E+05	2.621E+05	2.499E+05	2.410E+05	2.320E+05	2.138E+05

Calc. No. 2004-07600
Project No. 11163-013
Attachment B1

SR 94	0.000E+00	9.975E+05	9.441E+05	9.070E+05	8.745E+05	8.489E+05	8.233E+05	7.678E+05
Y 94	0.000E+00	1.065E+06	1.015E+06	9.792E+05	9.477E+05	9.226E+05	8.978E+05	8.420E+05
NB 94M	0.000E+00	2.637E-01	3.773E-01	4.453E-01	5.041E-01	5.447E-01	5.903E-01	6.497E-01

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

OUTPUT UNIT = 6

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* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
FISSION PRODUCTS
POWER= 2.16550E+01 MW, BURNUP= 3.39605E+04 MWD, FLUX= 2.07E+14 N/CM*2-SEC

7 SUMMARY TABLE: RADIOACTIVITY, CURIES

BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
BR 95	0.000E+00	4.333E+00	4.207E+00	4.235E+00	4.288E+00	4.434E+00	4.558E+00
KR 95	0.000E+00	2.997E+03	2.846E+03	2.804E+03	2.787E+03	2.823E+03	2.851E+03
RB 95	0.000E+00	1.559E+05	1.424E+05	1.340E+05	1.268E+05	1.218E+05	1.166E+05
SR 95	0.000E+00	9.268E+05	8.742E+05	8.390E+05	8.089E+05	7.858E+05	7.628E+05
Y 95	0.000E+00	1.107E+06	1.061E+06	1.029E+06	1.002E+06	9.800E+05	9.590E+05
ZR 95	0.000E+00	9.953E+05	1.075E+06	1.060E+06	1.035E+06	1.015E+06	9.943E+05
NB 95	0.000E+00	8.673E+05	1.067E+06	1.057E+06	1.045E+06	1.024E+06	1.004E+06
NB 95M	0.000E+00	7.002E+03	7.615E+03	7.515E+03	7.348E+03	7.204E+03	7.063E+03
BR 96	0.000E+00	2.300E-01	2.236E-01	2.253E-01	2.279E-01	2.357E-01	2.421E-01
KR 96	0.000E+00	4.844E+02	4.573E+02	4.477E+02	4.416E+02	4.444E+02	4.456E+02
RB 96	0.000E+00	3.909E+04	3.628E+04	3.475E+04	3.355E+04	3.288E+04	3.216E+04
SR 96	0.000E+00	6.453E+05	6.060E+05	5.809E+05	5.599E+05	5.445E+05	5.291E+05
Y 96	0.000E+00	1.043E+06	9.998E+05	9.708E+05	9.465E+05	9.274E+05	9.092E+05
NB 96	0.000E+00	7.985E+02	1.006E+03	1.085E+03	1.157E+03	1.233E+03	1.312E+03
KR 97	0.000E+00	2.289E+01	2.236E+01	2.264E+01	2.309E+01	2.398E+01	2.480E+01
RB 97	0.000E+00	7.254E+03	6.739E+03	6.473E+03	6.276E+03	6.181E+03	6.078E+03
SR 97	0.000E+00	3.389E+05	3.168E+05	3.035E+05	2.927E+05	2.854E+05	2.780E+05
Y 97	0.000E+00	8.858E+05	8.496E+05	8.261E+05	8.072E+05	7.930E+05	7.796E+05
ZR 97	0.000E+00	1.047E+06	1.022E+06	1.005E+06	9.918E+05	9.813E+05	9.726E+05
NB 97	0.000E+00	1.053E+06	1.029E+06	1.012E+06	9.993E+05	9.891E+05	9.807E+05
NB 97M	0.000E+00	9.925E+05	9.689E+05	9.528E+05	9.403E+05	9.305E+05	9.222E+05
KR 98	0.000E+00	2.783E+00	2.703E+00	2.720E+00	2.750E+00	2.841E+00	2.916E+00
RB 98	0.000E+00	1.431E+03	1.348E+03	1.316E+03	1.295E+03	1.299E+03	1.299E+03
SR 98	0.000E+00	1.314E+05	1.223E+05	1.173E+05	1.134E+05	1.110E+05	1.086E+05
Y 98	0.000E+00	6.377E+05	6.076E+05	5.891E+05	5.747E+05	5.644E+05	5.547E+05
ZR 98	0.000E+00	1.039E+06	1.018E+06	1.004E+06	9.934E+05	9.851E+05	9.787E+05
NB 98	0.000E+00	1.050E+06	1.031E+06	1.017E+06	1.008E+06	1.000E+06	9.945E+05
NB 98M	0.000E+00	6.409E+03	7.385E+03	7.956E+03	8.454E+03	8.785E+03	9.171E+03
RB 99	0.000E+00	1.315E+02	1.251E+02	1.235E+02	1.229E+02	1.247E+02	1.261E+02
SR 99	0.000E+00	3.325E+04	3.113E+04	3.013E+04	2.944E+04	2.923E+04	2.898E+04
Y 99	0.000E+00	3.642E+05	3.446E+05	3.336E+05	3.256E+05	3.205E+05	3.157E+05
ZR 99	0.000E+00	1.026E+06	1.003E+06	9.892E+05	9.798E+05	9.727E+05	9.676E+05
NB 99	0.000E+00	1.055E+06	1.036E+06	1.023E+06	1.015E+06	1.009E+06	1.005E+06
NB 99M	0.000E+00	3.098E+04	3.376E+04	3.535E+04	3.675E+04	3.765E+04	3.875E+04
MO 99	0.000E+00	1.092E+06	1.079E+06	1.073E+06	1.072E+06	1.072E+06	1.075E+06
TC 99	0.000E+00	1.869E+00	3.731E+00	5.539E+00	7.294E+00	8.991E+00	1.063E+01
TC 99M	0.000E+00	9.556E+05	9.447E+05	9.394E+05	9.382E+05	9.386E+05	9.415E+05
RB100	0.000E+00	1.004E+01	9.751E+00	9.823E+00	9.953E+00	1.029E+01	1.059E+01

Calc. No. 2004-07600
 Project No. 11163-013
 Attachment B1

SR100	0.000E+00	5.999E+03	5.665E+03	5.543E+03	5.477E+03	5.505E+03	5.522E+03	5.523E+03
Y100	0.000E+00	1.637E+05	1.542E+05	1.491E+05	1.455E+05	1.434E+05	1.414E+05	1.362E+05
ZR100	0.000E+00	9.561E+05	9.320E+05	9.171E+05	9.069E+05	8.993E+05	8.935E+05	8.680E+05
NB100	0.000E+00	5.717E+05	5.657E+05	5.617E+05	5.596E+05	5.576E+05	5.571E+05	5.458E+05
NB100M	0.000E+00	5.717E+05	5.657E+05	5.617E+05	5.596E+05	5.576E+05	5.571E+05	5.458E+05
TC100	0.000E+00	2.921E+04	5.810E+04	8.885E+04	1.207E+05	1.568E+05	1.937E+05	2.656E+05
SR101	0.000E+00	8.331E+02	7.874E+02	7.723E+02	7.645E+02	7.714E+02	7.759E+02	7.815E+02
Y101	0.000E+00	5.319E+04	4.973E+04	4.799E+04	4.678E+04	4.623E+04	4.566E+04	4.422E+04
ZR101	0.000E+00	6.268E+05	6.034E+05	5.905E+05	5.822E+05	5.770E+05	5.729E+05	5.565E+05
NB101	0.000E+00	9.221E+05	9.136E+05	9.096E+05	9.097E+05	9.102E+05	9.132E+05	9.012E+05
MO101	0.000E+00	9.547E+05	9.542E+05	9.553E+05	9.600E+05	9.639E+05	9.708E+05	9.641E+05
TC101	0.000E+00	9.548E+05	9.544E+05	9.594E+05	9.602E+05	9.641E+05	9.710E+05	9.644E+05
SR102	0.000E+00	6.938E+01	6.645E+01	6.609E+01	6.633E+01	6.784E+01	6.914E+01	7.123E+01

OUTPUT UNIT = 6

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ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
 FISSION PRODUCTS
 POWER= 2.16550E+01 MW, BURNUP= 3.39605E+04 MWD, FLUX= 2.07E+14 N/CM**2-SEC

7 SUMMARY TABLE: RADIOACTIVITY, CURIES

BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
Y102	0.000E+00	1.189E+04	1.123E+04	1.098E+04	1.086E+04	1.092E+04	1.086E+04
ZR102	0.000E+00	3.367E+05	3.248E+05	3.198E+05	3.177E+05	3.176E+05	3.181E+05
NB102	0.000E+00	7.331E+05	7.341E+05	7.377E+05	7.453E+05	7.520E+05	7.615E+05
MO102	0.000E+00	8.323E+05	8.487E+05	8.618E+05	8.778E+05	8.904E+05	9.066E+05
TC102	0.000E+00	8.328E+05	8.494E+05	8.626E+05	8.787E+05	8.913E+05	9.076E+05
TC102M	0.000E+00	4.977E+02	6.627E+02	7.620E+02	8.490E+02	9.091E+02	9.770E+02
RH102	0.000E+00	1.181E-02	5.856E-02	1.406E-01	2.542E-01	3.988E-01	5.695E-01
SR103	0.000E+00	2.077E+00	2.019E+00	2.041E+00	2.087E+00	2.168E+00	2.246E+00
Y103	0.000E+00	1.464E+03	1.411E+03	1.411E+03	1.429E+03	1.467E+03	1.506E+03
ZR103	0.000E+00	1.106E+05	1.082E+05	1.082E+05	1.095E+05	1.113E+05	1.135E+05
NB103	0.000E+00	4.531E+05	4.647E+05	4.755E+05	4.890E+05	5.004E+05	5.142E+05
MO103	0.000E+00	6.773E+05	7.239E+05	7.565E+05	7.900E+05	8.155E+05	8.456E+05
TC103	0.000E+00	6.838E+05	7.325E+05	7.684E+05	8.010E+05	8.273E+05	8.582E+05
RU103	0.000E+00	6.437E+05	7.196E+05	7.603E+05	7.987E+05	8.280E+05	8.610E+05
RH103M	0.000E+00	5.797E+05	6.481E+05	6.847E+05	7.193E+05	7.457E+05	7.754E+05
SR104	0.000E+00	7.098E-02	7.099E-02	7.393E-02	7.791E-02	8.310E-02	8.827E-02
Y104	0.000E+00	1.027E+02	1.022E+02	1.061E+02	1.121E+02	1.193E+02	1.269E+02
ZR104	0.000E+00	2.066E+04	2.068E+04	2.138E+04	2.251E+04	2.372E+04	2.507E+04
NB104	0.000E+00	1.850E+05	1.934E+05	2.026E+05	2.143E+05	2.247E+05	2.367E+05
MO104	0.000E+00	4.480E+05	5.013E+05	5.407E+05	5.818E+05	6.142E+05	6.513E+05
TC104	0.000E+00	4.703E+05	5.308E+05	5.748E+05	6.200E+05	6.551E+05	6.955E+05
RH104	0.000E+00	5.218E+04	1.235E+05	1.985E+05	2.738E+05	3.550E+05	4.338E+05
RH104M	0.000E+00	3.405E+03	8.063E+03	1.295E+04	1.787E+04	2.317E+04	2.831E+04
Y105	0.000E+00	6.171E+00	5.961E+00	6.022E+00	6.201E+00	6.457E+00	6.729E+00
ZR105	0.000E+00	2.700E+03	2.699E+03	2.804E+03	2.974E+03	3.156E+03	3.358E+03
NB105	0.000E+00	5.432E+04	5.808E+04	6.228E+04	6.752E+04	7.222E+04	7.756E+04
MO105	0.000E+00	2.693E+05	3.164E+05	3.517E+05	3.884E+05	4.174E+05	4.505E+05
TC105	0.000E+00	3.168E+05	3.819E+05	4.287E+05	4.758E+05	5.124E+05	5.540E+05

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RU105	0.000E+00	3.194E+05	3.860E+05	4.340E+05	4.823E+05	5.201E+05	5.629E+05	6.199E+05
RH105	0.000E+00	3.086E+05	3.728E+05	4.185E+05	4.645E+05	4.997E+05	5.398E+05	5.923E+05
RH105M	0.000E+00	8.943E+04	1.081E+05	1.215E+05	1.351E+05	1.456E+05	1.576E+05	1.736E+05
ZR106	0.000E+00	4.556E+02	4.264E+02	4.172E+02	4.169E+02	4.212E+02	4.273E+02	4.302E+02
NB106	0.000E+00	1.566E+04	1.602E+04	1.686E+04	1.814E+04	1.935E+04	2.075E+04	2.259E+04
MO106	0.000E+00	1.191E+05	1.450E+05	1.668E+05	1.910E+05	2.109E+05	2.335E+05	2.645E+05
TC106	0.000E+00	1.723E+05	2.245E+05	2.641E+05	3.055E+05	3.382E+05	3.752E+05	4.259E+05
RU106	0.000E+00	4.713E+04	1.031E+05	1.581E+05	2.118E+05	2.612E+05	3.088E+05	3.870E+05
RH106	0.000E+00	5.512E+04	1.127E+05	1.692E+05	2.245E+05	2.756E+05	3.251E+05	4.063E+05
RH106M	0.000E+00	3.592E+03	4.330E+03	5.009E+03	5.734E+03	6.502E+03	7.340E+03	8.713E+03
ZR107	0.000E+00	2.196E+01	2.037E+01	1.977E+01	1.957E+01	1.963E+01	1.975E+01	1.966E+01
NB107	0.000E+00	2.357E+03	2.370E+03	2.494E+03	2.705E+03	2.909E+03	3.148E+03	3.466E+03
MO107	0.000E+00	3.986E+04	4.749E+04	5.546E+04	6.530E+04	7.376E+04	8.344E+04	9.696E+04
TC107	0.000E+00	8.142E+04	1.086E+05	1.315E+05	1.572E+05	1.781E+05	2.020E+05	2.353E+05
RU107	0.000E+00	1.195E+05	1.697E+05	2.072E+05	2.459E+05	2.762E+05	3.105E+05	3.580E+05
RH107	0.000E+00	1.201E+05	1.707E+05	2.083E+05	2.472E+05	2.777E+05	3.122E+05	3.598E+05
PD107	0.000E+00	5.057E-03	1.357E-02	2.451E-02	3.779E-02	5.289E-02	6.994E-02	1.054E-01
PD107M	0.000E+00	1.083E+00	3.209E+00	6.687E+00	1.170E+01	1.870E+01	2.761E+01	4.973E+01
ZR108	0.000E+00	4.563E+00	4.497E+00	4.583E+00	4.682E+00	4.887E+00	5.063E+00	5.390E+00
NB108	0.000E+00	5.964E+02	5.902E+02	6.033E+02	6.202E+02	6.482E+02	6.741E+02	7.178E+02
MO108	0.000E+00	1.469E+04	1.651E+04	1.835E+04	2.050E+04	2.244E+04	2.458E+04	2.765E+04
TC108	0.000E+00	4.648E+04	6.361E+04	7.731E+04	9.1208E+04	1.040E+05	1.175E+05	1.363E+05
RU108	0.000E+00	7.529E+04	1.1109E+05	1.377E+05	1.625E+05	1.876E+05	2.124E+05	2.470E+05

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21 OUTPUT UNIT = 6

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
 FISSION PRODUCTS
 POWER= 2.16550E+01 MW, BURNUP= 3.39605E+04 MWD, FLUX= 2.07E+14 N/CM**2-SEC

7 SUMMARY TABLE: RADIOACTIVITY, CURIES

BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
RH108	0.000E+00	7.593E+04	1.120E+05	1.391E+05	1.673E+05	1.894E+05	2.145E+05
RH108M	0.000E+00	6.422E+02	1.061E+03	1.341E+03	1.608E+03	1.806E+03	2.029E+03
AG108	0.000E+00	3.745E-02	1.023E-01	1.892E-01	2.967E-01	4.286E-01	5.788E-01
ZR109	0.000E+00	3.186E-01	3.172E-01	3.259E-01	3.353E-01	3.523E-01	3.670E-01
NB109	0.000E+00	1.068E+02	1.081E+02	1.200E+02	1.161E+02	1.223E+02	1.279E+02
MO109	0.000E+00	4.991E+03	5.654E+03	6.213E+03	6.769E+03	7.290E+03	7.834E+03
TC109	0.000E+00	2.364E+04	3.201E+04	3.819E+04	4.443E+04	4.940E+04	5.494E+04
RU109	0.000E+00	4.697E+04	6.931E+04	8.585E+04	1.028E+05	1.161E+05	1.311E+05
RH109	0.000E+00	4.838E+04	7.170E+04	8.900E+04	1.068E+05	1.207E+05	1.364E+05
RH109M	0.000E+00	2.419E+04	3.585E+04	4.450E+04	5.338E+04	6.035E+04	6.821E+04
PD109	0.000E+00	4.960E+04	7.509E+04	9.543E+04	1.171E+05	1.361E+05	1.579E+05
AG109	0.000E+00	2.421E+04	3.591E+04	4.616E+04	5.355E+04	6.060E+04	6.855E+04
NB110	0.000E+00	4.957E+04	7.505E+04	9.538E+04	1.171E+05	1.360E+05	1.578E+05
MO110	0.000E+00	1.251E+01	1.245E+01	1.279E+01	1.316E+01	1.382E+01	1.440E+01
TC110	0.000E+00	7.979E+03	9.278E+03	1.042E+04	1.164E+04	1.274E+04	1.392E+04
RU110	0.000E+00	2.329E+04	3.187E+04	3.855E+04	4.558E+04	5.125E+04	5.763E+04
RH110	0.000E+00	2.459E+04	3.399E+04	4.127E+04	4.893E+04	5.508E+04	6.201E+04

RH110M	0.000E+00	1.307E+03	2.121E+03	2.724E+03	3.349E+03	3.833E+03	4.383E+03	5.146E+03
AG110	0.000E+00	3.744E+03	1.028E+04	1.904E+04	2.987E+04	4.314E+04	5.824E+04	9.017E+04
AG110M	0.000E+00	3.747E+01	1.728E+02	4.169E+02	7.656E+02	1.226E+03	1.786E+03	3.079E+03
NB111	0.000E+00	1.065E+00	1.059E+00	1.088E+00	1.119E+00	1.176E+00	1.225E+00	1.317E+00
MO111	0.000E+00	2.804E+02	2.799E+02	2.884E+02	2.975E+02	3.130E+02	3.268E+02	3.519E+02
TC111	0.000E+00	3.387E+03	3.563E+03	3.792E+03	4.042E+03	4.324E+03	4.606E+03	5.053E+03
RU111	0.000E+00	1.320E+04	1.609E+04	2.110E+04	2.108E+04	2.329E+04	2.572E+04	2.919E+04
RH111	0.000E+00	1.633E+04	2.072E+04	2.478E+04	2.808E+04	3.124E+04	3.476E+04	3.973E+04
PD111	0.000E+00	1.651E+04	2.103E+04	2.471E+04	2.866E+04	3.192E+04	3.559E+04	4.084E+04
PD111M	0.000E+00	1.782E+02	2.623E+02	3.270E+02	3.948E+02	4.512E+02	5.156E+02	6.140E+02
AG111	0.000E+00	1.656E+04	2.112E+04	2.483E+04	2.879E+04	3.212E+04	3.585E+04	4.122E+04
AG111M	0.000E+00	1.644E+04	2.096E+04	2.463E+04	2.856E+04	3.185E+04	3.533E+04	4.082E+04
CD111M	0.000E+00	6.837E-02	3.643E-01	1.033E+00	2.205E+00	4.138E+00	6.949E+00	1.525E+01
MO112	0.000E+00	5.172E+01	5.146E+01	5.289E+01	5.444E+01	5.723E+01	5.965E+01	6.416E+01
TC112	0.000E+00	1.301E+03	1.311E+03	1.360E+03	1.414E+03	1.494E+03	1.568E+03	1.696E+03
RU112	0.000E+00	7.587E+03	8.250E+03	8.959E+03	9.748E+03	1.053E+04	1.135E+04	1.259E+04
RH112	0.000E+00	1.055E+04	1.209E+04	1.348E+04	1.500E+04	1.637E+04	1.786E+04	2.000E+04
PD112	0.000E+00	1.102E+04	1.276E+04	1.430E+04	1.597E+04	1.746E+04	1.907E+04	2.140E+04
AG112	0.000E+00	1.105E+04	1.280E+04	1.434E+04	1.601E+04	1.750E+04	1.912E+04	2.145E+04
MO113	0.000E+00	3.679E+00	3.658E+00	3.759E+00	3.868E+00	4.065E+00	4.237E+00	4.557E+00
TC113	0.000E+00	3.527E+02	3.522E+02	3.631E+02	3.754E+02	3.954E+02	4.135E+02	4.457E+02
RU113	0.000E+00	4.765E+03	4.913E+03	5.168E+03	5.463E+03	5.813E+03	6.162E+03	6.715E+03
RH113	0.000E+00	8.637E+03	9.382E+03	1.015E+04	1.101E+04	1.185E+04	1.274E+04	1.404E+04
PD113	0.000E+00	9.767E+03	1.090E+04	1.194E+04	1.307E+04	1.412E+04	1.525E+04	1.688E+04
AG113	0.000E+00	8.799E+03	9.819E+03	1.076E+04	1.178E+04	1.273E+04	1.374E+04	1.521E+04
AG113M	0.000E+00	8.850E+02	1.102E+03	1.209E+03	1.324E+03	1.431E+03	1.545E+03	1.711E+03
CD113M	0.000E+00	4.143E+00	8.989E+00	1.453E+01	2.083E+01	2.796E+01	3.601E+01	5.354E+01
MO114	0.000E+00	3.769E-01	3.747E-01	3.848E-01	3.957E-01	4.158E-01	4.332E-01	4.657E-01
TC114	0.000E+00	8.073E+01	8.022E+01	8.240E+01	8.480E+01	8.910E+01	9.287E+01	9.981E+01
RU114	0.000E+00	2.384E+03	2.383E+03	2.456E+03	2.542E+03	2.674E+03	2.797E+03	3.007E+03
RH114	0.000E+00	5.888E+03	6.072E+03	6.361E+03	6.695E+03	7.079E+03	7.467E+03	8.063E+03
PD114	0.000E+00	7.778E+03	8.323E+03	8.875E+03	9.475E+03	1.007E+04	1.069E+04	1.160E+04
AG114	0.000E+00	7.845E+03	8.415E+03	8.982E+03	9.597E+03	1.020E+04	1.084E+04	1.176E+04

OUTPUT UNIT = 6

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ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
 FISSION PRODUCTS
 POWER= 2.16550E+01 MW, BURNUP= 3.39605E+04 MWD, FLUX= 2.07E+14 N/CM**2-SEC

7 SUMMARY TABLE: RADIOACTIVITY, CURIES

BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	ECC #1
IN114	0.000E+00	5.941E-02	2.699E-01	6.759E-01	1.314E+00	2.271E+00	3.572E+00
IN114M	0.000E+00	1.558E-02	8.746E-02	2.361E-01	4.766E-01	8.428E-01	1.346E+00
MO115	0.000E+00	2.512E-02	2.497E-02	2.565E-02	2.638E-02	2.772E-02	2.888E-02
TC115	0.000E+00	1.707E+01	1.697E+01	1.743E+01	1.792E+01	1.883E+01	1.962E+01
RU115	0.000E+00	1.135E+03	1.129E+03	1.159E+03	1.193E+03	1.253E+03	1.306E+03
RH115	0.000E+00	4.766E+03	4.800E+03	4.957E+03	5.113E+03	5.396E+03	5.640E+03
PD115	0.000E+00	8.039E+03	8.377E+03	8.792E+03	9.244E+03	9.746E+03	1.025E+04
AG115	0.000E+00	5.994E+03	6.264E+03	6.582E+03	6.926E+03	7.303E+03	7.686E+03

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AG115M	0.000E+00	2.278E+03	2.394E+03	2.523E+03	2.661E+03	2.808E+03	2.958E+03	3.182E+03
CD115	0.000E+00	7.581E+03	7.969E+03	8.412E+03	8.912E+03	9.456E+03	1.002E+04	1.091E+04
CD115M	0.000E+00	6.891E+02	7.626E+02	8.114E+02	8.609E+02	9.141E+02	9.684E+02	1.055E+03
IN115M	0.000E+00	7.598E+03	7.986E+03	8.439E+03	8.931E+03	9.475E+03	1.004E+04	1.093E+04
TC116	0.000E+00	1.054E+00	1.048E+00	1.076E+00	1.106E+00	1.162E+00	1.211E+00	1.301E+00
RU116	0.000E+00	2.558E+02	2.540E+02	2.605E+02	2.678E+02	2.810E+02	2.926E+02	3.138E+02
RH116	0.000E+00	2.348E+03	2.344E+03	2.405E+03	2.475E+03	2.589E+03	2.693E+03	2.872E+03
PD116	0.000E+00	6.524E+03	6.701E+03	6.949E+03	7.219E+03	7.541E+03	7.860E+03	8.340E+03
AG116	0.000E+00	3.563E+03	3.698E+03	3.853E+03	4.017E+03	4.200E+03	4.384E+03	4.655E+03
AG116M	0.000E+00	3.563E+03	3.699E+03	3.854E+03	4.018E+03	4.201E+03	4.385E+03	4.656E+03
IN116	0.000E+00	1.759E+03	2.981E+03	3.912E+03	4.621E+03	5.266E+03	5.784E+03	6.540E+03
IN116M	0.000E+00	1.265E+03	2.144E+03	2.813E+03	3.324E+03	3.788E+03	4.160E+03	4.703E+03
TC117	0.000E+00	4.564E-02	4.521E-02	4.629E-02	4.747E-02	4.975E-02	5.171E-02	5.538E-02
RU117	0.000E+00	4.156E+01	4.061E+01	4.106E+01	4.163E+01	4.316E+01	4.442E+01	4.680E+01
RH117	0.000E+00	1.779E+03	1.682E+03	1.644E+03	1.615E+03	1.621E+03	1.618E+03	1.615E+03
PD117	0.000E+00	6.368E+03	6.378E+03	6.504E+03	6.651E+03	6.874E+03	7.085E+03	7.407E+03
AG117	0.000E+00	3.582E+03	3.698E+03	3.838E+03	3.985E+03	4.155E+03	4.323E+03	4.573E+03
AG117M	0.000E+00	3.581E+03	3.697E+03	3.837E+03	3.983E+03	4.153E+03	4.322E+03	4.572E+03
CD117	0.000E+00	4.689E+03	4.859E+03	5.055E+03	5.258E+03	5.489E+03	5.721E+03	6.066E+03
CD117M	0.000E+00	2.536E+03	2.634E+03	2.743E+03	2.854E+03	2.980E+03	3.106E+03	3.291E+03
IN117	0.000E+00	4.323E+03	4.484E+03	4.667E+03	4.855E+03	5.069E+03	5.283E+03	5.600E+03
IN117M	0.000E+00	5.477E+03	5.679E+03	5.908E+03	6.146E+03	6.417E+03	6.687E+03	7.090E+03
SN117M	0.000E+00	1.315E+00	4.744E+00	1.004E+01	1.691E+01	2.589E+01	3.642E+01	6.049E+01
RU118	0.000E+00	2.477E+02	2.463E+02	2.530E+02	2.601E+02	2.733E+02	2.847E+02	3.061E+02
RH118	0.000E+00	1.945E+03	1.934E+03	1.986E+03	2.042E+03	2.145E+03	2.234E+03	2.400E+03
PD118	0.000E+00	4.918E+03	4.942E+03	5.084E+03	5.244E+03	5.485E+03	5.708E+03	6.081E+03
AG118	0.000E+00	5.002E+03	5.091E+03	5.237E+03	5.397E+03	5.599E+03	5.798E+03	6.090E+03
AG118M	0.000E+00	3.233E+03	3.336E+03	3.467E+03	3.606E+03	3.770E+03	3.932E+03	4.176E+03
CD118	0.000E+00	7.280E+03	7.514E+03	7.790E+03	8.080E+03	8.411E+03	8.743E+03	9.226E+03
IN118	0.000E+00	7.282E+03	7.517E+03	7.793E+03	8.083E+03	8.415E+03	8.747E+03	9.230E+03
IN118M	0.000E+00	1.705E+00	2.316E+00	2.686E+00	3.010E+00	3.235E+00	3.488E+00	3.814E+00
RH119	0.000E+00	1.261E+02	1.372E+02	1.472E+02	1.566E+02	1.665E+02	1.763E+02	1.917E+02
PD119	0.000E+00	3.037E+03	3.260E+03	3.467E+03	3.667E+03	3.878E+03	4.089E+03	4.413E+03
AG119	0.000E+00	6.232E+03	6.535E+03	6.846E+03	7.160E+03	7.504E+03	7.848E+03	8.360E+03
CD119	0.000E+00	3.557E+03	3.689E+03	3.836E+03	3.988E+03	4.160E+03	4.331E+03	4.582E+03
CD119M	0.000E+00	3.557E+03	3.689E+03	3.836E+03	3.988E+03	4.160E+03	4.331E+03	4.582E+03
IN119	0.000E+00	2.051E+03	2.126E+03	2.211E+03	2.298E+03	2.396E+03	2.495E+03	2.639E+03
IN119M	0.000E+00	5.341E+03	5.538E+03	5.758E+03	5.987E+03	6.244E+03	6.501E+03	6.877E+03
SN119M	0.000E+00	4.388E+01	7.272E+01	9.311E+01	1.088E+02	1.225E+02	1.352E+02	1.583E+02
RU120	0.000E+00	5.170E-02	5.141E-02	5.283E-02	5.437E-02	5.716E-02	5.958E-02	6.409E-02
RH120	0.000E+00	2.362E+01	2.348E+01	2.412E+01	2.483E+01	2.610E+01	2.721E+01	2.926E+01
PD120	0.000E+00	1.359E+03	1.351E+03	1.385E+03	1.425E+03	1.493E+03	1.555E+03	1.663E+03
AG120	0.000E+00	4.736E+03	4.763E+03	4.891E+03	5.038E+03	5.251E+03	5.452E+03	5.775E+03

OUTPUT UNIT = 6

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ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
FISSION PRODUCTS
POWER= 2.16550E+01 MW, BURNUP= 3.39605E+04 MWD, FLUX= 2.07E+14 N/CM**2-SEC

7 SUMMARY TABLE: RADIOACTIVITY, CURIES

Calc. No. 2004-07600
 Project No. 11163-013
 Attachment B1

	BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
CD120	0.000E+00	7.144E+03	7.369E+03	7.638E+03	7.918E+03	8.243E+03	8.567E+03	9.040E+03
IN120	0.000E+00	3.626E+03	3.750E+03	3.891E+03	4.038E+03	4.205E+03	4.371E+03	4.614E+03
IN120M	0.000E+00	3.626E+03	3.750E+03	3.891E+03	4.038E+03	4.205E+03	4.371E+03	4.614E+03
RH121	0.000E+00	3.706E+00	3.685E+00	3.787E+00	3.901E+00	4.102E+00	4.279E+00	4.604E+00
PD121	0.000E+00	5.289E+02	5.251E+02	5.388E+02	5.547E+02	5.823E+02	6.068E+02	6.510E+02
AG121	0.000E+00	3.327E+03	3.318E+03	3.398E+03	3.493E+03	3.644E+03	3.783E+03	4.016E+03
CD121	0.000E+00	7.127E+03	7.327E+03	7.580E+03	7.846E+03	8.162E+03	8.474E+03	8.934E+03
IN121	0.000E+00	6.017E+03	6.211E+03	6.437E+03	6.671E+03	6.942E+03	7.211E+03	7.604E+03
IN121M	0.000E+00	6.017E+03	6.211E+03	6.437E+03	6.671E+03	6.942E+03	7.211E+03	7.604E+03
SNI21	0.000E+00	7.523E+03	7.777E+03	8.049E+03	8.360E+03	8.697E+03	9.034E+03	9.525E+03
SNI21M	0.000E+00	7.523E+03	7.777E+03	8.049E+03	8.360E+03	8.697E+03	9.034E+03	9.525E+03
RH122	0.000E+00	4.495E-01	4.469E-01	4.593E-01	4.729E-01	4.972E-01	5.185E-01	5.579E-01
PD122	0.000E+00	1.613E+02	1.601E+02	1.643E+02	1.690E+02	1.775E+02	1.849E+02	1.985E+02
AG122	0.000E+00	2.060E+03	2.047E+03	2.093E+03	2.149E+03	2.243E+03	2.329E+03	2.476E+03
CD122	0.000E+00	7.017E+03	7.141E+03	7.349E+03	7.572E+03	7.861E+03	8.141E+03	8.561E+03
IN122	0.000E+00	7.449E+03	7.634E+03	7.880E+03	8.138E+03	8.452E+03	8.760E+03	9.215E+03
IN122M	0.000E+00	4.327E+02	4.942E+02	5.329E+02	5.674E+02	5.932E+02	6.220E+02	6.569E+02
SB122M	0.000E+00	1.278E+02	2.601E+02	4.085E+02	5.695E+02	7.601E+02	9.646E+02	1.391E+03
RH123	0.000E+00	3.875E-02	3.849E-02	3.951E-02	4.062E-02	4.267E-02	4.444E-02	4.775E-02
PD123	0.000E+00	3.711E+01	3.677E+01	3.766E+01	3.867E+01	4.054E+01	4.217E+01	4.516E+01
AG123	0.000E+00	1.095E+03	1.084E+03	1.106E+03	1.133E+03	1.181E+03	1.224E+03	1.299E+03
CD123	0.000E+00	6.768E+03	6.851E+03	7.032E+03	7.230E+03	7.501E+03	7.760E+03	8.156E+03
IN123	0.000E+00	6.145E+03	6.306E+03	6.511E+03	6.724E+03	6.981E+03	7.234E+03	7.605E+03
IN123M	0.000E+00	2.477E+03	2.595E+03	2.703E+03	2.810E+03	2.922E+03	3.036E+03	3.195E+03
SNI23	0.000E+00	1.168E+03	1.627E+03	1.833E+03	1.948E+03	2.033E+03	2.108E+03	2.223E+03
SNI23M	0.000E+00	7.161E+03	7.391E+03	7.651E+03	7.916E+03	8.223E+03	8.528E+03	8.969E+03
TE123M	0.000E+00	4.512E-02	2.950E-01	8.622E-01	1.825E+00	3.330E+00	5.459E+00	1.158E+01
PD124	0.000E+00	6.786E+00	6.741E+00	6.929E+00	7.149E+00	7.520E+00	7.853E+00	8.450E+00
AG124	0.000E+00	4.918E+02	4.873E+02	4.983E+02	5.119E+02	5.351E+02	5.561E+02	5.923E+02
CD124	0.000E+00	6.336E+03	6.359E+03	6.497E+03	6.656E+03	6.891E+03	7.114E+03	7.458E+03
IN124	0.000E+00	1.017E+04	1.041E+04	1.071E+04	1.102E+04	1.140E+04	1.176E+04	1.228E+04
SB124	0.000E+00	4.832E+01	1.295E+02	2.256E+02	3.323E+02	4.578E+02	5.951E+02	8.872E+02
SB124M	0.000E+00	2.249E+00	3.058E+00	3.670E+00	4.263E+00	4.822E+00	5.435E+00	6.534E+00
AG125	0.000E+00	1.439E+02	1.442E+02	1.491E+02	1.550E+02	1.634E+02	1.714E+02	1.848E+02
CD125	0.000E+00	4.117E+03	4.228E+03	4.393E+03	4.573E+03	4.791E+03	5.006E+03	5.335E+03
IN125	0.000E+00	5.710E+03	6.075E+03	6.396E+03	6.715E+03	7.032E+03	7.360E+03	7.825E+03
IN125M	0.000E+00	4.086E+03	4.406E+03	4.662E+03	4.909E+03	5.141E+03	5.383E+03	5.718E+03
SNI25	0.000E+00	5.654E+03	6.134E+03	6.485E+03	6.806E+03	7.098E+03	7.404E+03	7.801E+03
SNI25M	0.000E+00	9.071E+03	9.804E+03	1.038E+04	1.092E+04	1.143E+04	1.196E+04	1.270E+04
SB125	0.000E+00	1.715E+03	3.464E+03	5.134E+03	6.716E+03	8.203E+03	9.611E+03	1.200E+04
TE125M	0.000E+00	2.438E+02	6.351E+02	1.026E+03	1.399E+03	1.751E+03	2.082E+03	2.648E+03
PD126	0.000E+00	9.391E-02	9.429E-02	9.818E-02	1.030E-01	1.096E-01	1.160E-01	1.268E-01
AG126	0.000E+00	4.405E+01	4.404E+01	4.558E+01	4.756E+01	5.029E+01	5.295E+01	5.730E+01
CD126	0.000E+00	3.301E+03	3.315E+03	3.398E+03	3.505E+03	3.646E+03	3.787E+03	3.997E+03
IN126	0.000E+00	1.448E+04	1.495E+04	1.541E+04	1.589E+04	1.640E+04	1.693E+04	1.760E+04
SNI26	0.000E+00	7.716E-02	1.632E-01	2.550E-01	3.519E-01	4.530E-01	5.584E-01	7.624E-01
SB126	0.000E+00	3.138E+02	3.761E+02	4.269E+02	4.751E+02	5.225E+02	5.715E+02	6.517E+02
SB126M	0.000E+00	1.490E+02	1.854E+02	2.078E+02	2.273E+02	2.416E+02	2.574E+02	2.782E+02
CD127	0.000E+00	1.601E+03	1.639E+03	1.721E+03	1.827E+03	1.943E+03	2.066E+03	2.246E+03

Calc. No. 2004-07600
Project No. 11163-013
Attachment B1

IN127 0.000E+00 7.859E+03 8.247E+03 8.618E+03 9.028E+03 9.417E+03 9.839E+03 1.039E+04

OUTPUT UNIT = 6

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ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
FISSION PRODUCTS
POWER= 2.16550E+01 MW, BURNUP= 3.39605E+04 MWD, FLUX= 2.07E+14 N/CM*2-SEC

7 SUMMARY TABLE: RADIOACTIVITY, CURIES

BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
IN127M	0.000E+00	7.874E+03	8.260E+03	8.630E+03	9.038E+03	9.426E+03	9.848E+03
SN127	0.000E+00	2.871E+04	3.107E+04	3.282E+04	3.455E+04	3.601E+04	3.761E+04
SN127M	0.000E+00	1.327E+04	1.479E+04	1.576E+04	1.662E+04	1.727E+04	1.800E+04
SB127	0.000E+00	4.420E+04	4.860E+04	5.161E+04	5.447E+04	5.675E+04	5.929E+04
TE127	0.000E+00	4.202E+04	4.752E+04	5.095E+04	5.396E+04	5.633E+04	5.889E+04
TE127M	0.000E+00	4.035E+03	5.786E+03	6.641E+03	7.206E+03	7.611E+03	7.994E+03
XE127	0.000E+00	1.796E-04	9.914E-04	2.696E-03	5.498E-03	9.882E-03	1.602E-02
AG128	0.000E+00	1.601E+00	1.633E+00	1.734E+00	1.867E+00	2.022E+00	2.181E+00
CD128	0.000E+00	6.432E+02	6.463E+02	6.718E+02	7.093E+02	7.519E+02	7.973E+02
IN128	0.000E+00	1.511E+04	1.517E+04	1.541E+04	1.577E+04	1.618E+04	1.662E+04
SN128	0.000E+00	8.223E+04	8.499E+04	8.691E+04	8.883E+04	9.043E+04	9.229E+04
SB128	0.000E+00	4.962E+03	5.984E+03	6.600E+03	7.135E+03	7.512E+03	7.936E+03
SB128M	0.000E+00	8.661E+04	9.046E+04	9.305E+04	9.555E+04	9.756E+04	9.987E+04
I128	0.000E+00	5.722E+02	1.272E+03	2.094E+03	3.014E+03	4.107E+03	5.295E+03
CD129	0.000E+00	2.472E+02	2.507E+02	2.631E+02	2.792E+02	2.986E+02	3.183E+02
IN129	0.000E+00	1.144E+04	1.160E+04	1.195E+04	1.242E+04	1.292E+04	1.347E+04
SN129	0.000E+00	5.121E+04	5.377E+04	5.565E+04	5.759E+04	5.918E+04	6.101E+04
SN129M	0.000E+00	7.000E+04	7.021E+04	7.047E+04	7.090E+04	7.132E+04	7.191E+04
SB129	0.000E+00	1.518E+05	1.603E+05	1.659E+05	1.713E+05	1.754E+05	1.802E+05
TE129	0.000E+00	1.487E+05	1.576E+05	1.632E+05	1.686E+05	1.727E+05	1.774E+05
TE129M	0.000E+00	2.141E+04	2.335E+04	2.435E+04	2.523E+04	2.587E+04	2.659E+04
I129	0.000E+00	3.442E-03	7.288E-03	1.129E-02	1.540E-02	1.957E-02	2.380E-02
XE129M	0.000E+00	3.172E-02	1.336E-01	3.311E-01	6.444E-01	1.128E+00	1.795E+00
CD130	0.000E+00	3.051E+02	2.946E+02	2.939E+02	2.951E+02	3.017E+02	3.073E+02
IN130	0.000E+00	1.623E+04	1.570E+04	1.551E+04	1.543E+04	1.549E+04	1.556E+04
SN130	0.000E+00	1.906E+05	1.922E+05	1.938E+05	1.961E+05	1.981E+05	2.007E+05
SB130	0.000E+00	4.674E+04	5.059E+04	5.292E+04	5.508E+04	5.658E+04	5.835E+04
SB130M	0.000E+00	2.497E+05	2.536E+05	2.565E+05	2.599E+05	2.626E+05	2.662E+05
I130	0.000E+00	1.843E+03	3.786E+03	5.947E+03	8.229E+03	1.103E+04	1.396E+04
I130M	0.000E+00	7.019E+02	1.453E+03	2.294E+03	3.209E+03	4.277E+03	5.421E+03
CD131	0.000E+00	4.538E+01	4.421E+01	4.58E+01	4.519E+01	4.673E+01	4.806E+01
IN131	0.000E+00	5.896E+03	5.645E+03	5.564E+03	5.533E+03	5.576E+03	5.614E+03
SN131	0.000E+00	1.868E+05	1.821E+05	1.799E+05	1.790E+05	1.789E+05	1.791E+05
SB131	0.000E+00	4.816E+05	4.783E+05	4.767E+05	4.769E+05	4.772E+05	4.788E+05
TE131	0.000E+00	4.937E+05	4.956E+05	4.972E+05	5.002E+05	5.024E+05	5.062E+05
TE131M	0.000E+00	7.308E+04	7.592E+04	7.759E+04	7.921E+04	8.031E+04	8.171E+04
I131	0.000E+00	5.515E+05	5.556E+05	5.585E+05	5.629E+05	5.660E+05	5.709E+05
XE131M	0.000E+00	6.122E+03	6.169E+03	6.202E+03	6.251E+03	6.287E+03	6.344E+03
CD132	0.000E+00	4.161E+00	4.046E+00	4.075E+00	4.121E+00	4.259E+00	4.374E+00
IN132	0.000E+00	1.641E+03	1.540E+03	1.497E+03	1.466E+03	1.462E+03	1.455E+03

Calc. No. 2004-07600
 Project No. 11163-013
 Attachment B1

SNI32	0.000E+00	1.121E+05	1.059E+05	1.027E+05	1.004E+05	9.928E+04	9.814E+04	9.498E+04
SB132	0.000E+00	3.081E+05	2.985E+05	2.934E+05	2.901E+05	2.882E+05	2.869E+05	2.798E+05
SB132M	0.000E+00	1.945E+05	1.913E+05	1.895E+05	1.886E+05	1.880E+05	1.879E+05	1.842E+05
TE132	0.000E+00	8.035E+05	8.035E+05	8.037E+05	8.064E+05	8.082E+05	8.123E+05	8.031E+05
I132	0.000E+00	8.106E+05	8.122E+05	8.134E+05	8.170E+05	8.195E+05	8.244E+05	8.162E+05
CSI32	0.000E+00	1.659E+01	3.328E+01	5.084E+01	6.879E+01	8.892E+01	1.092E+02	1.478E+02
INI33	0.000E+00	1.576E+02	1.512E+02	1.504E+02	1.506E+02	1.540E+02	1.567E+02	1.614E+02
SNI33	0.000E+00	3.443E+04	3.214E+04	3.100E+04	3.019E+04	2.985E+04	2.948E+04	2.860E+04
SB133	0.000E+00	3.969E+05	3.748E+05	3.620E+05	3.524E+05	3.461E+05	3.400E+05	3.248E+05
TE133	0.000E+00	7.144E+05	7.008E+05	6.936E+05	6.903E+05	6.883E+05	6.880E+05	6.751E+05
TE133M	0.000E+00	4.997E+05	4.807E+05	4.673E+05	4.559E+05	4.465E+05	4.377E+05	4.153E+05

OUTPUT UNIT = 6

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ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
 FISSION PRODUCTS
 POWER= 2.16550E+01 MW, BURNUP= 3.39605E+04 MWD, FLUX= 2.07E+14 N/CM**2-SEC

7 SUMMARY TABLE: RADIOACTIVITY, CURIES

	BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
I133	0.000E+00	1.222E+06	1.204E+06	1.192E+06	1.185E+06	1.179E+06	1.176E+06	1.149E+06
I133M	0.000E+00	2.739E+04	2.987E+04	3.132E+04	3.260E+04	3.345E+04	3.447E+04	3.538E+04
XE133	0.000E+00	1.221E+06	1.204E+06	1.193E+06	1.186E+06	1.181E+06	1.178E+06	1.153E+06
XE133M	0.000E+00	3.649E+04	3.642E+04	3.636E+04	3.640E+04	3.640E+04	3.651E+04	3.599E+04
INI34	0.000E+00	7.762E+00	7.635E+00	7.774E+00	7.948E+00	8.294E+00	8.596E+00	9.145E+00
SNI34	0.000E+00	3.809E+03	3.666E+03	3.654E+03	3.677E+03	3.761E+03	3.838E+03	3.952E+03
SB134	0.000E+00	5.555E+04	5.366E+04	5.312E+04	5.315E+04	5.359E+04	5.413E+04	5.427E+04
SB134M	0.000E+00	5.174E+04	4.999E+04	4.946E+04	4.947E+04	4.983E+04	5.030E+04	5.032E+04
TE134	0.000E+00	1.153E+06	1.094E+06	1.058E+06	1.030E+06	1.009E+06	9.900E+05	9.414E+05
I134	0.000E+00	1.366E+06	1.337E+06	1.319E+06	1.308E+06	1.300E+06	1.294E+06	1.260E+06
I134M	0.000E+00	9.520E+04	1.034E+05	1.084E+05	1.132E+05	1.166E+05	1.206E+05	1.245E+05
XE134M	0.000E+00	5.699E+03	6.589E+03	7.115E+03	7.578E+03	7.891E+03	8.253E+03	8.654E+03
CSI34	0.000E+00	3.509E+03	1.324E+04	2.820E+04	4.745E+04	7.089E+04	9.770E+04	1.553E+05
CSI34M	0.000E+00	3.532E+03	7.073E+03	1.080E+04	1.460E+04	1.887E+04	2.317E+04	3.136E+04
SNI35	0.000E+00	4.467E+02	4.268E+02	4.228E+02	4.218E+02	4.294E+02	4.353E+02	4.453E+02
SB135	0.000E+00	3.791E+04	3.523E+04	3.381E+04	3.275E+04	3.219E+04	3.160E+04	3.029E+04
TE135	0.000E+00	5.793E+05	5.520E+05	5.367E+05	5.263E+05	5.195E+05	5.137E+05	4.954E+05
I135	0.000E+00	1.138E+06	1.120E+06	1.110E+06	1.105E+06	1.100E+06	1.099E+06	1.076E+06
XE135	0.000E+00	5.543E+05	5.524E+05	5.419E+05	5.331E+05	5.175E+05	5.060E+05	4.761E+05
XE135M	0.000E+00	2.162E+05	2.197E+05	2.217E+05	2.241E+05	2.256E+05	2.279E+05	2.271E+05
CSI35	0.000E+00	8.999E-02	1.809E-01	2.705E-01	3.588E-01	4.448E-01	5.292E-01	6.789E-01
CSI35M	0.000E+00	4.221E+02	1.148E+03	2.289E+03	3.820E+03	5.884E+03	8.372E+03	1.422E+04
BA135M	0.000E+00	3.087E-01	1.625E+00	5.065E+00	1.164E+01	2.285E+01	3.964E+01	8.994E+01
SNI36	0.000E+00	3.518E+01	3.421E+01	3.446E+01	3.488E+01	3.606E+01	3.705E+01	3.886E+01
SB136	0.000E+00	6.822E+03	6.397E+03	6.208E+03	6.079E+03	6.055E+03	6.019E+03	5.920E+03
TE136	0.000E+00	3.284E+05	3.078E+05	2.958E+05	2.867E+05	2.807E+05	2.748E+05	2.610E+05
I136	0.000E+00	5.537E+05	5.376E+05	5.292E+05	5.246E+05	5.220E+05	5.206E+05	5.090E+05
I136M	0.000E+00	3.385E+05	3.288E+05	3.224E+05	3.117E+05	3.140E+05	3.110E+05	3.001E+05
CSI36	0.000E+00	7.749E+03	1.331E+04	1.860E+04	2.401E+04	2.982E+04	3.589E+04	4.741E+04
BA136M	0.000E+00	1.277E+03	2.193E+03	3.066E+03	3.957E+03	4.914E+03	5.915E+03	7.813E+03

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SB137	0.000E+00	8.422E+02	8.111E+02	8.089E+02	8.122E+02	8.314E+02	8.474E+02	8.743E+02
TE137	0.000E+00	8.407E+04	7.949E+04	7.730E+04	7.589E+04	7.539E+04	7.489E+04	7.319E+04
II137	0.000E+00	5.770E+05	5.524E+05	5.381E+05	5.279E+05	5.211E+05	5.150E+05	4.964E+05
XE137	0.000E+00	1.075E+06	1.055E+06	1.043E+06	1.036E+06	1.030E+06	1.027E+06	1.002E+06
CS137	0.000E+00	1.389E+04	2.765E+04	4.125E+04	5.469E+04	6.796E+04	8.108E+04	1.048E+05
BA137M	0.000E+00	1.321E+04	2.625E+04	3.912E+04	5.184E+04	6.440E+04	7.682E+04	9.923E+04
SB138	0.000E+00	9.665E+01	9.432E+01	9.528E+01	9.667E+01	1.002E+02	1.031E+02	1.085E+02
TE138	0.000E+00	2.042E+04	1.924E+04	1.874E+04	1.841E+04	1.838E+04	1.832E+04	1.810E+04
II138	0.000E+00	2.975E+05	2.814E+05	2.722E+05	2.654E+05	2.610E+05	2.568E+05	2.461E+05
XE138	0.000E+00	1.089E+06	1.051E+06	1.026E+06	1.007E+06	9.926E+05	9.799E+05	9.416E+05
CS138	0.000E+00	1.184E+06	1.148E+06	1.125E+06	1.108E+06	1.095E+06	1.083E+06	1.045E+06
CS138M	0.000E+00	4.653E+04	4.789E+04	4.856E+04	4.920E+04	4.952E+04	5.002E+04	4.980E+04
SB139	0.000E+00	6.877E+00	6.757E+00	6.868E+00	7.000E+00	7.289E+00	7.536E+00	7.992E+00
TE139	0.000E+00	3.732E+03	3.550E+03	3.488E+03	3.451E+03	3.477E+03	3.492E+03	3.507E+03
II139	0.000E+00	1.358E+05	1.276E+05	1.229E+05	1.192E+05	1.168E+05	1.145E+05	1.090E+05
XE139	0.000E+00	8.777E+05	8.389E+05	8.147E+05	7.960E+05	7.821E+05	7.693E+05	7.349E+05
CS139	0.000E+00	1.124E+06	1.089E+06	1.067E+06	1.050E+06	1.037E+06	1.026E+06	9.899E+05
BA139	0.000E+00	1.143E+06	1.112E+06	1.092E+06	1.077E+06	1.066E+06	1.057E+06	1.022E+06
TE140	0.000E+00	4.377E+02	4.180E+02	4.133E+02	4.110E+02	4.171E+02	4.214E+02	4.290E+02
II140	0.000E+00	4.072E+04	3.766E+04	3.589E+04	3.443E+04	3.354E+04	3.257E+04	3.067E+04
XE140	0.000E+00	6.084E+05	5.733E+05	5.513E+05	5.336E+05	5.206E+05	5.080E+05	4.790E+05

OUTPUT UNIT = 6

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ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
 FISSION PRODUCTS

POWER= 2.16550E+01 MW, BURNUP= 3.39605E+04 MWD, FLUX= 2.07E+14 N/CM**2-SEC

7 SUMMARY TABLE: RADIOACTIVITY, CURIES

BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
CS140	0.000E+00	1.017E+06	9.842E+05	9.633E+05	9.476E+05	9.356E+05	9.252E+05
BA140	0.000E+00	1.100E+06	1.071E+06	1.052E+06	1.038E+06	1.027E+06	1.018E+06
LA140	0.000E+00	1.104E+06	1.079E+06	1.063E+06	1.052E+06	1.045E+06	1.013E+06
PR140	0.000E+00	1.107E+00	2.517E+00	4.027E+00	5.606E+00	7.416E+00	9.299E+00
TE141	0.000E+00	1.893E+01	1.820E+01	1.811E+01	1.812E+01	1.853E+01	1.884E+01
II141	0.000E+00	6.456E+03	5.977E+03	5.721E+03	5.513E+03	5.409E+03	5.289E+03
XE141	0.000E+00	2.099E+05	1.969E+05	1.895E+05	1.838E+05	1.802E+05	1.766E+05
CS141	0.000E+00	7.765E+05	7.469E+05	7.278E+05	7.127E+05	7.012E+05	6.907E+05
BA141	0.000E+00	1.043E+06	1.016E+06	9.978E+05	9.833E+05	9.714E+05	9.612E+05
LA141	0.000E+00	1.047E+06	1.021E+06	1.002E+06	9.875E+05	9.757E+05	9.655E+05
CE141	0.000E+00	1.032E+06	1.025E+06	1.009E+06	9.958E+05	9.849E+05	9.752E+05
TE142	0.000E+00	1.721E+00	1.700E+00	1.738E+00	1.779E+00	1.862E+00	1.933E+00
II142	0.000E+00	7.485E+02	7.128E+02	7.032E+02	6.982E+02	7.075E+02	7.138E+02
XE142	0.000E+00	2.270E+04	6.758E+04	6.481E+04	6.270E+04	6.153E+04	6.030E+04
CS142	0.000E+00	4.938E+05	4.677E+05	4.517E+05	4.390E+05	4.299E+05	4.211E+05
BA142	0.000E+00	1.014E+06	9.809E+05	9.587E+05	9.411E+05	9.270E+05	9.143E+05
LA142	0.000E+00	1.033E+06	1.001E+06	9.791E+05	9.618E+05	9.479E+05	9.354E+05
PR142	0.000E+00	3.828E+03	8.700E+03	1.392E+04	1.938E+04	2.563E+04	3.214E+04
PR142M	0.000E+00	7.242E+02	1.646E+03	2.633E+03	3.666E+03	4.850E+03	6.082E+03
II143	0.000E+00	4.404E+01	4.265E+01	4.280E+01	4.322E+01	4.452E+01	4.563E+01

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Project No. 11163-013
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XE143	0.000E+00	1.102E+04	1.037E+04	1.008E+04	1.898E+03	9.861E+03	9.818E+03	9.655E+03
CS143	0.000E+00	2.600E+05	2.424E+05	2.315E+05	2.225E+05	2.161E+05	2.096E+05	1.958E+05
BA143	0.000E+00	9.158E+05	8.793E+05	8.549E+05	8.350E+05	8.194E+05	8.048E+05	7.668E+05
LA143	0.000E+00	1.019E+06	9.799E+05	9.534E+05	9.314E+05	9.140E+05	8.977E+05	8.551E+05
CE143	0.000E+00	1.024E+06	9.846E+05	9.580E+05	9.362E+05	9.189E+05	9.027E+05	8.605E+05
PR143	0.000E+00	1.021E+06	9.817E+05	9.551E+05	9.332E+05	9.158E+05	8.996E+05	8.572E+05
I144	0.000E+00	3.337E+00	3.273E+00	3.323E+00	3.386E+00	3.524E+00	3.642E+00	3.859E+00
XE144	0.000E+00	1.791E+03	1.699E+03	1.669E+03	1.654E+03	1.668E+03	1.679E+03	1.689E+03
CS144	0.000E+00	6.256E+04	5.970E+04	5.837E+04	5.760E+04	5.737E+04	5.719E+04	5.614E+04
BA144	0.000E+00	7.271E+05	6.891E+05	6.644E+05	6.439E+05	6.284E+05	6.133E+05	5.783E+05
LA144	0.000E+00	9.216E+05	8.806E+05	8.532E+05	8.306E+05	8.129E+05	7.960E+05	7.546E+05
CE144	0.000E+00	3.650E+05	3.574E+05	3.532E+05	3.502E+05	3.476E+05	3.454E+05	3.398E+05
PR144	0.000E+00	3.681E+05	3.574E+05	3.532E+05	3.502E+05	3.476E+05	3.454E+05	3.398E+05
PR144M	0.000E+00	4.387E+03	6.912E+03	8.349E+03	9.130E+03	9.533E+03	9.701E+03	9.664E+03
XE145	0.000E+00	1.462E+02	1.458E+02	1.499E+02	1.547E+02	1.623E+02	1.692E+02	1.812E+02
CS145	0.000E+00	1.536E+04	1.471E+04	1.443E+04	1.427E+04	1.426E+04	1.425E+04	1.408E+04
BA145	0.000E+00	3.535E+05	3.378E+05	3.281E+05	3.204E+05	3.150E+05	3.099E+05	2.965E+05
LA145	0.000E+00	6.442E+05	6.194E+05	6.031E+05	5.901E+05	5.801E+05	5.708E+05	5.457E+05
CE145	0.000E+00	6.859E+05	6.615E+05	6.452E+05	6.322E+05	6.221E+05	6.127E+05	5.868E+05
PR145	0.000E+00	6.861E+05	6.617E+05	6.454E+05	6.324E+05	6.223E+05	6.129E+05	5.870E+05
XE146	0.000E+00	1.023E+01	1.003E+01	1.016E+01	1.034E+01	1.074E+01	1.108E+01	1.169E+01
CS146	0.000E+00	2.099E+03	2.018E+03	1.991E+03	1.991E+03	2.014E+03	2.034E+03	2.053E+03
BA146	0.000E+00	1.271E+05	1.213E+05	1.181E+05	1.158E+05	1.146E+05	1.134E+05	1.098E+05
LA146	0.000E+00	4.104E+05	3.953E+05	3.861E+05	3.792E+05	3.743E+05	3.699E+05	3.564E+05
CE146	0.000E+00	5.301E+05	5.144E+05	5.043E+05	4.968E+05	4.910E+05	4.861E+05	4.696E+05
PR146	0.000E+00	5.317E+05	5.161E+05	5.061E+05	4.986E+05	4.929E+05	4.880E+05	4.714E+05
PM146	0.000E+00	8.081E-02	2.901E-01	5.798E-01	9.154E-01	1.282E+00	1.659E+00	2.357E+00
XE147	0.000E+00	8.499E-01	8.422E-01	8.626E-01	8.850E-01	9.277E-01	9.644E-01	1.033E+00
CS147	0.000E+00	3.072E+02	2.994E+02	3.014E+02	3.048E+02	3.142E+02	3.222E+02	3.361E+02
BA147	0.000E+00	2.788E+04	2.666E+04	2.612E+04	2.579E+04	2.574E+04	2.568E+04	2.530E+04
LA147	0.000E+00	1.957E+05	1.888E+05	1.849E+05	1.822E+05	1.805E+05	1.791E+05	1.739E+05

OUTPUT UNIT = 6

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ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL

FISSION PRODUCTS

POWER= 2.16550E+01 MW, BURNUP= 3.39605E+04 MWD, FLUX= 2.07E+14 N/CM**2-SEC

7 SUMMARY TABLE: RADIOACTIVITY, CURIES

BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
CE147	0.000E+00	4.001E+05	3.901E+05	3.838E+05	3.795E+05	3.763E+05	3.738E+05
PR147	0.000E+00	4.100E+05	4.001E+05	3.939E+05	3.897E+05	3.864E+05	3.840E+05
ND147	0.000E+00	4.084E+05	3.989E+05	3.931E+05	3.893E+05	3.865E+05	3.845E+05
PM147	0.000E+00	4.476E+04	7.686E+04	9.693E+04	1.089E+05	1.150E+05	1.174E+05
CS148	0.000E+00	1.862E+01	1.834E+01	1.866E+01	1.904E+01	1.983E+01	2.051E+01
BA148	0.000E+00	4.411E+03	4.269E+03	4.246E+03	4.252E+03	4.317E+03	4.374E+03
LA148	0.000E+00	7.016E+04	6.798E+04	6.698E+04	6.645E+04	6.633E+04	6.629E+04
CE148	0.000E+00	2.807E+05	2.757E+05	2.729E+05	2.716E+05	2.708E+05	2.707E+05
PR148	0.000E+00	3.102E+05	3.056E+05	3.030E+05	3.020E+05	3.013E+05	3.013E+05
PM148	0.000E+00	4.977E+04	8.577E+04	1.112E+05	1.284E+05	1.419E+05	1.504E+05

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PM148M	0.000E+00	9.813E+03	1.716E+04	2.199E+04	2.504E+04	2.693E+04	2.790E+04	2.778E+04
BA149	0.000E+00	4.470E+02	4.388E+02	4.438E+02	4.513E+02	4.664E+02	4.801E+02	5.026E+02
LA149	0.000E+00	1.607E+04	1.571E+04	1.585E+04	1.571E+04	1.589E+04	1.608E+04	1.621E+04
CE149	0.000E+00	1.486E+05	1.469E+05	1.464E+05	1.468E+05	1.474E+05	1.484E+05	1.474E+05
PR149	0.000E+00	2.034E+05	2.031E+05	2.035E+05	2.048E+05	2.060E+05	2.078E+05	2.069E+05
ND149	0.000E+00	2.077E+05	2.084E+05	2.097E+05	2.120E+05	2.144E+05	2.174E+05	2.189E+05
PM149	0.000E+00	2.324E+05	2.520E+05	2.678E+05	2.806E+05	2.928E+05	3.029E+05	3.124E+05
CS150	0.000E+00	1.668E-02	1.655E-02	1.697E-02	1.743E-02	1.829E-02	1.903E-02	2.041E-02
BA150	0.000E+00	3.195E+01	3.154E+01	3.213E+01	3.286E+01	3.422E+01	3.544E+01	3.755E+01
CE150	0.000E+00	2.819E+03	2.785E+03	2.810E+03	2.857E+03	2.928E+03	3.002E+03	3.094E+03
LA150	0.000E+00	6.175E+04	6.221E+04	6.302E+04	6.424E+04	6.543E+04	6.685E+04	6.800E+04
PR150	0.000E+00	1.213E+05	1.241E+05	1.267E+05	1.298E+05	1.324E+05	1.356E+05	1.382E+05
PM150	0.000E+00	1.189E+03	1.290E+03	1.408E+03	1.518E+03	1.660E+03	1.788E+03	1.984E+03
LA151	0.000E+00	3.388E+02	3.358E+02	3.417E+02	3.502E+02	3.630E+02	3.755E+02	3.943E+02
CE151	0.000E+00	1.747E+04	1.769E+04	1.806E+04	1.858E+04	1.910E+04	1.970E+04	2.035E+04
PR151	0.000E+00	6.358E+04	6.585E+04	6.783E+04	7.017E+04	7.214E+04	7.446E+04	7.682E+04
ND151	0.000E+00	8.947E+04	9.426E+04	9.803E+04	1.022E+05	1.056E+05	1.096E+05	1.142E+05
PM151	0.000E+00	8.970E+04	9.455E+04	9.835E+04	1.022E+05	1.059E+05	1.100E+05	1.145E+05
SM151	0.000E+00	2.077E+02	2.971E+02	3.644E+02	3.851E+02	4.145E+02	4.442E+02	4.910E+02
BA152	0.000E+00	8.085E-02	8.031E-02	8.244E-02	8.479E-02	8.905E-02	9.277E-02	9.962E-02
LA152	0.000E+00	3.649E+01	3.620E+01	3.706E+01	3.814E+01	3.989E+01	4.151E+01	4.424E+01
CE152	0.000E+00	3.734E+03	3.755E+03	3.844E+03	3.970E+03	4.114E+03	4.269E+03	4.472E+03
PR152	0.000E+00	2.695E+04	2.804E+04	2.907E+04	3.032E+04	3.139E+04	3.264E+04	3.406E+04
ND152	0.000E+00	5.864E+04	6.287E+04	6.605E+04	6.946E+04	7.216E+04	7.530E+04	7.885E+04
PM152	0.000E+00	5.976E+04	6.415E+04	6.745E+04	7.097E+04	7.375E+04	7.700E+04	8.068E+04
PM152M	0.000E+00	9.143E+02	1.072E+03	1.172E+03	1.265E+03	1.331E+03	1.407E+03	1.497E+03
EU152	0.000E+00	1.198E+00	4.314E+00	7.556E+00	1.019E+01	1.212E+01	1.344E+01	1.472E+01
EU152M	0.000E+00	3.804E+01	6.832E+01	8.486E+01	9.588E+01	1.043E+02	1.119E+02	1.235E+02
LA153	0.000E+00	3.680E+00	3.661E+00	3.763E+00	3.879E+00	4.077E+00	4.254E+00	4.572E+00
CE153	0.000E+00	6.215E+02	6.244E+02	6.438E+02	6.689E+02	7.016E+02	7.341E+02	7.842E+02
PR153	0.000E+00	8.218E+03	8.529E+03	8.800E+03	9.339E+03	9.760E+03	1.023E+04	1.083E+04
ND153	0.000E+00	3.368E+04	3.613E+04	3.810E+04	4.030E+04	4.208E+04	4.416E+04	4.661E+04
PM153	0.000E+00	3.764E+04	4.069E+04	4.306E+04	4.564E+04	4.770E+04	5.010E+04	5.293E+04
SM153	0.000E+00	5.695E+04	8.534E+04	1.155E+05	1.461E+05	1.786E+05	2.106E+05	2.669E+05
GD153	0.000E+00	7.121E-02	5.783E-01	1.730E+00	3.494E+00	5.873E+00	8.761E+00	1.537E+01
LA154	0.000E+00	1.695E-01	1.688E-01	1.737E-01	1.790E-01	1.883E-01	1.965E-01	2.115E-01
CE154	0.000E+00	6.918E+01	6.983E+01	7.245E+01	7.560E+01	7.982E+01	8.391E+01	9.059E+01
PR154	0.000E+00	1.764E+03	1.868E+03	1.983E+03	2.122E+03	2.252E+03	2.396E+03	2.594E+03
ND154	0.000E+00	1.469E+04	1.654E+04	1.801E+04	1.960E+04	2.089E+04	2.236E+04	2.425E+04
PM154	0.000E+00	1.761E+04	2.011E+04	2.202E+04	2.403E+04	2.563E+04	2.746E+04	2.982E+04
PM154M	0.000E+00	2.656E+03	3.242E+03	3.638E+03	4.025E+03	4.312E+03	4.641E+03	5.061E+03

OUTPUT UNIT = 6

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ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
 FISSION PRODUCTS
 POWER= 2.16550E+01 MW, BURNUP= 3.39605E+04 MWD, FLUX= 2.07E+14 N/CM**2-SEC

7 SUMMARY TABLE: RADIOACTIVITY, CURIES

BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
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Calc. No. 2004-07600
 Project No. 11163-013
 Attachment B1

EU154	0.000E+00	1.184E+02	5.026E+02	1.202E+03	2.240E+03	3.640E+03	5.368E+03	9.310E+03
CE155	0.000E+00	7.928E+00	3.996E+00	8.298E+02	8.637E+00	9.130E+00	9.589E+00	1.038E+01
PR155	0.000E+00	3.369E+02	3.578E+02	3.827E+02	4.118E+02	4.409E+02	4.720E+02	5.176E+02
ND155	0.000E+00	5.293E+03	6.040E+03	6.660E+03	7.339E+03	7.904E+03	8.543E+03	9.399E+03
PM155	0.000E+00	9.986E+01	1.184E+04	1.324E+04	1.469E+04	1.584E+04	1.715E+04	1.888E+04
SM155	0.000E+00	1.105E+04	1.334E+04	1.507E+04	1.687E+04	1.834E+04	2.002E+04	2.241E+04
EU155	0.000E+00	5.177E+02	9.814E+02	1.486E+03	2.135E+03	2.964E+03	4.025E+03	6.554E+03
GD155M	0.000E+00	6.636E-04	5.505E-03	1.992E-02	5.038E-02	1.066E-01	1.964E-01	4.828E-01
CE156	0.000E+00	7.477E-01	7.541E-01	7.828E-01	8.114E-01	8.611E-01	9.041E-01	9.799E-01
PR156	0.000E+00	5.817E+01	6.272E+01	6.802E+01	7.400E+01	8.013E+01	8.653E+01	9.631E+01
ND156	0.000E+00	1.573E+03	1.890E+03	2.160E+03	2.456E+03	2.705E+03	2.985E+03	3.375E+03
PM156	0.000E+00	4.592E+03	5.796E+03	6.718E+03	7.685E+03	8.459E+03	9.333E+03	1.053E+04
SM156	0.000E+00	6.023E+03	7.743E+03	9.010E+03	1.031E+04	1.132E+04	1.247E+04	1.403E+04
EU156	0.000E+00	1.109E+04	1.761E+04	2.452E+04	3.335E+04	4.511E+04	6.046E+04	9.679E+04
CE157	0.000E+00	5.984E-02	5.987E-02	6.181E-02	6.391E-02	6.739E-02	7.048E-02	7.611E-02
PR157	0.000E+00	9.619E+00	1.007E+01	1.075E+01	1.152E+01	1.239E+01	1.327E+01	1.468E+01
ND157	0.000E+00	4.251E+02	5.080E+02	5.840E+02	6.690E+02	7.436E+02	8.261E+02	9.450E+02
PM157	0.000E+00	2.018E+03	2.606E+03	3.077E+03	3.583E+03	3.996E+03	4.461E+03	5.109E+03
SM157	0.000E+00	3.596E+03	4.771E+03	5.658E+03	6.581E+03	7.313E+03	8.139E+03	9.277E+03
EU157	0.000E+00	3.897E+03	5.236E+03	6.303E+03	7.458E+03	8.519E+03	9.786E+03	1.203E+04
PR158	0.000E+00	7.588E-01	7.789E-01	8.201E-01	8.665E-01	9.257E-01	9.828E-01	1.078E+00
ND158	0.000E+00	6.530E+01	7.708E+01	8.845E+01	1.013E+02	1.129E+02	1.256E+02	1.442E+02
PM158	0.000E+00	6.033E+02	7.943E+02	9.530E+02	1.127E+03	1.270E+03	1.432E+03	1.658E+03
SM158	0.000E+00	1.805E+03	2.449E+03	2.950E+03	3.483E+03	3.907E+03	4.388E+03	5.054E+03
EU158	0.000E+00	1.931E+03	2.627E+03	3.164E+03	3.732E+03	4.184E+03	4.696E+03	5.405E+03
PR159	0.000E+00	3.081E-02	3.128E-02	3.268E-02	3.423E-02	3.640E-02	3.843E-02	4.193E-02
ND159	0.000E+00	6.976E+00	7.942E+00	8.955E+00	1.011E+01	1.120E+01	1.237E+01	1.414E+01
PM159	0.000E+00	1.297E+02	1.728E+02	2.098E+02	2.508E+02	2.850E+02	3.235E+02	3.782E+02
SM159	0.000E+00	7.592E+02	1.072E+03	1.321E+03	1.588E+03	1.802E+03	2.045E+03	2.384E+03
EU159	0.000E+00	9.243E+02	1.311E+03	1.613E+03	1.935E+03	2.192E+03	2.484E+03	2.890E+03
GD159	0.000E+00	9.508E+02	1.377E+03	1.733E+03	2.124E+03	2.472E+03	2.875E+03	3.557E+03
ND160	0.000E+00	7.125E-01	7.515E-01	8.004E-01	8.556E-01	9.145E-01	9.753E-01	1.068E+00
PM160	0.000E+00	2.712E+01	3.343E+01	3.873E+01	4.448E+01	4.932E+01	5.472E+01	6.233E+01
SM160	0.000E+00	2.929E+02	4.063E+02	4.944E+02	5.873E+02	6.618E+02	7.458E+02	8.631E+02
EU160	0.000E+00	4.282E+02	6.094E+02	7.477E+02	8.922E+02	1.007E+03	1.137E+03	1.318E+03
TB160	0.000E+00	1.575E+01	5.496E+01	1.134E+02	1.899E+02	2.888E+02	4.073E+02	6.825E+02
ND161	0.000E+00	5.301E-02	5.460E-02	5.745E-02	6.053E-02	6.449E-02	6.827E-02	7.465E-02
PM161	0.000E+00	3.199E+00	3.889E+00	4.488E+00	5.128E+00	5.695E+00	6.310E+00	7.214E+00
SM161	0.000E+00	7.780E+01	1.088E+02	1.331E+02	1.585E+02	1.792E+02	2.023E+02	2.351E+02
EU161	0.000E+00	1.814E+02	2.612E+02	3.219E+02	3.848E+02	4.350E+02	4.914E+02	5.705E+02
GD161	0.000E+00	2.081E+02	3.012E+02	3.719E+02	4.453E+02	5.042E+02	5.705E+02	6.650E+02
TB161	0.000E+00	2.097E+02	3.064E+02	3.828E+02	4.639E+02	5.339E+02	6.141E+02	7.429E+02
PM162	0.000E+00	1.852E-01	1.969E-01	2.137E-01	2.335E-01	2.548E-01	2.768E-01	3.114E-01
SM162	0.000E+00	1.378E+01	1.630E+01	1.866E+01	2.125E+01	2.360E+01	2.616E+01	2.993E+01
EU162	0.000E+00	6.446E+01	8.479E+01	1.005E+02	1.166E+02	1.299E+02	1.445E+02	1.654E+02
GD162	0.000E+00	1.108E+02	1.534E+02	1.840E+02	2.142E+02	2.382E+02	2.647E+02	3.020E+02
TB162	0.000E+00	1.096E+02	1.519E+02	1.823E+02	2.122E+02	2.359E+02	2.622E+02	2.991E+02
TB162M	0.000E+00	3.244E+00	4.662E+00	5.633E+00	6.562E+00	7.274E+00	8.066E+00	9.163E+00
SM163	0.000E+00	1.827E+00	2.016E+00	2.227E+00	2.463E+00	2.699E+00	2.947E+00	3.328E+00
EU163	0.000E+00	1.702E+01	2.098E+01	2.424E+01	2.764E+01	3.059E+01	3.379E+01	3.846E+01
GD163	0.000E+00	4.701E+01	6.324E+01	7.503E+01	8.662E+01	9.595E+01	1.062E+02	1.207E+02

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
 FISSION PRODUCTS
 POWER= 2.16550E+01 MW, BURNUP= 3.39605E+04 MWD, FLUX= 2.07E+14 N/CM**2-SEC

7 SUMMARY TABLE: RADIOACTIVITY, CURIES

	BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
TB163	0.000E+00	5.023E+01	6.815E+01	8.101E+01	9.359E+01	1.036E+02	1.147E+02	1.303E+02
SM164	0.000E+00	1.853E+01	1.948E+01	2.085E+01	2.238E+01	2.414E+01	2.589E+01	2.872E+01
EU164	0.000E+00	4.024E+00	4.621E+00	5.159E+00	5.719E+00	6.247E+00	6.803E+00	7.411E+00
GD164	0.000E+00	2.061E+01	2.643E+01	3.071E+01	3.489E+01	3.834E+01	4.210E+01	4.748E+01
TB164	0.000E+00	2.472E+01	3.244E+01	3.797E+01	4.328E+01	4.758E+01	5.228E+01	5.895E+01
SM165	0.000E+00	1.256E-02	1.286E-02	1.351E-02	1.424E-02	1.519E-02	1.611E-02	1.765E-02
EU165	0.000E+00	7.267E-01	7.884E-01	8.543E-01	9.238E-01	9.970E-01	1.071E+00	1.188E+00
GD165	0.000E+00	7.793E+00	9.413E+00	1.067E+01	1.190E+01	1.297E+01	1.411E+01	1.579E+01
TB165	0.000E+00	1.173E+01	1.488E+01	1.715E+01	1.931E+01	2.110E+01	2.303E+01	2.581E+01
DY165	0.000E+00	2.029E+01	3.572E+01	5.474E+01	7.926E+01	1.121E+02	1.544E+02	2.640E+02
DY165M	0.000E+00	1.136E+01	2.074E+01	3.252E+01	4.778E+01	6.834E+01	9.489E+01	1.639E+02
DY166	0.000E+00	7.048E+00	9.180E+00	1.077E+01	1.236E+01	1.369E+01	1.516E+01	1.735E+01
HO166	0.000E+00	7.844E+00	1.156E+01	1.580E+01	2.1139E+01	2.888E+01	3.909E+01	6.756E+01
ER167M	0.000E+00	3.208E-02	8.520E-02	1.645E-01	2.774E-01	4.454E-01	6.810E-01	1.404E+00
ER169	0.000E+00	1.217E-03	5.026E-03	1.200E-02	2.249E-02	3.791E-02	5.823E-02	1.125E-01
TM170	0.000E+00	1.139E-05	1.588E-04	7.175E-04	2.052E-03	4.692E-03	9.190E-03	2.489E-02
SUMTOT	0.000E+00	1.039E+08	1.030E+08	1.023E+08	1.019E+08	1.017E+08	1.017E+08	9.989E+07
TOTAL	0.000E+00	1.039E+08	1.030E+08	1.023E+08	1.019E+08	1.017E+08	1.017E+08	9.989E+07

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
 FISSION PRODUCTS
 POWER= 2.16550E+01 MW, BURNUP= 3.39605E+04 MWD, FLUX= 2.07E+14 N/CM**2-SEC

7 SUMMARY TABLE: RADIOACTIVITY, CURIES

	BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
H	0.000E+00	6.662E+01	1.347E+02	2.032E+02	2.718E+02	3.400E+02	4.082E+02	5.323E+02
CO	0.000E+00	1.055E+00	1.037E+00	1.055E+00	1.077E+00	1.122E+00	1.162E+00	1.234E+00
NI	0.000E+00	4.078E+01	3.968E+01	3.990E+01	4.032E+01	4.154E+01	4.257E+01	4.439E+01
CU	0.000E+00	3.044E+02	2.887E+02	2.822E+02	2.773E+02	2.774E+02	2.765E+02	2.742E+02
ZN	0.000E+00	3.183E+03	2.962E+03	2.832E+03	2.720E+03	2.652E+03	2.578E+03	2.434E+03
GA	0.000E+00	1.635E+04	1.511E+04	1.433E+04	1.365E+04	1.318E+04	1.268E+04	1.173E+04
GE	0.000E+00	1.034E+05	9.564E+04	9.059E+04	8.611E+04	8.286E+04	7.944E+04	7.286E+04
AS	0.000E+00	3.117E+05	2.873E+05	2.711E+05	2.566E+05	2.458E+05	2.345E+05	2.129E+05
SE	0.000E+00	9.409E+05	8.641E+05	8.122E+05	7.656E+05	7.304E+05	6.935E+05	6.239E+05
BR	0.000E+00	2.111E+06	1.927E+06	1.801E+06	1.688E+06	1.601E+06	1.510E+06	1.341E+06
KR	0.000E+00	3.729E+06	3.414E+06	3.201E+06	3.008E+06	2.861E+06	2.707E+06	2.419E+06
RB	0.000E+00	5.091E+06	4.687E+06	4.412E+06	4.166E+06	3.977E+06	3.780E+06	3.406E+06

Calc. No. 2004-07600
Project No. 11163-013
Attachment B1

SR	0.000E+00	6.869E+06	6.491E+06	6.205E+06	5.950E+06	5.757E+06	5.559E+06	5.151E+06
Y	0.000E+00	8.883E+06	8.509E+06	8.204E+06	7.933E+06	7.729E+06	7.523E+06	7.067E+06
ZR	0.000E+00	6.162E+06	6.111E+06	6.018E+06	5.943E+06	5.886E+06	5.840E+06	5.665E+06
NB	0.000E+00	8.573E+06	8.695E+06	8.655E+06	8.628E+06	8.606E+06	8.605E+06	8.461E+06
MO	0.000E+00	4.453E+06	4.640E+06	4.777E+06	4.955E+06	5.090E+06	5.251E+06	5.411E+06
TC	0.000E+00	4.581E+06	4.896E+06	5.144E+06	5.412E+06	5.635E+06	5.893E+06	6.207E+06
RU	0.000E+00	1.305E+06	1.624E+06	1.858E+06	2.093E+06	2.285E+06	2.492E+06	2.781E+06
RH	0.000E+00	1.440E+06	1.864E+06	2.202E+06	2.542E+06	2.839E+06	3.152E+06	3.620E+06
PD	0.000E+00	1.500E+05	1.960E+05	2.331E+05	2.725E+05	3.066E+05	3.449E+05	4.044E+05
AG	0.000E+00	1.640E+05	2.100E+05	2.518E+05	2.981E+05	3.430E+05	3.936E+05	4.818E+05
CD	0.000E+00	7.455E+04	7.659E+04	7.939E+04	8.243E+04	8.604E+04	8.965E+04	9.509E+04
IN	0.000E+00	1.670E+05	1.729E+05	1.795E+05	1.863E+05	1.937E+05	2.011E+05	2.113E+05
SN	0.000E+00	8.042E+05	8.041E+05	8.077E+05	8.145E+05	8.222E+05	8.318E+05	8.342E+05
SB	0.000E+00	2.120E+06	2.103E+06	2.098E+06	2.102E+06	2.109E+06	2.120E+06	2.103E+06
TE	0.000E+00	4.970E+06	4.848E+06	4.776E+06	4.730E+06	4.697E+06	4.675E+06	4.554E+06
I	0.000E+00	7.163E+06	7.041E+06	6.971E+06	6.934E+06	6.909E+06	6.900E+06	6.762E+06
XE	0.000E+00	5.986E+06	5.820E+06	5.707E+06	5.624E+06	5.553E+06	5.496E+06	5.302E+06
CS	0.000E+00	5.011E+06	4.866E+06	4.791E+06	4.748E+06	4.732E+06	4.727E+06	4.660E+06
BA	0.000E+00	6.471E+06	6.268E+06	6.139E+06	6.041E+06	5.969E+06	5.905E+06	5.699E+06
LA	0.000E+00	6.465E+06	6.251E+06	6.111E+06	6.001E+06	5.916E+06	5.840E+06	5.614E+06
CE	0.000E+00	4.550E+06	4.658E+06	4.701E+06	4.707E+06	4.695E+06	4.669E+06	4.523E+06
PR	0.000E+00	3.761E+06	3.893E+06	3.965E+06	3.998E+06	4.010E+06	4.008E+06	3.926E+06
ND	0.000E+00	8.199E+05	8.256E+05	8.325E+05	8.434E+05	8.530E+05	8.658E+05	8.713E+05
PM	0.000E+00	5.636E+05	6.781E+05	7.592E+05	8.204E+05	8.669E+05	9.038E+05	9.358E+05
SM	0.000E+00	8.079E+04	1.155E+05	1.505E+05	1.861E+05	2.225E+05	2.591E+05	3.217E+05
EU	0.000E+00	1.921E+04	2.932E+04	3.958E+04	5.238E+04	6.833E+04	8.876E+04	1.352E+05
GD	0.000E+00	1.345E+03	1.931E+03	2.407E+03	2.920E+03	3.367E+03	3.881E+03	4.724E+03
TB	0.000E+00	4.250E+02	6.334E+02	8.203E+02	1.029E+03	1.238E+03	1.482E+03	1.949E+03
DY	0.000E+00	3.870E+01	6.565E+01	9.803E+01	1.394E+02	1.941E+02	2.644E+02	4.453E+02
HO	0.000E+00	7.844E+00	1.156E+01	1.580E+01	2.139E+01	2.888E+01	3.909E+01	6.756E+01
ER	0.000E+00	3.329E-02	9.022E-02	1.765E-01	2.999E-01	4.833E-01	7.393E-01	1.517E+00
TM	0.000E+00	1.495E-05	1.883E-04	8.242E-04	2.321E-03	5.270E-03	1.027E-02	2.772E-02
SUMTOT	0.000E+00	1.039E+08	1.030E+08	1.023E+08	1.019E+08	1.017E+08	1.017E+08	9.989E+07

CUMULATIVE TABLE TOTALS

TOTAL	0.000E+00	1.039E+08	1.030E+08	1.023E+08	1.019E+08	1.017E+08	1.017E+08	9.989E+07
AP+FP	0.000E+00	1.039E+08	1.030E+08	1.023E+08	1.019E+08	1.017E+08	1.017E+08	9.989E+07
ACT+FP	2.315E+00	1.230E+08	1.221E+08	1.221E+08	1.221E+08	1.234E+08	1.245E+08	1.248E+08
AP+ACT+FP	2.315E+00	1.230E+08	1.221E+08	1.221E+08	1.224E+08	1.234E+08	1.245E+08	1.248E+08

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21
OUTPUT UNIT = 6

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
FISSION PRODUCTS
POWER= 2.16550E+01 MW, BURNUP= 3.39605E+04 MWD, FLUX= 2.07E+14 N/CM**2-SEC

9 SUMMARY TABLE: THERMAL POWER, WATTS

BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
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Calc. No. 2004-07600
 Project No. 11163-013
 Attachment B1

H 3	0.000E+00	2.243E-03	4.537E-03	6.841E-03	9.150E-03	1.145E-02	1.374E-02	1.792E-02
CO 72	0.000E+00	3.900E-02	3.827E-02	3.895E-02	3.960E-02	4.120E-02	4.258E-02	4.509E-02
NI 72	0.000E+00	2.839E-01	2.798E-01	2.836E-01	2.887E-01	2.987E-01	3.076E-01	3.226E-01
CU 72	0.000E+00	7.606E-01	7.725E-01	7.940E-01	8.170E-01	8.478E-01	8.772E-01	9.221E-01
ZN 72	0.000E+00	4.583E-02	4.764E-02	4.954E-02	5.144E-02	5.359E-02	5.571E-02	5.884E-02
GA 72	0.000E+00	5.766E-01	5.998E-01	6.239E-01	6.480E-01	6.751E-01	7.020E-01	7.415E-01
CO 73	0.000E+00	1.039E-02	1.031E-02	1.058E-02	1.089E-02	1.144E-02	1.193E-02	1.282E-02
NI 73	0.000E+00	3.821E-01	3.750E-01	3.813E-01	3.896E-01	4.062E-01	4.209E-01	4.470E-01
CU 73	0.000E+00	8.598E-01	8.337E-01	8.338E-01	8.387E-01	8.585E-01	8.754E-01	9.029E-01
ZN 73	0.000E+00	1.009E+00	1.002E+00	1.009E+00	1.018E+00	1.036E+00	1.054E+00	1.075E+00
GA 73	0.000E+00	3.232E-01	3.233E-01	3.268E-01	3.309E-01	3.374E-01	3.437E-01	3.514E-01
GE 73M	0.000E+00	2.839E-02	2.840E-02	2.871E-02	2.907E-02	2.965E-02	3.020E-02	3.088E-02
CO 74	0.000E+00	2.894E-03	2.812E-03	2.831E-03	2.859E-03	2.953E-03	3.029E-03	3.173E-03
NI 74	0.000E+00	2.264E-01	2.160E-01	2.134E-01	2.118E-01	2.148E-01	2.167E-01	2.204E-01
CU 74	0.000E+00	2.223E+00	2.115E+00	2.070E+00	2.034E+00	2.033E+00	2.025E+00	2.006E+00
ZN 74	0.000E+00	9.420E-01	9.236E-01	9.166E-01	9.112E-01	9.137E-01	9.150E-01	9.091E-01
GA 74	0.000E+00	3.927E+00	3.881E+00	3.869E+00	3.862E+00	3.882E+00	3.898E+00	3.887E+00
CO 75	0.000E+00	3.444E-04	3.346E-04	3.368E-04	3.403E-04	3.515E-04	3.606E-04	3.778E-04
NI 75	0.000E+00	1.395E-01	1.328E-01	1.310E-01	1.299E-01	1.317E-01	1.328E-01	1.349E-01
CU 75	0.000E+00	1.868E+00	1.757E+00	1.704E+00	1.662E+00	1.652E+00	1.635E+00	1.603E+00
ZN 75	0.000E+00	5.751E+00	5.531E+00	5.414E+00	5.315E+00	5.275E+00	5.226E+00	5.097E+00
GA 75	0.000E+00	2.756E+00	2.693E+00	2.661E+00	2.633E+00	2.626E+00	2.617E+00	2.573E+00
GE 75	0.000E+00	9.345E-01	9.149E-01	9.050E-01	8.967E-01	8.949E-01	8.925E-01	8.787E-01
GE 75M	0.000E+00	1.178E-02	1.176E-02	1.177E-02	1.178E-02	1.184E-02	1.190E-02	1.185E-02
NI 76	0.000E+00	3.160E-02	2.978E-02	2.910E-02	2.860E-02	2.873E-02	2.872E-02	2.875E-02
CU 76	0.000E+00	2.323E+00	2.146E+00	2.050E+00	1.970E+00	1.930E+00	1.882E+00	1.795E+00
ZN 76	0.000E+00	7.881E+00	7.343E+00	7.013E+00	6.723E+00	6.534E+00	6.329E+00	5.931E+00
GA 76	0.000E+00	2.444E+01	2.324E+01	2.247E+01	2.179E+01	2.132E+01	2.084E+01	1.978E+01
AS 76	0.000E+00	2.156E-02	4.216E-02	6.477E-02	8.742E-02	1.141E-01	1.420E-01	1.981E-01
NI 77	0.000E+00	7.192E-03	6.825E-03	6.714E-03	6.638E-03	6.713E-03	6.751E-03	6.834E-03
CU 77	0.000E+00	8.785E-01	8.124E-01	7.755E-01	7.480E-01	7.347E-01	7.179E-01	6.886E-01
ZN 77	0.000E+00	1.744E+01	1.612E+01	1.530E+01	1.458E+01	1.411E+01	1.359E+01	1.262E+01
GE 77	0.000E+00	2.468E+01	2.327E+01	2.232E+01	2.145E+01	2.082E+01	2.016E+01	1.882E+01
GA 77	0.000E+00	6.708E+00	6.509E+00	6.357E+00	6.214E+00	6.103E+00	5.991E+00	5.717E+00
SE 77M	0.000E+00	9.412E+00	8.975E+00	8.673E+00	8.395E+00	8.190E+00	7.977E+00	7.519E+00
AS 77	0.000E+00	2.633E+00	2.527E+00	2.452E+00	2.383E+00	2.331E+00	2.277E+00	2.157E+00
SE 77M	0.000E+00	6.882E-03	6.630E-03	6.473E-03	6.349E-03	6.296E-03	6.265E-03	6.238E-03
NI 78	0.000E+00	7.063E-04	6.710E-04	6.611E-04	6.548E-04	6.633E-04	6.683E-04	6.784E-04
CU 78	0.000E+00	4.440E-01	4.085E-01	3.895E-01	3.736E-01	3.660E-01	3.567E-01	3.403E-01
ZN 78	0.000E+00	1.390E+01	1.262E+01	1.182E+01	1.111E+01	1.063E+01	1.011E+01	9.167E+00
GA 78	0.000E+00	8.555E+01	7.915E+01	7.488E+01	7.107E+01	6.822E+01	6.525E+01	5.952E+01
GE 78	0.000E+00	1.156E+01	1.132E+01	1.114E+01	1.097E+01	1.083E+01	1.070E+01	1.032E+01
AS 78	0.000E+00	6.008E+01	5.907E+01	5.823E+01	5.746E+01	5.681E+01	5.622E+01	5.431E+01
CU 79	0.000E+00	8.322E-02	7.947E-02	7.868E-02	7.830E-02	7.969E-02	8.064E-02	8.250E-02
ZN 79	0.000E+00	1.212E+01	1.124E+01	1.081E+01	1.045E+01	1.031E+01	1.013E+01	9.802E+00
GA 79	0.000E+00	6.680E+01	6.211E+01	5.930E+01	5.690E+01	5.538E+01	5.373E+01	5.052E+01
GE 79	0.000E+00	1.039E+02	1.007E+02	9.847E+01	9.651E+01	9.506E+01	9.363E+01	8.989E+01
AS 79	0.000E+00	5.085E+01	4.924E+01	4.828E+01	4.700E+01	4.618E+01	4.536E+01	4.332E+01
SE 79M	0.000E+00	5.500E+00	5.324E+00	5.202E+00	5.088E+00	5.001E+00	4.914E+00	4.696E+00
CU 80	0.000E+00	1.374E-02	1.300E-02	1.276E-02	1.258E-02	1.270E-02	1.274E-02	1.285E-02
ZN 80	0.000E+00	3.789E+00	3.467E+00	3.286E+00	3.132E+00	3.046E+00	2.947E+00	2.772E+00

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
 FISSION PRODUCTS
 POWER= 2.16550E+01 MW, BURNUP= 3.39605E+04 MWD, FLUX= 2.07E+14 N/CM**2-SEC

9 SUMMARY TABLE: THERMAL POWER, WATTS

	BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
GA 80	0.000E+00	1.263E+02	1.147E+02	1.073E+02	1.007E+02	9.607E+01	9.111E+01	8.205E+01
GE 80	0.000E+00	1.151E+02	1.083E+02	1.036E+02	0.992E+02	9.593E+01	9.250E+01	8.547E+01
AS 80	0.000E+00	4.088E+02	3.978E+02	3.822E+02	3.715E+02	3.628E+02	3.542E+02	3.342E+02
BR 80	0.000E+00	1.106E-03	1.444E-03	1.652E-03	1.838E-03	1.977E-03	2.138E-03	2.378E-03
BR 80M	0.000E+00	6.812E-05	9.427E-05	1.100E-04	1.237E-04	1.333E-04	1.441E-04	1.587E-04
CU 81	0.000E+00	9.000E-04	8.615E-04	8.548E-04	8.521E-04	8.689E-04	8.807E-04	9.040E-04
ZN 81	0.000E+00	1.396E+00	1.292E+00	1.241E+00	1.197E+00	1.181E+00	1.159E+00	1.122E+00
GA 81	0.000E+00	5.727E+01	5.197E+01	4.872E+01	4.587E+01	4.397E+01	4.191E+01	3.821E+01
GE 81	0.000E+00	4.739E+02	4.370E+02	4.123E+02	3.902E+02	3.737E+02	3.565E+02	3.237E+02
AS 81	0.000E+00	3.555E+02	3.389E+02	3.270E+02	3.160E+02	3.074E+02	2.987E+02	2.799E+02
SE 81	0.000E+00	1.371E+02	1.314E+02	1.272E+02	1.233E+02	1.203E+02	1.172E+02	1.103E+02
SE 81M	0.000E+00	6.870E-01	6.522E-01	6.246E-01	5.981E-01	5.758E-01	5.531E-01	5.066E-01
GA 82	0.000E+00	3.398E+01	3.093E+01	2.916E+01	2.763E+01	2.671E+01	2.567E+01	2.382E+01
GE 82	0.000E+00	2.795E+02	2.534E+02	2.365E+02	2.217E+02	2.109E+02	1.995E+02	1.787E+02
AS 82	0.000E+00	7.579E+02	6.975E+02	6.573E+02	6.216E+02	5.950E+02	5.671E+02	5.142E+02
AS 82M	0.000E+00	4.643E+02	4.380E+02	4.192E+02	4.020E+02	3.883E+02	3.744E+02	3.457E+02
BR 82	0.000E+00	7.721E+00	1.428E+01	2.086E+01	2.754E+01	3.492E+01	4.247E+01	5.697E+01
BR 82M	0.000E+00	7.988E-02	1.481E-01	2.195E-01	2.903E-01	3.708E-01	4.528E-01	6.117E-01
ZN 83	0.000E+00	1.662E-02	1.569E-02	1.536E-02	1.511E-02	1.521E-02	1.523E-02	1.529E-02
GA 83	0.000E+00	8.452E+00	7.727E+00	7.319E+00	6.969E+00	6.776E+00	6.551E+00	6.158E+00
GE 83	0.000E+00	5.031E+02	4.531E+02	4.213E+02	3.932E+02	3.734E+02	3.522E+02	3.141E+02
AS 83	0.000E+00	1.096E+03	9.974E+02	9.319E+02	8.735E+02	8.298E+02	7.839E+02	6.989E+02
SE 83	0.000E+00	6.165E+02	5.846E+02	5.624E+02	5.424E+02	5.268E+02	5.110E+02	4.773E+02
SE 83M	0.000E+00	7.387E+02	6.885E+02	6.542E+02	6.235E+02	5.999E+02	5.756E+02	5.273E+02
BR 83	0.000E+00	1.791E+02	1.685E+02	1.611E+02	1.545E+02	1.494E+02	1.442E+02	1.334E+02
KR 83M	0.000E+00	2.221E+01	2.089E+01	1.998E+01	1.917E+01	1.854E+01	1.790E+01	1.659E+01
GA 84	0.000E+00	9.581E-01	9.090E-01	8.950E-01	8.871E-01	8.984E-01	9.056E-01	9.187E-01
GE 84	0.000E+00	1.061E+02	9.799E+01	9.380E+01	9.048E+01	8.896E+01	8.715E+01	8.373E+01
AS 84	0.000E+00	1.877E+03	1.710E+03	1.603E+03	1.509E+03	1.442E+03	1.371E+03	1.239E+03
SE 84	0.000E+00	9.206E+02	8.524E+02	8.059E+02	7.641E+02	7.320E+02	6.988E+02	6.344E+02
BR 84	0.000E+00	3.041E+03	2.825E+03	2.676E+03	2.543E+03	2.440E+03	2.334E+03	2.126E+03
BR 84M	0.000E+00	8.163E+01	8.639E+01	8.872E+01	9.058E+01	9.153E+01	9.282E+01	9.297E+01
GE 85	0.000E+00	4.392E+01	3.982E+01	3.736E+01	3.522E+01	3.387E+01	3.236E+01	2.970E+01
AS 85	0.000E+00	1.028E+03	9.255E+02	8.585E+02	7.990E+02	7.556E+02	7.095E+02	6.265E+02
SE 85	0.000E+00	2.045E+03	1.869E+03	1.750E+03	1.643E+03	1.561E+03	1.475E+03	1.315E+03
SE 85M	0.000E+00	1.544E+03	1.420E+03	1.334E+03	1.256E+03	1.196E+03	1.133E+03	1.013E+03
BR 85	0.000E+00	1.279E+03	1.186E+03	1.121E+03	1.061E+03	1.015E+03	9.675E+02	8.750E+02
KR 85	0.000E+00	2.407E+00	4.578E+00	6.566E+00	8.383E+00	1.006E+01	1.159E+01	1.410E+01
KR 85M	0.000E+00	5.131E+02	4.759E+02	4.499E+02	4.263E+02	4.079E+02	3.888E+02	3.519E+02
GE 86	0.000E+00	7.430E+00	6.751E+00	6.350E+00	6.002E+00	5.789E+00	5.549E+00	5.129E+00
AS 86	0.000E+00	7.647E+02	6.843E+02	6.331E+02	5.856E+02	5.518E+02	5.157E+02	4.516E+02

Calc. No. 2004-07600
 Project No. 11163-013
 Attachment B1

SE 86	0.000E+00	3.068E+03	2.776E+03	2.579E+03	2.403E+03	2.270E+03	2.129E+03	1.872E+03
BR 86	0.000E+00	4.678E+03	4.297E+03	4.035E+03	3.798E+03	3.615E+03	3.425E+03	3.064E+03
BR 86M	0.000E+00	4.399E+03	4.038E+03	3.790E+03	3.566E+03	3.393E+03	3.213E+03	2.873E+03
RB 86	0.000E+00	8.211E-01	1.514E+00	2.226E+00	2.951E+00	3.768E+00	4.602E+00	6.224E+00
RB 86M	0.000E+00	1.020E-01	1.572E-01	2.067E-01	2.556E-01	3.069E-01	3.599E-01	4.587E-01
GE 87	0.000E+00	1.443E+00	1.300E+00	1.212E+00	1.132E+00	1.079E+00	1.021E+00	9.198E-01
AS 87	0.000E+00	3.613E+02	3.206E+02	2.933E+02	2.685E+02	2.498E+02	2.300E+02	1.952E+02
SE 87	0.000E+00	4.052E+03	3.703E+03	3.468E+03	3.256E+03	3.096E+03	2.929E+03	2.616E+03
BR 87	0.000E+00	8.082E+03	7.422E+03	6.969E+03	6.560E+03	6.244E+03	5.916E+03	5.293E+03

OUTPUT UNIT = 6

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ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
 FISSION PRODUCTS
 POWER= 2.16550E+01 MW, BURNUP= 3.39605E+04 MWD, FLUX= 2.07E+14 N/CM**2-SEC

9 SUMMARY TABLE: THERMAL POWER, WATTS

	BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
KR 87	0.000E+00	5.255E+03	4.831E+03	4.539E+03	4.274E+03	4.068E+03	3.855E+03	3.449E+03
SE 87M	0.000E+00	1.217E-03	1.910E-03	2.603E-03	3.454E-03	4.512E-03	5.867E-03	9.193E-03
GE 88	0.000E+00	3.211E-02	3.059E-02	3.022E-02	2.999E-02	3.045E-02	3.074E-02	3.132E-02
AS 88	0.000E+00	2.697E+01	2.479E+01	2.360E+01	2.260E+01	2.209E+01	2.148E+01	2.041E+01
SE 88	0.000E+00	1.360E+03	1.231E+03	1.148E+03	1.075E+03	1.024E+03	9.689E+02	8.692E+02
BR 88	0.000E+00	6.017E+03	5.460E+03	5.080E+03	4.737E+03	4.473E+03	4.196E+03	3.688E+03
KR 88	0.000E+00	8.126E+03	7.468E+03	7.013E+03	6.599E+03	6.276E+03	5.941E+03	5.308E+03
RB 88	0.000E+00	9.499E+03	8.741E+03	8.215E+03	7.737E+03	7.366E+03	6.980E+03	6.247E+03
AS 89	0.000E+00	2.370E+00	2.206E+00	2.129E+00	2.067E+00	2.050E+00	2.024E+00	1.979E+00
SE 89	0.000E+00	5.137E+02	4.653E+02	4.377E+02	4.098E+02	3.927E+02	3.739E+02	3.405E+02
BR 89	0.000E+00	8.569E+03	7.671E+03	7.067E+03	6.521E+03	6.106E+03	5.669E+03	4.885E+03
KR 89	0.000E+00	1.412E+04	1.289E+04	1.205E+04	1.128E+04	1.068E+04	1.006E+04	8.900E+03
RB 89	0.000E+00	1.427E+04	1.310E+04	1.229E+04	1.155E+04	1.097E+04	1.037E+04	9.237E+03
SR 89	0.000E+00	2.574E+03	2.533E+03	2.388E+03	2.246E+03	2.135E+03	2.020E+03	1.804E+03
Y 89M	0.000E+00	7.045E-04	9.673E-04	1.124E-03	1.258E-03	1.351E-03	1.435E-03	1.588E-03
SE 90	0.000E+00	1.544E+02	1.385E+02	1.283E+02	1.192E+02	1.129E+02	1.060E+02	9.396E+01
BR 90	0.000E+00	6.743E+03	5.993E+03	5.488E+03	5.030E+03	4.683E+03	4.316E+03	3.666E+03
KR 90	0.000E+00	1.135E+04	1.035E+04	9.659E+03	9.035E+03	8.554E+03	8.051E+03	7.118E+03
RB 90	0.000E+00	1.824E+04	1.668E+04	1.561E+04	1.463E+04	1.387E+04	1.308E+04	1.160E+04
RB 90M	0.000E+00	4.314E+03	4.035E+03	3.834E+03	3.649E+03	3.501E+03	3.350E+03	3.048E+03
SR 90	0.000E+00	1.447E+01	2.764E+01	3.985E+01	5.118E+01	6.180E+01	7.168E+01	8.817E+01
Y 90	0.000E+00	7.026E+01	1.344E+02	1.941E+02	2.495E+02	3.017E+02	3.504E+02	4.320E+02
Y 90M	0.000E+00	1.738E-02	2.292E-02	2.647E-02	2.962E-02	3.205E-02	3.471E-02	3.851E-02
SE 91	0.000E+00	2.676E+01	2.446E+01	2.314E+01	2.200E+01	2.136E+01	2.060E+01	1.932E+01
BR 91	0.000E+00	2.093E+03	1.868E+03	1.721E+03	1.588E+03	1.491E+03	1.386E+03	1.203E+03
KR 91	0.000E+00	1.078E+04	9.793E+03	9.132E+03	8.538E+03	8.089E+03	7.618E+03	6.748E+03
RB 91	0.000E+00	2.212E+04	2.037E+04	1.916E+04	1.807E+04	1.723E+04	1.635E+04	1.468E+04
SR 91	0.000E+00	7.695E+03	7.124E+03	6.728E+03	6.368E+03	6.089E+03	5.799E+03	5.240E+03
Y 91	0.000E+00	3.187E+03	3.259E+03	3.107E+03	2.946E+03	2.818E+03	2.686E+03	2.437E+03
Y 91M	0.000E+00	1.841E+03	1.705E+03	1.610E+03	1.524E+03	1.457E+03	1.388E+03	1.254E+03
SE 92	0.000E+00	8.125E-01	7.843E-01	7.849E-01	7.900E-01	8.122E-01	8.303E-01	8.638E-01
BR 92	0.000E+00	1.837E+02	1.720E+02	1.670E+02	1.634E+02	1.629E+02	1.620E+02	1.597E+02

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KR 92	0.000E+00	4.763E+03	4.353E+03	4.092E+03	3.866E+03	3.705E+03	3.535E+03	3.214E+03
RB 92	0.000E+00	1.732E+04	1.599E+04	1.509E+04	1.429E+04	1.367E+04	1.304E+04	1.181E+04
SR 92	0.000E+00	9.059E+03	8.460E+03	8.044E+03	7.669E+03	7.376E+03	7.076E+03	6.476E+03
Y 92	0.000E+00	1.005E+04	9.385E+03	8.926E+03	8.513E+03	8.190E+03	7.859E+03	7.195E+03
BR 93	0.000E+00	3.791E+01	3.475E+01	3.301E+01	3.158E+01	3.081E+01	2.993E+01	2.832E+01
KR 93	0.000E+00	2.529E+03	2.312E+03	2.181E+03	2.073E+03	2.001E+03	1.925E+03	1.779E+03
RB 93	0.000E+00	1.197E+04	1.104E+04	1.043E+04	9.898E+03	9.501E+03	9.091E+03	8.290E+03
SR 93	0.000E+00	1.630E+04	1.537E+04	1.472E+04	1.415E+04	1.370E+04	1.325E+04	1.229E+04
Y 93	0.000E+00	8.192E+03	7.738E+03	7.422E+03	7.141E+03	6.920E+03	6.697E+03	6.225E+03
ZR 93	0.000E+00	3.212E-05	6.268E-05	9.202E-05	1.202E-04	1.475E-04	1.737E-04	2.197E-04
BR 94	0.000E+00	3.788E+00	3.505E+00	3.364E+00	3.253E+00	3.210E+00	3.154E+00	3.053E+00
KR 94	0.000E+00	8.542E+02	7.659E+02	7.090E+02	6.589E+02	6.223E+02	5.837E+02	5.140E+02
RB 94	0.000E+00	8.390E+03	7.758E+03	7.356E+03	7.014E+03	6.765E+03	6.510E+03	6.001E+03
SR 94	0.000E+00	1.249E+04	1.182E+04	1.136E+04	1.095E+04	1.063E+04	1.031E+04	9.613E+03
Y 94	0.000E+00	1.775E+04	1.691E+04	1.632E+04	1.579E+04	1.537E+04	1.496E+04	1.403E+04
NB 94M	0.000E+00	7.363E-05	1.053E-04	1.243E-04	1.407E-04	1.521E-04	1.648E-04	1.814E-04
BR 95	0.000E+00	1.925E-01	1.869E-01	1.882E-01	1.906E-01	1.970E-01	2.025E-01	2.124E-01
KR 95	0.000E+00	1.046E+02	9.936E+01	9.789E+01	9.730E+01	9.856E+01	9.952E+01	1.009E+02
RB 95	0.000E+00	4.178E+03	3.817E+03	3.592E+03	3.400E+03	3.266E+03	3.124E+03	2.856E+03

OUTPUT UNIT = 6

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ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
 FISSION PRODUCTS
 POWER= 2.16550E+01 MW, BURNUP= 3.39605E+04 MWD, FLUX= 2.07E+14 N/CM**2-SEC

9 SUMMARY TABLE: THERMAL POWER, WATTS

	BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
SR 95	0.000E+00	1.814E+04	1.710E+04	1.642E+04	1.583E+04	1.538E+04	1.493E+04	1.395E+04
Y 95	0.000E+00	1.466E+04	1.405E+04	1.363E+04	1.327E+04	1.298E+04	1.270E+04	1.203E+04
ZR 95	0.000E+00	5.042E+03	5.445E+03	5.367E+03	5.244E+03	5.140E+03	5.036E+03	4.794E+03
NB 95	0.000E+00	4.160E+03	5.117E+03	5.119E+03	5.012E+03	4.913E+03	4.815E+03	4.646E+03
NB 95M	0.000E+00	9.729E+00	1.058E+01	1.044E+01	1.021E+01	1.001E+01	9.814E+00	9.295E+00
BR 96	0.000E+00	1.277E-02	1.242E-02	1.251E-02	1.266E-02	1.309E-02	1.345E-02	1.411E-02
KR 96	0.000E+00	1.393E+01	1.315E+01	1.288E+01	1.270E+01	1.279E+01	1.282E+01	1.286E+01
RB 96	0.000E+00	1.430E+03	1.327E+03	1.271E+03	1.227E+03	1.203E+03	1.176E+03	1.122E+03
SR 96	0.000E+00	9.455E+03	8.880E+03	8.512E+03	8.205E+03	7.979E+03	7.753E+03	7.263E+03
Y 96	0.000E+00	2.391E+04	2.293E+04	2.226E+04	2.171E+04	2.127E+04	2.085E+04	1.981E+04
NB 96	0.000E+00	1.328E+01	1.672E+01	1.805E+01	1.923E+01	2.051E+01	2.181E+01	2.374E+01
KR 97	0.000E+00	9.494E-01	9.271E-01	9.387E-01	9.574E-01	9.946E-01	1.028E+00	1.086E+00
RB 97	0.000E+00	2.249E+02	2.089E+02	2.007E+02	1.946E+02	1.917E+02	1.885E+02	1.815E+02
SR 97	0.000E+00	8.410E+03	7.862E+03	7.532E+03	7.265E+03	7.083E+03	6.899E+03	6.499E+03
Y 97	0.000E+00	1.626E+04	1.560E+04	1.517E+04	1.482E+04	1.456E+04	1.431E+04	1.367E+04
ZR 97	0.000E+00	5.457E+03	5.326E+03	5.237E+03	5.168E+03	5.114E+03	5.068E+03	4.904E+03
NB 97	0.000E+00	7.009E+03	6.848E+03	6.737E+03	6.652E+03	6.584E+03	6.528E+03	6.321E+03
NB 97M	0.000E+00	4.369E+03	4.265E+03	4.194E+03	4.140E+03	4.096E+03	4.060E+03	3.929E+03
KR 98	0.000E+00	9.413E-02	9.144E-02	9.203E-02	9.304E-02	9.611E-02	9.865E-02	1.033E-01
RB 98	0.000E+00	5.772E+01	5.438E+01	5.309E+01	5.224E+01	5.241E+01	5.240E+01	5.227E+01
SR 98	0.000E+00	2.481E+03	2.311E+03	2.215E+03	2.141E+03	2.097E+03	2.051E+03	1.952E+03
Y 98	0.000E+00	1.810E+04	1.724E+04	1.672E+04	1.631E+04	1.602E+04	1.574E+04	1.503E+04

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ZR 98	0.000E+00	5.563E+03	5.449E+03	5.372E+03	5.317E+03	5.273E+03	5.239E+03	5.088E+03
NB 98	0.000E+00	1.296E+04	1.272E+04	1.255E+04	1.244E+04	1.234E+04	1.227E+04	1.194E+04
NB 98M	0.000E+00	1.233E+02	1.421E+02	1.530E+02	1.626E+02	1.690E+02	1.764E+02	1.844E+02
RB 99	0.000E+00	4.695E+00	4.466E+00	4.407E+00	4.386E+00	4.451E+00	4.501E+00	4.580E+00
SR 99	0.000E+00	1.026E+03	9.603E+02	9.296E+02	9.083E+02	9.018E+02	8.939E+02	8.740E+02
Y 99	0.000E+00	8.070E+03	7.636E+03	7.393E+03	7.214E+03	7.102E+03	6.996E+03	6.718E+03
ZR 99	0.000E+00	1.468E+04	1.436E+04	1.415E+04	1.402E+04	1.392E+04	1.385E+04	1.348E+04
NB 99	0.000E+00	9.741E+03	9.558E+03	9.443E+03	9.371E+03	9.314E+03	9.279E+03	9.051E+03
NB 99M	0.000E+00	3.983E+02	4.340E+02	4.544E+02	4.725E+02	4.841E+02	4.982E+02	5.101E+02
MO 99	0.000E+00	3.506E+03	3.465E+03	3.446E+03	3.441E+03	3.443E+03	3.454E+03	3.416E+03
TC 99	0.000E+00	9.375E-04	1.871E-03	2.778E-03	3.658E-03	4.509E-03	5.331E-03	6.755E-03
TC 99M	0.000E+00	8.055E+02	7.963E+02	7.918E+02	7.908E+02	7.912E+02	7.936E+02	7.850E+02
RB100	0.000E+00	5.032E-01	4.889E-01	4.925E-01	4.990E-01	5.161E-01	5.308E-01	5.569E-01
SR100	0.000E+00	1.410E+02	1.331E+02	1.303E+02	1.287E+02	1.294E+02	1.298E+02	1.298E+02
Y100	0.000E+00	5.652E+03	5.326E+03	5.150E+03	5.024E+03	4.953E+03	4.884E+03	4.704E+03
ZR100	0.000E+00	7.759E+03	7.563E+03	7.442E+03	7.359E+03	7.297E+03	7.251E+03	7.043E+03
NB100	0.000E+00	1.349E+04	1.335E+04	1.325E+04	1.320E+04	1.316E+04	1.314E+04	1.288E+04
NB100M	0.000E+00	1.181E+04	1.168E+04	1.160E+04	1.156E+04	1.152E+04	1.151E+04	1.127E+04
TC100	0.000E+00	2.571E+02	5.114E+02	7.821E+02	1.062E+03	1.380E+03	1.705E+03	2.338E+03
SR101	0.000E+00	3.010E+01	2.844E+01	2.790E+01	2.762E+01	2.786E+01	2.803E+01	2.823E+01
Y101	0.000E+00	1.454E+03	1.360E+03	1.312E+03	1.279E+03	1.264E+03	1.248E+03	1.209E+03
ZR101	0.000E+00	1.160E+04	1.117E+04	1.093E+04	1.078E+04	1.068E+04	1.061E+04	1.030E+04
NB101	0.000E+00	1.219E+04	1.208E+04	1.203E+04	1.203E+04	1.204E+04	1.208E+04	1.192E+04
MO101	0.000E+00	1.091E+04	1.090E+04	1.091E+04	1.097E+04	1.101E+04	1.109E+04	1.101E+04
TC101	0.000E+00	4.583E+03	4.581E+03	4.586E+03	4.609E+03	4.627E+03	4.661E+03	4.629E+03
SR102	0.000E+00	2.007E+00	1.922E+00	1.912E+00	1.919E+00	1.962E+00	2.000E+00	2.060E+00
Y102	0.000E+00	4.746E+02	4.483E+02	4.382E+02	4.333E+02	4.346E+02	4.357E+02	4.336E+02
ZR102	0.000E+00	4.330E+03	4.178E+03	4.113E+03	4.087E+03	4.085E+03	4.092E+03	4.038E+03
NB102	0.000E+00	1.814E+04	1.817E+04	1.826E+04	1.844E+04	1.861E+04	1.885E+04	1.887E+04

OUTPUT UNIT = 6

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL

FISSION PRODUCTS

POWER= 2.16550E+01 MW, BURNUP= 3.39605E+04 MWD, FLUX= 2.07E+14 N/CM**2-SEC

9 SUMMARY TABLE: THERMAL POWER, WATTS

BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
MO102	0.000E+00	1.534E+03	1.565E+03	1.589E+03	1.618E+03	1.641E+03	1.671E+03
TC102	0.000E+00	8.590E+03	8.761E+03	8.896E+03	9.063E+03	9.193E+03	9.361E+03
TC102M	0.000E+00	9.446E+00	1.258E+01	1.446E+01	1.611E+01	1.726E+01	1.854E+01
RH102	0.000E+00	1.506E-04	7.470E-04	1.794E-03	3.243E-03	5.088E-03	7.265E-03
SR103	0.000E+00	8.644E-02	8.404E-02	8.497E-02	8.685E-02	9.025E-02	9.350E-02
Y103	0.000E+00	4.807E+01	4.632E+01	4.631E+01	4.693E+01	4.817E+01	4.944E+01
ZR103	0.000E+00	2.712E+03	2.653E+03	2.653E+03	2.685E+03	2.730E+03	2.784E+03
NB103	0.000E+00	8.377E+03	8.591E+03	8.791E+03	9.040E+03	9.252E+03	9.507E+03
MO103	0.000E+00	9.209E+03	9.843E+03	1.029E+04	1.074E+04	1.109E+04	1.150E+04
TC103	0.000E+00	4.974E+03	5.328E+03	5.574E+03	5.826E+03	6.017E+03	6.242E+03
RUI03	0.000E+00	2.154E+03	2.408E+03	2.544E+03	2.672E+03	2.770E+03	2.881E+03
RH103M	0.000E+00	1.334E+02	1.492E+02	1.576E+02	1.656E+02	1.716E+02	1.785E+02

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 Attachment B1

SR104	0.000E+00	2.513E-03	2.513E-03	2.617E-03	2.758E-03	2.942E-03	3.125E-03	3.421E-03
Y104	0.000E+00	4.641E+00	4.795E+00	4.968E+00	5.158E+00	5.366E+00	5.593E+00	5.837E+00
ZR104	0.000E+00	3.646E+02	3.649E+02	3.773E+02	3.973E+02	4.186E+02	4.424E+02	4.747E+02
NB104	0.000E+00	5.587E+03	5.841E+03	6.120E+03	6.473E+03	6.788E+03	7.150E+03	7.600E+03
MO104	0.000E+00	2.749E+03	3.075E+03	3.317E+03	3.570E+03	3.768E+03	3.996E+03	4.279E+03
TC104	0.000E+00	1.023E+04	1.154E+04	1.250E+04	1.348E+04	1.424E+04	1.512E+04	1.621E+04
RH104	0.000E+00	3.085E+02	7.304E+02	1.173E+03	1.619E+03	2.099E+03	2.565E+03	3.387E+03
RH104M	0.000E+00	2.826E+00	6.691E+00	1.075E+01	1.483E+01	1.923E+01	2.349E+01	3.103E+01
Y105	0.000E+00	2.431E-01	2.348E-01	2.372E-01	2.443E-01	2.544E-01	2.651E-01	2.802E-01
ZR105	0.000E+00	8.018E+01	8.017E+01	8.327E+01	8.833E+01	9.372E+01	9.973E+01	1.081E+02
NB105	0.000E+00	1.274E+03	1.362E+03	1.460E+03	1.583E+03	1.693E+03	1.819E+03	1.986E+03
MO105	0.000E+00	4.973E+03	5.842E+03	6.479E+03	7.171E+03	7.708E+03	8.318E+03	9.119E+03
TC105	0.000E+00	3.495E+03	4.213E+03	4.724E+03	5.249E+03	5.653E+03	6.111E+03	6.714E+03
RH105	0.000E+00	2.242E+03	2.709E+03	3.046E+03	3.385E+03	3.650E+03	3.951E+03	4.351E+03
RH105	0.000E+00	4.224E+02	5.102E+02	5.728E+02	6.357E+02	6.839E+02	7.388E+02	8.107E+02
RH105M	0.000E+00	6.833E+01	8.259E+01	9.284E+01	1.032E+02	1.113E+02	1.204E+02	1.326E+02
ZR106	0.000E+00	1.070E+01	1.001E+01	9.792E+00	9.787E+00	9.888E+00	1.003E+01	1.010E+01
NB106	0.000E+00	5.574E+02	5.702E+02	6.001E+02	6.457E+02	6.887E+02	7.385E+02	8.040E+02
MO106	0.000E+00	1.267E+03	1.543E+03	1.775E+03	2.033E+03	2.244E+03	2.485E+03	2.814E+03
TC106	0.000E+00	3.970E+03	5.175E+03	6.087E+03	7.040E+03	7.793E+03	8.647E+03	9.815E+03
RH106	0.000E+00	2.802E+00	6.130E+00	9.398E+00	1.259E+01	1.553E+01	1.836E+01	2.301E+01
RH106M	0.000E+00	5.286E+02	1.081E+03	1.623E+03	2.153E+03	2.643E+03	3.118E+03	3.897E+03
Y107	0.000E+00	2.927E-04	2.644E-04	2.478E-04	2.343E-04	2.256E-04	2.163E-04	1.990E-04
ZR107	0.000E+00	7.807E-01	7.244E-01	7.029E-01	6.959E-01	6.982E-01	7.024E-01	6.990E-01
NB107	0.000E+00	6.942E+01	6.979E+01	7.345E+01	7.966E+01	8.568E+01	9.269E+01	1.021E+02
MO107	0.000E+00	8.726E+02	1.040E+03	1.214E+03	1.429E+03	1.615E+03	1.826E+03	2.123E+03
TC107	0.000E+00	1.352E+03	1.803E+03	2.184E+03	2.610E+03	2.958E+03	3.354E+03	3.907E+03
RH107	0.000E+00	1.029E+03	1.461E+03	1.783E+03	2.116E+03	2.377E+03	2.673E+03	3.081E+03
RH107M	0.000E+00	5.744E+02	8.163E+02	9.964E+02	1.182E+03	1.328E+03	1.493E+03	1.721E+03
ZR108	0.000E+00	1.348E-03	3.994E-03	8.324E-03	1.456E-02	2.328E-02	3.437E-02	4.610E-02
NB108	0.000E+00	1.313E-01	1.294E-01	1.319E-01	1.348E-01	1.407E-01	1.457E-01	1.552E-01
MO108	0.000E+00	2.479E+01	2.454E+01	2.508E+01	2.578E+01	2.695E+01	2.802E+01	2.984E+01
TC108	0.000E+00	2.343E+02	2.634E+02	2.927E+02	3.226E+02	3.579E+02	3.921E+02	4.410E+02
RH108	0.000E+00	1.273E+03	1.742E+03	2.118E+03	2.522E+03	2.849E+03	3.218E+03	3.734E+03
RH108M	0.000E+00	2.303E+02	3.392E+02	4.213E+02	5.067E+02	5.738E+02	6.498E+02	7.553E+02
AG108	0.000E+00	1.050E+03	1.548E+03	1.922E+03	2.312E+03	2.618E+03	2.965E+03	3.446E+03
	0.000E+00	1.210E+01	1.999E+01	2.527E+01	3.030E+01	3.403E+01	3.823E+01	4.399E+01
	0.000E+00	1.394E-04	3.811E-04	7.045E-04	1.105E-03	1.596E-03	2.155E-03	3.341E-03

OUTPUT UNIT = 6

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
 FISSION PRODUCTS
 POWER= 2.16550E+01 MW, BURNUP= 3.39605E+04 MWD, FLUX= 2.07E+14 N/CM**2-SEC

9 SUMMARY TABLE: THERMAL POWER, WATTS

BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
ZR109	0.000E+00	1.296E-02	1.290E-02	1.326E-02	1.364E-02	1.433E-02	1.604E-02
NB109	0.000E+00	3.733E+00	3.778E+00	3.916E+00	4.058E+00	4.275E+00	4.815E+00

Calc. No. 2004-07600
 Project No. 11163-013
 Attachment B1

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
 FISSION PRODUCTS
 POWER= 2.16550E+01 MW, BURNUP= 3.39605E+04 MWD, FLUX= 2.07E+14 N/CM**2-SEC

9 SUMMARY TABLE: THERMAL POWER, WATTS

BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
TC115	0.000E+00	6.399E-01	6.360E-01	6.532E-01	6.718E-01	7.058E-01	7.354E-01
RUI15	0.000E+00	3.290E+01	3.271E+01	3.359E+01	3.458E+01	3.631E+01	3.784E+01
RHI15	0.000E+00	1.069E+02	1.077E+02	1.112E+02	1.153E+02	1.211E+02	1.265E+02
PD115	0.000E+00	1.229E+02	1.281E+02	1.413E+02	1.490E+02	1.568E+02	1.685E+02
AG115	0.000E+00	6.129E+01	6.405E+01	6.730E+01	7.082E+01	7.468E+01	7.859E+01
AG115M	0.000E+00	2.577E+01	2.708E+01	2.854E+01	3.009E+01	3.176E+01	3.345E+01
CD115	0.000E+00	2.406E+01	2.530E+01	2.673E+01	2.829E+01	3.002E+01	3.179E+01
CD115M	0.000E+00	2.570E+00	2.844E+00	3.026E+00	3.211E+00	3.409E+00	3.612E+00
INI15M	0.000E+00	1.515E+01	1.593E+01	1.683E+01	1.781E+01	1.889E+01	2.001E+01
TC116	0.000E+00	5.164E-02	5.131E-02	5.269E-02	5.418E-02	5.692E-02	6.371E-02
RUI16	0.000E+00	5.654E+00	5.614E+00	5.759E+00	5.920E+00	6.212E+00	6.467E+00
RHI16	0.000E+00	7.985E+01	7.970E+01	8.178E+01	8.417E+01	8.805E+01	9.159E+01
PD116	0.000E+00	6.067E+01	6.232E+01	6.463E+01	6.714E+01	7.013E+01	7.310E+01
AG116	0.000E+00	7.232E+01	7.506E+01	7.821E+01	8.153E+01	8.524E+01	8.899E+01
AG116M	0.000E+00	8.470E+01	8.791E+01	9.160E+01	9.550E+01	9.985E+01	1.042E+02
INI16	0.000E+00	1.441E+01	2.442E+01	3.205E+01	3.786E+01	4.314E+01	4.738E+01
INI16M	0.000E+00	2.082E+01	3.529E+01	4.631E+01	5.471E+01	6.235E+01	7.742E+01
TC117	0.000E+00	1.900E-03	1.882E-03	1.927E-03	1.976E-03	2.071E-03	2.153E-03
RUI17	0.000E+00	1.434E+00	1.401E+00	1.417E+00	1.436E+00	1.489E+00	1.532E+00
RHI17	0.000E+00	4.837E+01	4.574E+01	4.472E+01	4.394E+01	4.408E+01	4.400E+01
PD117	0.000E+00	1.272E+02	1.274E+02	1.299E+02	1.328E+02	1.373E+02	1.415E+02
AG117	0.000E+00	5.263E+01	5.434E+01	5.690E+01	5.855E+01	6.105E+01	6.353E+01
AG117M	0.000E+00	5.518E+01	5.698E+01	5.914E+01	6.139E+01	6.401E+01	6.661E+01
CD117	0.000E+00	3.377E+01	3.500E+01	3.641E+01	3.787E+01	3.954E+01	4.120E+01
CD117M	0.000E+00	2.061E+01	2.141E+01	2.229E+01	2.320E+01	2.422E+01	2.524E+01
INI17	0.000E+00	1.947E+01	2.020E+01	2.102E+01	2.187E+01	2.284E+01	2.380E+01
INI17M	0.000E+00	2.068E+01	2.144E+01	2.231E+01	2.321E+01	2.423E+01	2.525E+01
SN117M	0.000E+00	2.438E-03	8.800E-03	1.863E-02	3.137E-02	4.802E-02	6.755E-02
RUI18	0.000E+00	6.503E+00	6.465E+00	6.641E+00	6.829E+00	7.175E+00	7.475E+00
RHI18	0.000E+00	7.712E+01	7.666E+01	7.872E+01	8.095E+01	8.503E+01	8.856E+01
PD118	0.000E+00	6.577E+01	6.609E+01	6.799E+01	7.013E+01	7.335E+01	7.633E+01
AG118	0.000E+00	9.440E+01	9.608E+01	9.884E+01	1.019E+02	1.057E+02	1.094E+02
AG118M	0.000E+00	4.068E+01	4.198E+01	4.363E+01	4.538E+01	4.744E+01	4.948E+01
CD118	0.000E+00	1.894E+01	1.955E+01	2.027E+01	2.103E+01	2.189E+01	2.275E+01
INI18	0.000E+00	8.792E+01	9.076E+01	9.410E+01	9.760E+01	1.016E+02	1.056E+02
INI18M	0.000E+00	3.338E-02	4.536E-02	5.260E-02	5.894E-02	6.335E-02	6.832E-02
RHI19	0.000E+00	3.972E+00	4.324E+00	4.638E+00	4.934E+00	5.247E+00	5.555E+00
PD119	0.000E+00	7.709E+01	8.275E+01	8.800E+01	9.307E+01	9.844E+01	1.038E+02
AG119	0.000E+00	1.175E+02	1.232E+02	1.290E+02	1.350E+02	1.414E+02	1.479E+02
CD119	0.000E+00	3.900E+01	4.045E+01	4.206E+01	4.374E+01	4.561E+01	4.750E+01
CD119M	0.000E+00	4.351E+01	4.513E+01	4.693E+01	4.880E+01	5.089E+01	5.299E+01
INI19	0.000E+00	1.640E+01	1.700E+01	1.768E+01	1.838E+01	1.916E+01	1.995E+01
INI19M	0.000E+00	4.511E+01	4.678E+01	4.864E+01	5.057E+01	5.274E+01	5.492E+01
SN119M	0.000E+00	2.268E-02	3.759E-02	4.813E-02	5.626E-02	6.331E-02	6.986E-02

Calc. No. 2004-07600
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RUI20	0.000E+00	1.631E-03	1.621E-03	1.666E-03	1.715E-03	1.803E-03	1.879E-03	2.021E-03
RHI20	0.000E+00	1.034E+00	1.027E+00	1.055E+00	1.087E+00	1.142E+00	1.191E+00	1.280E+00
PD120	0.000E+00	2.378E+01	2.362E+01	2.452E+01	2.493E+01	2.612E+01	2.720E+01	2.909E+01
AG120	0.000E+00	7.212E+01	7.253E+01	7.448E+01	7.672E+01	7.997E+01	8.303E+01	8.795E+01
CD120	0.000E+00	4.014E+01	4.141E+01	4.292E+01	4.450E+01	4.632E+01	4.814E+01	5.080E+01
INI20	0.000E+00	8.394E+01	8.682E+01	9.009E+01	9.349E+01	9.735E+01	1.012E+02	1.068E+02
INI20M	0.000E+00	5.809E+01	6.008E+01	6.235E+01	6.469E+01	6.737E+01	7.004E+01	7.393E+01

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21 OUTPUT UNIT = 6

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL

FISSION PRODUCTS

POWER= 2.16550E+01 MW, BURNUP= 3.39605E+04 MWD, FLUX= 2.07E+14 N/CM**2-SEC

9 SUMMARY TABLE: THERMAL POWER, WATTS

	BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
RH121	0.000E+00	1.369E-01	1.361E-01	1.399E-01	1.441E-01	1.516E-01	1.581E-01	1.701E-01
PD121	0.000E+00	1.555E+01	1.543E+01	1.584E+01	1.631E+01	1.712E+01	1.784E+01	1.914E+01
AG121	0.000E+00	7.617E+01	7.596E+01	7.778E+01	7.995E+01	8.341E+01	8.660E+01	9.194E+01
CD121	0.000E+00	1.181E+02	1.214E+02	1.256E+02	1.300E+02	1.352E+02	1.404E+02	1.480E+02
INI21	0.000E+00	7.248E+01	7.481E+01	7.754E+01	8.036E+01	8.362E+01	8.686E+01	9.160E+01
INI21M	0.000E+00	1.934E+01	2.008E+01	2.084E+01	2.160E+01	2.243E+01	2.327E+01	2.445E+01
SN121	0.000E+00	9.098E+00	9.405E+00	9.751E+00	1.011E+01	1.052E+01	1.092E+01	1.152E+01
SN121M	0.000E+00	2.984E-05	7.021E-05	1.64E-04	1.673E-04	2.210E-04	2.780E-04	3.889E-04
RH122	0.000E+00	2.124E-02	2.111E-02	2.170E-02	2.234E-02	2.349E-02	2.450E-02	2.636E-02
PD122	0.000E+00	3.601E+00	3.574E+00	3.667E+00	3.773E+00	3.962E+00	4.129E+00	4.431E+00
AG122	0.000E+00	7.179E+01	7.131E+01	7.294E+01	7.488E+01	7.816E+01	8.115E+01	8.627E+01
CD122	0.000E+00	6.027E+01	6.134E+01	6.312E+01	6.504E+01	6.752E+01	6.992E+01	7.353E+01
INI22	0.000E+00	2.053E+02	2.104E+02	2.171E+02	2.243E+02	2.329E+02	2.414E+02	2.539E+02
INI22M	0.000E+00	8.487E-01	9.693E-01	1.045E+00	1.113E+00	1.164E+00	1.220E+00	1.289E+00
SB122M	0.000E+00	9.971E-04	2.014E-03	3.146E-03	4.374E-03	5.824E-03	7.380E-03	1.062E-02
RH123	0.000E+00	1.589E-03	1.578E-03	1.620E-03	1.666E-03	1.750E-03	1.823E-03	1.958E-03
PD123	0.000E+00	1.252E+00	1.240E+00	1.270E+00	1.304E+00	1.367E+00	1.422E+00	1.523E+00
AG123	0.000E+00	3.049E+01	3.019E+01	3.081E+01	3.155E+01	3.290E+01	3.409E+01	3.618E+01
CD123	0.000E+00	1.351E+02	1.368E+02	1.404E+02	1.443E+02	1.498E+02	1.549E+02	1.628E+02
INI23	0.000E+00	8.528E+01	8.751E+01	9.035E+01	9.330E+01	9.687E+01	1.004E+02	1.055E+02
INI23M	0.000E+00	3.993E+01	4.183E+01	4.357E+01	4.529E+01	4.710E+01	4.893E+01	5.149E+01
SN123	0.000E+00	3.649E+00	5.083E+00	5.726E+00	6.085E+00	6.350E+00	6.584E+00	6.943E+00
SN123M	0.000E+00	2.610E+01	2.694E+01	2.788E+01	2.885E+01	2.997E+01	3.108E+01	3.269E+01
TE123M	0.000E+00	6.572E-05	4.297E-04	1.256E-03	2.659E-03	4.849E-03	7.951E-03	1.686E-02
PD124	0.000E+00	1.817E-01	1.805E-01	1.856E-01	1.915E-01	2.014E-01	2.103E-01	2.263E-01
AG124	0.000E+00	1.934E+01	1.916E+01	1.959E+01	2.013E+01	2.104E+01	2.186E+01	2.329E+01
CD124	0.000E+00	8.590E+01	8.621E+01	8.807E+01	9.023E+01	9.342E+01	9.645E+01	1.011E+02
INI24	0.000E+00	2.686E+02	2.750E+02	2.829E+02	2.911E+02	3.009E+02	3.106E+02	3.243E+02
SB124	0.000E+00	6.416E-01	1.719E+00	2.995E+00	4.412E+00	6.079E+00	7.901E+00	1.178E+01
SB124M	0.000E+00	5.782E-03	7.861E-03	9.436E-03	1.096E-02	1.240E-02	1.397E-02	1.680E-02
AG125	0.000E+00	4.674E+00	4.685E+00	4.842E+00	5.032E+00	5.307E+00	5.566E+00	6.002E+00
CD125	0.000E+00	9.858E+01	1.012E+02	1.052E+02	1.095E+02	1.147E+02	1.199E+02	1.278E+02
INI25	0.000E+00	1.094E+02	1.163E+02	1.225E+02	1.286E+02	1.347E+02	1.410E+02	1.499E+02

Calc. No. 2004-07600
Project No. 11163-013
Attachment B1

INI25M	0.000E+00	8.117E+01	8.753E+01	9.261E+01	9.751E+01	1.021E+02	1.069E+02	1.136E+02
SNI25	0.000E+00	3.747E+01	4.065E+01	4.297E+01	4.510E+01	4.704E+01	4.907E+01	5.170E+01
SNI25M	0.000E+00	6.103E+01	6.596E+01	6.981E+01	7.349E+01	7.691E+01	8.050E+01	8.544E+01
SB125	0.000E+00	5.363E+00	1.083E+01	1.605E+01	2.100E+01	2.564E+01	3.005E+01	3.752E+01
TE125M	0.000E+00	2.049E-01	5.338E-01	8.626E-01	1.176E+00	1.471E+00	1.750E+00	2.225E+00
PD126	0.000E+00	2.969E-03	2.981E-03	3.104E-03	3.255E-03	3.465E-03	3.666E-03	4.008E-03
AG126	0.000E+00	1.897E+00	1.897E+00	1.963E+00	2.049E+00	2.166E+00	2.281E+00	2.468E+00
CD126	0.000E+00	5.793E+01	5.816E+01	5.963E+01	6.149E+01	6.398E+01	6.644E+01	7.014E+01
INI26	0.000E+00	4.405E+02	4.547E+02	4.688E+02	4.834E+02	4.989E+02	5.149E+02	5.355E+02
SNI26	0.000E+00	9.623E-05	2.035E-04	3.180E-04	4.389E-04	5.650E-04	6.964E-04	9.509E-04
SB126	0.000E+00	5.799E+00	6.949E+00	7.887E+00	8.778E+00	9.655E+00	1.056E+01	1.204E+01
SB126M	0.000E+00	1.897E+00	2.361E+00	2.646E+00	2.894E+00	3.076E+00	3.277E+00	3.542E+00
CD127	0.000E+00	4.421E+01	4.527E+01	4.752E+01	5.047E+01	5.366E+01	5.706E+01	6.203E+01
INI27	0.000E+00	1.894E+02	1.988E+02	2.077E+02	2.176E+02	2.270E+02	2.371E+02	2.504E+02
INI27M	0.000E+00	1.983E+02	2.080E+02	2.173E+02	2.276E+02	2.374E+02	2.480E+02	2.618E+02
SNI27	0.000E+00	4.156E+02	4.498E+02	4.751E+02	5.001E+02	5.212E+02	5.445E+02	5.735E+02
SNI27M	0.000E+00	1.280E+02	1.428E+02	1.521E+02	1.604E+02	1.667E+02	1.737E+02	1.818E+02

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21
OUTPUT UNIT = 6

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
FISSION PRODUCTS
POWER= 2.16550E+01 MW, BURNUP= 3.39605E+04 MWD, FLUX= 2.07E+14 N/CM**2-SEC

9 SUMMARY TABLE: THERMAL POWER, WATTS

	BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
SB127	0.000E+00	2.623E+02	2.884E+02	3.062E+02	3.232E+02	3.367E+02	3.518E+02	3.701E+02
TE127	0.000E+00	5.673E+01	6.417E+01	6.880E+01	7.287E+01	7.607E+01	7.953E+01	8.384E+01
TE127M	0.000E+00	2.170E+00	3.112E+00	3.572E+00	3.876E+00	4.094E+00	4.300E+00	4.597E+00
AG128	0.000E+00	7.492E-02	7.639E-02	8.113E-02	8.735E-02	9.461E-02	1.021E-01	1.139E-01
CD128	0.000E+00	1.409E+01	1.416E+01	1.471E+01	1.553E+01	1.647E+01	1.746E+01	1.892E+01
INI28	0.000E+00	5.255E+02	5.277E+02	5.362E+02	5.487E+02	5.628E+02	5.783E+02	5.957E+02
SNI28	0.000E+00	3.968E+02	4.101E+02	4.194E+02	4.286E+02	4.363E+02	4.453E+02	4.524E+02
SB128	0.000E+00	1.024E+02	1.235E+02	1.362E+02	1.473E+02	1.551E+02	1.638E+02	1.745E+02
SB128M	0.000E+00	1.520E+03	1.587E+03	1.633E+03	1.676E+03	1.712E+03	1.752E+03	1.788E+03
I128	0.000E+00	2.838E+00	6.307E+00	1.039E+01	1.495E+01	2.037E+01	2.627E+01	3.858E+01
CD129	0.000E+00	7.952E+00	8.065E+00	8.465E+00	8.981E+00	9.606E+00	1.024E+01	1.124E+01
INI29	0.000E+00	3.132E+02	3.177E+02	3.272E+02	3.400E+02	3.539E+02	3.688E+02	3.889E+02
SNI29	0.000E+00	7.679E+02	8.064E+02	8.346E+02	8.637E+02	8.876E+02	9.150E+02	9.433E+02
SNI29M	0.000E+00	1.115E+03	1.118E+03	1.122E+03	1.129E+03	1.136E+03	1.145E+03	1.141E+03
SB129	0.000E+00	1.696E+03	1.791E+03	1.854E+03	1.914E+03	1.960E+03	2.014E+03	2.063E+03
TE129	0.000E+00	5.313E+02	5.630E+02	5.831E+02	6.023E+02	6.168E+02	6.338E+02	6.496E+02
TE129M	0.000E+00	3.755E+01	4.093E+01	4.269E+01	4.424E+01	4.535E+01	4.663E+01	4.786E+01
XE129M	0.000E+00	4.437E-05	1.868E-04	9.014E-04	9.014E-04	1.578E-03	2.511E-03	5.132E-03
CD130	0.000E+00	8.278E+00	7.994E+00	7.975E+00	8.008E+00	8.187E+00	8.338E+00	8.584E+00
INI30	0.000E+00	5.169E+02	5.000E+02	4.939E+02	4.914E+02	4.934E+02	4.955E+02	4.932E+02
SNI30	0.000E+00	1.485E+03	1.498E+03	1.511E+03	1.529E+03	1.544E+03	1.565E+03	1.570E+03
SB130	0.000E+00	1.094E+03	1.184E+03	1.239E+03	1.289E+03	1.324E+03	1.366E+03	1.405E+03
SB130M	0.000E+00	5.500E+03	5.586E+03	5.650E+03	5.725E+03	5.785E+03	5.863E+03	5.883E+03
I130	0.000E+00	2.653E+01	5.451E+01	8.562E+01	1.1194E+02	1.588E+02	2.009E+02	2.875E+02

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II130M	0.000E+00	1.280E+00	2.649E+00	4.182E+00	5.850E+00	7.799E+00	9.884E+00	1.418E+01
CDI31	0.000E+00	1.991E+00	1.940E+00	1.956E+00	1.983E+00	2.051E+00	2.109E+00	2.212E+00
INI31	0.000E+00	1.894E+02	1.813E+02	1.777E+02	1.787E+02	1.791E+02	1.803E+02	1.809E+02
SNI31	0.000E+00	3.336E+03	3.250E+03	3.212E+03	3.196E+03	3.194E+03	3.198E+03	3.153E+03
SB131	0.000E+00	6.972E+03	6.923E+03	6.900E+03	6.903E+03	6.908E+03	6.931E+03	6.841E+03
TEI31	0.000E+00	3.334E+03	3.346E+03	3.377E+03	3.377E+03	3.392E+03	3.418E+03	3.395E+03
TEI31M	0.000E+00	7.027E+02	7.299E+02	7.460E+02	7.616E+02	7.721E+02	7.856E+02	7.916E+02
II131	0.000E+00	1.873E+03	1.887E+03	1.897E+03	1.912E+03	1.922E+03	1.939E+03	1.929E+03
XEI31M	0.000E+00	5.889E+00	5.935E+00	5.966E+00	6.014E+00	6.049E+00	6.103E+00	6.079E+00
CDI32	0.000E+00	1.650E-01	1.604E-01	1.616E-01	1.634E-01	1.689E-01	1.734E-01	1.818E-01
INI32	0.000E+00	8.255E+01	7.747E+01	7.527E+01	7.372E+01	7.355E+01	7.316E+01	7.224E+01
SNI32	0.000E+00	1.370E+03	1.295E+03	1.255E+03	1.228E+03	1.213E+03	1.200E+03	1.161E+03
SB132	0.000E+00	7.188E+03	6.965E+03	6.844E+03	6.769E+03	6.725E+03	6.693E+03	6.529E+03
SB132M	0.000E+00	4.533E+03	4.458E+03	4.415E+03	4.395E+03	4.381E+03	4.378E+03	4.291E+03
TEI32	0.000E+00	1.592E+03	1.592E+03	1.592E+03	1.597E+03	1.601E+03	1.609E+03	1.591E+03
II132	0.000E+00	1.332E+04	1.335E+04	1.337E+04	1.343E+04	1.347E+04	1.355E+04	1.342E+04
CS132	0.000E+00	7.161E-02	1.437E-01	2.195E-01	2.970E-01	3.839E-01	4.715E-01	6.380E-01
INI33	0.000E+00	7.290E+00	6.993E+00	6.956E+00	6.968E+00	7.123E+00	7.248E+00	7.464E+00
SNI33	0.000E+00	9.974E+02	9.309E+02	8.980E+02	8.746E+02	8.648E+02	8.541E+02	8.285E+02
SB133	0.000E+00	8.706E+03	8.221E+03	7.940E+03	7.730E+03	7.590E+03	7.457E+03	7.123E+03
TEI33	0.000E+00	7.394E+03	7.253E+03	7.179E+03	7.144E+03	7.124E+03	7.121E+03	6.987E+03
TEI33M	0.000E+00	8.833E+03	8.497E+03	8.260E+03	8.058E+03	7.893E+03	7.737E+03	7.341E+03
II133	0.000E+00	7.337E+03	7.229E+03	7.158E+03	7.116E+03	7.080E+03	7.062E+03	6.900E+03
II133M	0.000E+00	2.648E+02	2.888E+02	3.028E+02	3.152E+02	3.234E+02	3.333E+02	3.420E+02
XEI33	0.000E+00	1.308E+01	1.289E+03	1.277E+03	1.271E+03	1.265E+03	1.262E+03	1.235E+03
XEI33M	0.000E+00	5.011E+01	5.002E+01	4.994E+01	4.999E+01	5.000E+01	5.014E+01	4.943E+01
INI34	0.000E+00	4.209E-01	4.140E-01	4.216E-01	4.310E-01	4.498E-01	4.661E-01	4.959E-01

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

OUTPUT UNIT = 6

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
 FISSION PRODUCTS
 POWER= 2.16550E+01 MW, BURNUP= 3.39605E+04 MWD, FLUX= 2.07E+14 N/CM**2-SEC

9 SUMMARY TABLE: THERMAL POWER, WATTS

BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
SNI34	0.000E+00	9.337E+01	8.986E+01	8.957E+01	9.014E+01	9.220E+01	9.408E+01
SB134	0.000E+00	1.623E+03	1.568E+03	1.552E+03	1.553E+03	1.566E+03	1.582E+03
SB134M	0.000E+00	1.548E+03	1.496E+03	1.480E+03	1.480E+03	1.491E+03	1.505E+03
TEI34	0.000E+00	8.079E+03	7.668E+03	7.414E+03	7.217E+03	7.073E+03	6.937E+03
II134	0.000E+00	2.629E+04	2.575E+04	2.540E+04	2.519E+04	2.502E+04	2.491E+04
II134M	0.000E+00	1.957E+02	2.125E+02	2.229E+02	2.328E+02	2.397E+02	2.479E+02
XEI34M	0.000E+00	6.432E+01	7.437E+01	8.030E+01	8.553E+01	8.906E+01	9.315E+01
CS134	0.000E+00	3.571E+01	1.348E+02	2.870E+02	4.829E+02	7.215E+02	9.943E+02
CS134M	0.000E+00	2.831E+00	5.669E+00	8.653E+00	1.170E+01	1.512E+01	1.857E+01
SNI35	0.000E+00	1.494E+01	1.427E+01	1.414E+01	1.411E+01	1.436E+01	1.489E+01
SB135	0.000E+00	1.095E+03	1.017E+03	9.764E+02	9.457E+02	9.296E+02	9.125E+02
TEI35	0.000E+00	1.067E+04	1.016E+04	9.882E+03	9.690E+03	9.565E+03	9.457E+03
II135	0.000E+00	1.306E+04	1.286E+04	1.274E+04	1.268E+04	1.263E+04	1.261E+04
XEI35	0.000E+00	1.855E+03	1.849E+03	1.813E+03	1.784E+03	1.732E+03	1.693E+03

Calc. No. 2004-07600
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XE135M	0.000E+00	6.749E+02	6.859E+02	6.923E+02	6.998E+02	7.045E+02	7.116E+02	7.092E+02
CS135	0.000E+00	3.003E-05	6.036E-05	9.026E-05	1.197E-04	1.484E-04	1.766E-04	2.266E-04
CS135M	0.000E+00	4.051E+00	1.102E+01	2.197E+01	3.666E+01	5.647E+01	8.035E+01	1.365E+02
BA135M	0.000E+00	4.878E-04	2.569E-03	8.004E-03	1.839E-02	3.611E-02	6.264E-02	1.421E-01
SN136	0.000E+00	1.021E+00	9.932E-01	1.001E+00	1.013E+00	1.047E+00	1.076E+00	1.128E+00
SB136	0.000E+00	2.659E+02	2.494E+02	2.420E+02	2.370E+02	2.360E+02	2.346E+02	2.308E+02
TE136	0.000E+00	5.531E+03	5.184E+03	4.982E+03	4.822E+03	4.727E+03	4.627E+03	4.395E+03
I136	0.000E+00	1.397E+04	1.356E+04	1.335E+04	1.323E+04	1.317E+04	1.313E+04	1.284E+04
I136M	0.000E+00	7.673E+03	7.452E+03	7.308E+03	7.204E+03	7.119E+03	7.049E+03	6.802E+03
CS136	0.000E+00	1.056E+02	1.815E+02	2.536E+02	3.274E+02	4.066E+02	4.894E+02	6.463E+02
BA136M	0.000E+00	1.544E+01	2.652E+01	3.708E+01	4.785E+01	5.943E+01	7.153E+01	9.448E+01
SB137	0.000E+00	2.918E+01	2.811E+01	2.803E+01	2.815E+01	2.881E+01	2.936E+01	3.030E+01
TE137	0.000E+00	2.139E+03	2.022E+03	1.967E+03	1.931E+03	1.918E+03	1.905E+03	1.862E+03
I137	0.000E+00	1.212E+04	1.160E+04	1.130E+04	1.109E+04	1.094E+04	1.082E+04	1.042E+04
XE137	0.000E+00	1.251E+04	1.228E+04	1.214E+04	1.205E+04	1.199E+04	1.195E+04	1.166E+04
CS137	0.000E+00	1.537E+01	3.059E+01	4.563E+01	6.049E+01	7.517E+01	8.968E+01	1.159E+02
BA137M	0.000E+00	5.188E+01	1.031E+02	1.536E+02	2.036E+02	2.529E+02	3.016E+02	3.896E+02
SB138	0.000E+00	4.268E+00	4.164E+00	4.207E+00	4.269E+00	4.423E+00	4.554E+00	4.792E+00
TE138	0.000E+00	4.343E+02	4.092E+02	3.985E+02	3.915E+02	3.909E+02	3.896E+02	3.850E+02
I138	0.000E+00	7.054E+03	6.673E+03	6.455E+03	6.292E+03	6.189E+03	6.089E+03	5.834E+03
XE138	0.000E+00	1.163E+04	1.121E+04	1.095E+04	1.075E+04	1.060E+04	1.046E+04	1.005E+04
CS138	0.000E+00	2.497E+04	2.422E+04	2.373E+04	2.337E+04	2.309E+04	2.285E+04	2.204E+04
CS138M	0.000E+00	2.576E+02	2.651E+02	2.688E+02	2.723E+02	2.741E+02	2.769E+02	2.757E+02
SB139	0.000E+00	2.648E-01	2.602E-01	2.644E-01	2.695E-01	2.807E-01	2.902E-01	3.078E-01
TE139	0.000E+00	1.161E+02	1.105E+02	1.086E+02	1.074E+02	1.082E+02	1.087E+02	1.091E+02
I139	0.000E+00	3.399E+03	3.196E+03	3.078E+03	2.984E+03	2.926E+03	2.866E+03	2.730E+03
XE139	0.000E+00	1.390E+04	1.329E+04	1.290E+04	1.261E+04	1.239E+04	1.218E+04	1.164E+04
CS139	0.000E+00	1.330E+04	1.289E+04	1.263E+04	1.243E+04	1.228E+04	1.215E+04	1.172E+04
BA139	0.000E+00	6.365E+03	6.192E+03	6.080E+03	5.999E+03	5.935E+03	5.883E+03	5.692E+03
TE140	0.000E+00	1.101E+01	1.051E+01	1.039E+01	1.033E+01	1.049E+01	1.060E+01	1.079E+01
I140	0.000E+00	1.212E+03	1.121E+03	1.068E+03	1.025E+03	9.979E+02	9.693E+02	9.127E+02
XE140	0.000E+00	8.090E+03	7.622E+03	7.330E+03	7.094E+03	6.922E+03	6.754E+03	6.369E+03
CS140	0.000E+00	2.448E+04	2.370E+04	2.319E+04	2.282E+04	2.253E+04	2.228E+04	2.147E+04
BA140	0.000E+00	3.069E+03	2.989E+03	2.936E+03	2.897E+03	2.866E+03	2.840E+03	2.744E+03
LA140	0.000E+00	1.851E+04	1.808E+04	1.782E+04	1.764E+04	1.752E+04	1.743E+04	1.699E+04
PR140	0.000E+00	4.595E-03	1.044E-02	1.671E-02	2.326E-02	3.077E-02	3.859E-02	5.451E-02
TE141	0.000E+00	6.745E-01	6.482E-01	6.453E-01	6.457E-01	6.601E-01	6.711E-01	6.915E-01

OUTPUT UNIT = 6

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ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
 FISSION PRODUCTS
 POWER= 2.16550E+01 MW, BURNUP= 3.39605E+04 MWD, FLUX= 2.07E+14 N/CM**2-SEC

9 SUMMARY TABLE: THERMAL POWER, WATTS

BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
I141	0.000E+00	1.850E+02	1.713E+02	1.639E+02	1.580E+02	1.550E+02	1.515E+02
XE141	0.000E+00	4.778E+03	4.483E+03	4.313E+03	4.185E+03	4.102E+03	4.020E+03
CS141	0.000E+00	1.474E+04	1.418E+04	1.381E+04	1.353E+04	1.331E+04	1.311E+04
BA141	0.000E+00	1.069E+04	1.042E+04	1.023E+04	1.008E+04	9.955E+03	9.851E+03

Calc. No. 2004-07600
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LA141	0.000E+00	6.151E+03	5.993E+03	5.884E+03	5.799E+03	5.730E+03	5.670E+03	5.470E+03
CE141	0.000E+00	1.511E+03	1.500E+03	1.477E+03	1.458E+03	1.442E+03	1.428E+03	1.364E+03
TE142	0.000E+00	4.724E-02	4.668E-02	4.770E-02	4.885E-02	5.111E-02	5.306E-02	5.667E-02
I142	0.000E+00	3.033E+01	2.888E+01	2.849E+01	2.829E+01	2.867E+01	2.893E+01	2.936E+01
XE142	0.000E+00	1.234E+03	1.147E+03	1.100E+03	1.064E+03	1.044E+03	1.023E+03	9.779E+02
CS142	0.000E+00	1.343E+04	1.272E+04	1.229E+04	1.194E+04	1.169E+04	1.145E+04	1.088E+04
BA142	0.000E+00	8.826E+03	8.541E+03	8.349E+03	8.195E+03	8.072E+03	7.961E+03	7.639E+03
LA142	0.000E+00	2.187E+04	2.119E+04	2.073E+04	2.036E+04	2.007E+04	1.981E+04	1.902E+04
PR142	0.000E+00	1.967E+01	4.472E+01	7.173E+01	9.960E+01	1.318E+02	1.652E+02	2.334E+02
PR142M	0.000E+00	1.073E+00	2.439E+00	3.903E+00	5.433E+00	7.187E+00	9.013E+00	1.273E+01
I143	0.000E+00	1.439E+00	1.393E+00	1.398E+00	1.412E+00	1.454E+00	1.490E+00	1.553E+00
XE143	0.000E+00	2.932E+02	2.758E+02	2.681E+02	2.633E+02	2.623E+02	2.612E+02	2.569E+02
CS143	0.000E+00	5.752E+03	5.365E+03	5.123E+03	4.924E+03	4.781E+03	4.637E+03	4.332E+03
BA143	0.000E+00	1.443E+04	1.386E+04	1.348E+04	1.316E+04	1.292E+04	1.269E+04	1.209E+04
LA143	0.000E+00	1.191E+04	1.145E+04	1.114E+04	1.089E+04	1.068E+04	1.049E+04	9.996E+03
CE143	0.000E+00	4.312E+03	4.147E+03	4.035E+03	3.943E+03	3.870E+03	3.802E+03	3.624E+03
PR143	0.000E+00	1.902E+03	1.829E+03	1.779E+03	1.739E+03	1.706E+03	1.676E+03	1.597E+03
I144	0.000E+00	1.428E-01	1.400E-01	1.422E-01	1.449E-01	1.508E-01	1.558E-01	1.651E-01
XE144	0.000E+00	3.401E+01	3.226E+01	3.170E+01	3.141E+01	3.169E+01	3.188E+01	3.208E+01
CS144	0.000E+00	1.999E+03	1.908E+03	1.865E+03	1.841E+03	1.833E+03	1.828E+03	1.794E+03
BA144	0.000E+00	7.302E+03	6.920E+03	6.671E+03	6.466E+03	6.310E+03	6.158E+03	5.807E+03
LA144	0.000E+00	1.883E+04	1.799E+04	1.743E+04	1.697E+04	1.661E+04	1.626E+04	1.542E+04
CE144	0.000E+00	2.421E+02	3.816E+02	4.611E+02	5.042E+02	5.265E+02	5.357E+02	5.337E+02
PR144	0.000E+00	2.706E+03	4.251E+03	5.131E+03	5.610E+03	5.857E+03	5.960E+03	5.938E+03
PR144M	0.000E+00	1.501E+00	2.365E+00	2.857E+00	3.124E+00	3.262E+00	3.319E+00	3.306E+00
XE145	0.000E+00	4.364E+00	4.352E+00	4.474E+00	4.617E+00	4.844E+00	5.052E+00	5.410E+00
CS145	0.000E+00	3.663E+02	3.507E+02	3.441E+02	3.402E+02	3.400E+02	3.397E+02	3.356E+02
BA145	0.000E+00	6.722E+03	6.423E+03	6.238E+03	6.093E+03	5.990E+03	5.893E+03	5.637E+03
LA145	0.000E+00	9.845E+03	9.465E+03	9.217E+03	9.017E+03	8.865E+03	8.722E+03	8.340E+03
CE145	0.000E+00	6.038E+03	5.823E+03	5.680E+03	5.565E+03	5.476E+03	5.394E+03	5.165E+03
PR145	0.000E+00	2.812E+03	2.712E+03	2.646E+03	2.592E+03	2.551E+03	2.512E+03	2.406E+03
XE146	0.000E+00	2.398E-01	2.350E-01	2.381E-01	2.424E-01	2.516E-01	2.597E-01	2.740E-01
CS146	0.000E+00	7.219E+01	6.939E+01	6.865E+01	6.848E+01	6.926E+01	6.995E+01	7.061E+01
BA146	0.000E+00	1.462E+03	1.395E+03	1.358E+03	1.332E+03	1.317E+03	1.304E+03	1.263E+03
LA146	0.000E+00	1.003E+04	9.666E+03	9.442E+03	9.273E+03	9.152E+03	9.045E+03	8.716E+03
CE146	0.000E+00	1.380E+03	1.339E+03	1.313E+03	1.293E+03	1.278E+03	1.265E+03	1.222E+03
PR146	0.000E+00	8.078E+03	7.841E+03	7.689E+03	7.575E+03	7.488E+03	7.414E+03	7.162E+03
PM146	0.000E+00	4.075E-04	1.463E-03	2.924E-03	4.617E-03	6.464E-03	8.366E-03	1.189E-02
XE147	0.000E+00	2.880E-02	2.854E-02	2.923E-02	2.999E-02	3.143E-02	3.268E-02	3.500E-02
CS147	0.000E+00	8.934E+00	8.707E+00	8.764E+00	8.864E+00	9.136E+00	9.369E+00	9.775E+00
BA147	0.000E+00	6.045E+02	5.782E+02	5.655E+02	5.591E+02	5.580E+02	5.567E+02	5.487E+02
LA147	0.000E+00	3.335E+03	3.217E+03	3.110E+03	3.105E+03	3.077E+03	3.053E+03	2.964E+03
CE147	0.000E+00	5.035E+03	4.909E+03	4.830E+03	4.776E+03	4.735E+03	4.703E+03	4.568E+03
PR147	0.000E+00	3.810E+03	3.719E+03	3.661E+03	3.622E+03	3.592E+03	3.569E+03	3.468E+03
ND147	0.000E+00	9.852E+02	9.624E+02	9.485E+02	9.392E+02	9.324E+02	9.276E+02	9.039E+02
PM147	0.000E+00	1.605E+01	2.757E+01	3.477E+01	3.907E+01	4.126E+01	4.211E+01	4.133E+01
CS148	0.000E+00	7.246E-01	7.136E-01	7.261E-01	7.411E-01	7.718E-01	7.984E-01	8.467E-01

Calc. No. 2004-07600
 Project No. 11163-013
 Attachment B1

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL

FISSION PRODUCTS

POWER= 2.16550E+01 MW, BURNUP= 3.39605E+04 MWD, FLUX= 2.07E+14 N/CM**2-SEC

9 SUMMARY TABLE: THERMAL POWER, WATTS

	BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
BA148	0.000E+00	6.851E+01	6.631E+01	6.595E+01	6.603E+01	6.705E+01	6.794E+01	6.907E+01
LA148	0.000E+00	1.913E+03	1.854E+03	1.827E+03	1.812E+03	1.809E+03	1.808E+03	1.780E+03
CE148	0.000E+00	1.641E+03	1.611E+03	1.595E+03	1.588E+03	1.582E+03	1.582E+03	1.552E+03
PR148	0.000E+00	5.187E+03	5.110E+03	5.067E+03	5.049E+03	5.038E+03	5.039E+03	4.948E+03
PM148	0.000E+00	3.833E+02	3.605E+02	3.581E+02	3.588E+02	3.593E+02	3.593E+02	3.523E+02
PM148M	0.000E+00	1.244E+02	2.176E+02	2.788E+02	3.174E+02	3.415E+02	3.537E+02	3.523E+02
BA149	0.000E+00	1.141E+01	1.121E+01	1.133E+01	1.152E+01	1.191E+01	1.226E+01	1.283E+01
LA149	0.000E+00	3.411E+02	3.335E+02	3.323E+02	3.336E+02	3.374E+02	3.415E+02	3.441E+02
CE149	0.000E+00	2.215E+03	2.189E+03	2.182E+03	2.187E+03	2.196E+03	2.211E+03	2.196E+03
PR149	0.000E+00	1.699E+03	1.697E+03	1.700E+03	1.711E+03	1.720E+03	1.736E+03	1.728E+03
ND149	0.000E+00	1.096E+03	1.099E+03	1.106E+03	1.119E+03	1.131E+03	1.147E+03	1.155E+03
PM149	0.000E+00	5.192E+02	5.630E+02	5.982E+02	6.269E+02	6.542E+02	6.768E+02	6.980E+02
CS150	0.000E+00	7.177E-04	7.122E-04	7.303E-04	7.502E-04	7.870E-04	8.190E-04	8.783E-04
BA150	0.000E+00	6.461E-01	6.378E-01	6.496E-01	6.645E-01	6.919E-01	7.165E-01	7.592E-01
LA150	0.000E+00	8.807E+01	8.700E+01	8.778E+01	8.924E+01	9.148E+01	9.377E+01	9.667E+01
CE150	0.000E+00	5.563E+02	5.605E+02	5.678E+02	5.788E+02	5.895E+02	6.023E+02	6.127E+02
PR150	0.000E+00	2.309E+03	2.363E+03	2.412E+03	2.471E+03	2.521E+03	2.581E+03	2.631E+03
PM150	0.000E+00	1.609E+01	1.745E+01	1.905E+01	2.054E+01	2.246E+01	2.420E+01	2.684E+01
LA151	0.000E+00	8.835E+00	8.758E+00	8.911E+00	9.135E+00	9.468E+00	9.794E+00	1.028E+01
CE151	0.000E+00	3.208E+02	3.248E+02	3.317E+02	3.412E+02	3.508E+02	3.617E+02	3.737E+02
PR151	0.000E+00	8.958E+02	9.278E+02	9.557E+02	9.887E+02	1.016E+03	1.049E+03	1.082E+03
ND151	0.000E+00	7.865E+02	8.287E+02	8.618E+02	8.981E+02	9.282E+02	9.635E+02	1.004E+03
PM151	0.000E+00	3.302E+02	3.481E+02	3.620E+02	3.773E+02	3.900E+02	4.048E+02	4.216E+02
SM151	0.000E+00	2.435E-02	3.483E-02	4.061E-02	4.515E-02	4.860E-02	5.208E-02	5.757E-02
BA152	0.000E+00	2.009E-03	1.996E-03	2.048E-03	2.107E-03	2.213E-03	2.305E-03	2.476E-03
LA152	0.000E+00	1.313E+00	1.303E+00	1.334E+00	1.373E+00	1.436E+00	1.494E+00	1.592E+00
CE152	0.000E+00	4.949E+01	4.977E+01	5.095E+01	5.263E+01	5.453E+01	5.659E+01	5.927E+01
PR152	0.000E+00	6.367E+02	6.625E+02	6.870E+02	7.163E+02	7.417E+02	7.713E+02	8.048E+02
ND152	0.000E+00	1.954E+02	2.094E+02	2.200E+02	2.314E+02	2.404E+02	2.509E+02	2.627E+02
PM152	0.000E+00	6.118E+02	6.567E+02	6.905E+02	7.266E+02	7.550E+02	7.883E+02	8.259E+02
PM152M	0.000E+00	9.251E+00	1.085E+01	1.186E+01	1.280E+01	1.346E+01	1.423E+01	1.515E+01
EU152	0.000E+00	9.059E-03	3.263E-02	5.715E-02	7.707E-02	9.165E-02	1.017E-01	1.113E-01
EU152M	0.000E+00	1.827E-01	3.282E-01	4.077E-01	4.606E-01	5.011E-01	5.374E-01	5.934E-01
LA153	0.000E+00	1.136E-01	1.130E-01	1.162E-01	1.198E-01	1.259E-01	1.313E-01	1.411E-01
CE153	0.000E+00	1.404E+01	1.411E+01	1.494E+01	1.511E+01	1.585E+01	1.658E+01	1.771E+01
PR153	0.000E+00	1.531E+02	1.589E+02	1.657E+02	1.740E+02	1.819E+02	1.907E+02	2.019E+02
ND153	0.000E+00	4.169E+02	4.472E+02	4.716E+02	4.988E+02	5.209E+02	5.465E+02	5.768E+02
PM153	0.000E+00	1.673E+02	1.809E+02	1.914E+02	2.029E+02	2.121E+02	2.227E+02	2.353E+02
SM153	0.000E+00	1.117E+02	1.674E+02	2.266E+02	2.867E+02	3.504E+02	4.133E+02	4.737E+02
GD153	0.000E+00	6.433E-05	5.224E-04	1.562E-03	3.156E-03	5.306E-03	7.914E-03	1.388E-02
LA154	0.000E+00	6.865E-03	6.838E-03	7.035E-03	7.252E-03	7.629E-03	7.961E-03	8.568E-03
CE154	0.000E+00	1.210E+00	1.221E+00	1.267E+00	1.322E+00	1.396E+00	1.468E+00	1.585E+00
PR154	0.000E+00	4.938E+01	5.229E+01	5.533E+01	5.940E+01	6.306E+01	6.709E+01	7.263E+01
ND154	0.000E+00	9.393E+01	1.058E+02	1.152E+02	1.254E+02	1.336E+02	1.430E+02	1.551E+02
PM154	0.000E+00	2.761E+02	3.153E+02	3.452E+02	3.767E+02	4.018E+02	4.305E+02	4.675E+02

Calc. No. 2004-07600
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Attachment B1

PM154M	0.000E+00	4.024E+01	4.912E+01	5.512E+01	6.098E+01	6.533E+01	7.031E+01	7.668E+01
EUI154	0.000E+00	1.059E+00	4.496E+01	1.076E+01	2.003E+01	3.256E+01	4.802E+01	8.327E+01
CE155	0.000E+00	2.148E-01	2.167E-01	2.248E-01	2.340E-01	2.474E-01	2.598E-01	2.812E-01
PR155	0.000E+00	7.757E+00	8.238E+00	8.812E+00	9.480E+00	1.015E+01	1.087E+01	1.192E+01
ND155	0.000E+00	8.010E+01	9.141E+01	1.008E+02	1.111E+02	1.196E+02	1.293E+02	1.422E+02
PM155	0.000E+00	1.161E+02	1.377E+02	1.539E+02	1.708E+02	1.841E+02	1.993E+02	2.195E+02

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21 OUTPUT UNIT = 6

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL

FISSION PRODUCTS

POWER= 2.16550E+01 MW, BURNUP= 3.39605E+04 MWD, FLUX= 2.07E+14 N/CM**2-SEC

9 SUMMARY TABLE: THERMAL POWER, WATTS

	BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
SMI55	0.000E+00	6.447E+01	7.780E+01	8.790E+01	9.838E+01	1.070E+02	1.168E+02	1.307E+02
EUI55	0.000E+00	3.765E-01	7.138E-01	1.081E+00	1.552E+00	2.156E+00	2.928E+00	4.767E+00
GD155M	0.000E+00	4.779E-07	3.965E-06	1.434E-05	3.629E-05	7.679E-05	1.415E-04	3.477E-04
CE156	0.000E+00	1.698E-02	1.713E-02	1.778E-02	1.849E-02	1.956E-02	2.053E-02	2.225E-02
PR156	0.000E+00	1.899E+00	2.048E+00	2.221E+00	2.417E+00	2.617E+00	2.826E+00	3.145E+00
ND156	0.000E+00	1.608E+01	1.933E+01	2.209E+01	2.511E+01	2.766E+01	3.052E+01	3.451E+01
PM156	0.000E+00	8.752E+01	1.104E+02	1.280E+02	1.465E+02	1.612E+02	1.779E+02	2.006E+02
SMI56	0.000E+00	1.525E+01	1.960E+01	2.280E+01	2.608E+01	2.866E+01	3.157E+01	3.552E+01
EUI56	0.000E+00	1.145E+02	1.817E+02	2.531E+02	3.442E+02	4.655E+02	6.240E+02	9.989E+02
CE157	0.000E+00	1.899E-03	1.900E-03	1.961E-03	2.028E-03	2.138E-03	2.237E-03	2.415E-03
PR157	0.000E+00	2.730E-01	2.859E-01	3.052E-01	3.269E-01	3.517E-01	3.766E-01	4.167E-01
ND157	0.000E+00	8.177E+00	9.771E+00	1.123E+01	1.287E+01	1.430E+01	1.589E+01	1.818E+01
PM157	0.000E+00	3.141E+01	4.056E+01	4.790E+01	5.578E+01	6.220E+01	6.944E+01	7.952E+01
SMI57	0.000E+00	3.242E+01	4.301E+01	5.102E+01	5.934E+01	6.593E+01	7.338E+01	8.364E+01
EUI57	0.000E+00	1.737E+01	2.334E+01	2.810E+01	3.324E+01	3.798E+01	4.362E+01	5.364E+01
PR158	0.000E+00	2.842E-02	2.917E-02	3.072E-02	3.245E-02	3.467E-02	3.681E-02	4.038E-02
ND158	0.000E+00	9.816E-01	1.159E+00	1.330E+00	1.523E+00	1.697E+00	1.889E+00	2.168E+00
PM158	0.000E+00	1.482E+01	1.952E+01	2.342E+01	2.769E+01	3.120E+01	3.517E+01	4.074E+01
SMI58	0.000E+00	7.564E+00	1.026E+01	1.236E+01	1.460E+01	1.637E+01	1.839E+01	2.118E+01
EUI58	0.000E+00	2.439E+01	3.316E+01	3.995E+01	4.712E+01	5.282E+01	5.929E+01	6.824E+01
PR159	0.000E+00	1.046E-03	1.062E-03	1.109E-03	1.162E-03	1.236E-03	1.305E-03	1.424E-03
ND159	0.000E+00	1.637E-01	1.864E-01	2.102E-01	2.372E-01	2.628E-01	2.904E-01	3.318E-01
PM159	0.000E+00	2.656E+00	3.539E+00	4.296E+00	5.135E+00	5.837E+00	6.625E+00	7.746E+00
SMI59	0.000E+00	8.897E+00	1.257E+01	1.548E+01	1.861E+01	2.112E+01	2.396E+01	2.794E+01
EUI59	0.000E+00	8.668E+00	1.229E+01	1.513E+01	1.815E+01	2.056E+01	2.329E+01	2.710E+01
GD159	0.000E+00	3.100E+00	4.489E+00	5.650E+00	6.924E+00	8.059E+00	9.372E+00	1.160E+01
ND160	0.000E+00	1.424E-02	1.502E-02	1.600E-02	1.710E-02	1.828E-02	1.949E-02	2.135E-02
PM160	0.000E+00	7.866E-01	9.696E-01	1.123E+00	1.290E+00	1.430E+00	1.587E+00	1.808E+00
SMI60	0.000E+00	3.109E+00	4.314E+00	5.249E+00	6.235E+00	7.026E+00	7.918E+00	9.163E+00
EUI60	0.000E+00	5.760E+00	8.196E+00	1.006E+01	1.200E+01	1.355E+01	1.529E+01	1.772E+01
TR160	0.000E+00	1.283E-01	4.476E-01	9.237E-01	1.546E+00	2.352E+00	3.318E+00	5.559E+00
ND161	0.000E+00	1.530E-03	1.576E-03	1.658E-03	1.747E-03	1.861E-03	1.970E-03	2.154E-03
PM161	0.000E+00	8.196E-02	9.962E-02	1.150E-01	1.314E-01	1.459E-01	1.617E-01	1.848E-01
SMI61	0.000E+00	1.266E+00	1.771E+00	2.166E+00	2.580E+00	2.917E+00	3.293E+00	3.826E+00
EUI61	0.000E+00	2.233E+00	3.216E+00	3.963E+00	4.737E+00	5.355E+00	6.049E+00	7.024E+00

Calc. No. 2004-07600
Project No. 11163-013
Attachment B1

GD161	0.000E+00	1.510E+00	2.185E+00	2.698E+00	3.231E+00	3.658E+00	4.139E+00	4.825E+00
TB161	0.000E+00	4.202E-01	6.139E-01	7.671E-01	9.295E-01	1.070E+00	1.230E+00	1.488E+00
PM162	0.000E+00	6.386E-03	6.790E-03	7.370E-03	8.052E-03	8.787E-03	9.545E-03	1.074E-02
SM162	0.000E+00	1.780E-01	2.106E-01	2.410E-01	2.745E-01	3.049E-01	3.379E-01	3.866E-01
EU162	0.000E+00	1.280E+00	1.683E+00	1.995E+00	2.315E+00	2.578E+00	2.869E+00	3.284E+00
GD162	0.000E+00	4.026E-01	5.573E-01	6.686E-01	7.785E-01	8.654E-01	9.620E-01	1.097E+00
TB162	0.000E+00	1.093E+00	1.514E+00	1.817E+00	2.116E+00	2.352E+00	2.614E+00	2.982E+00
TB162M	0.000E+00	3.523E-02	5.063E-02	6.117E-02	7.126E-02	7.899E-02	8.759E-02	9.951E-02
SM163	0.000E+00	3.876E-02	4.278E-02	4.724E-02	5.225E-02	5.726E-02	6.253E-02	7.061E-02
EU163	0.000E+00	3.034E-01	3.741E-01	4.323E-01	4.928E-01	5.454E-01	6.026E-01	6.858E-01
GD163	0.000E+00	4.645E-01	6.249E-01	7.414E-01	8.560E-01	9.481E-01	1.050E+00	1.193E+00
TB163	0.000E+00	3.031E-01	4.112E-01	4.889E-01	5.648E-01	6.254E-01	6.922E-01	7.865E-01
SM164	0.000E+00	3.226E-03	3.392E-03	3.630E-03	3.897E-03	4.202E-03	4.507E-03	4.999E-03
EU164	0.000E+00	1.052E-01	1.208E-01	1.349E-01	1.495E-01	1.633E-01	1.778E-01	1.997E-01
GD164	0.000E+00	1.313E-01	1.684E-01	1.957E-01	2.223E-01	2.443E-01	2.683E-01	3.026E-01
TB164	0.000E+00	3.462E-01	4.544E-01	5.318E-01	6.062E-01	6.665E-01	7.322E-01	8.257E-01

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

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OUTPUT UNIT = 6

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
FISSION PRODUCTS
POWER= 2.16550E+01 MW, BURNUP= 3.39605E+04 MWD, FLUX= 2.07E+14 N/CM**2-SEC

9 SUMMARY TABLE: THERMAL POWER, WATTS

BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
SM165	0.000E+00	3.267E-04	3.345E-04	3.515E-04	3.705E-04	3.953E-04	4.190E-04
EU165	0.000E+00	1.628E-02	1.766E-02	1.914E-02	2.070E-02	2.234E-02	2.400E-02
GD165	0.000E+00	1.075E-01	1.298E-01	1.471E-01	1.641E-01	1.789E-01	1.947E-01
TB165	0.000E+00	1.184E-01	1.502E-01	1.731E-01	1.949E-01	2.130E-01	2.325E-01
DY165	0.000E+00	9.392E-02	1.654E-01	2.534E-01	3.669E-01	5.188E-01	7.147E-01
DY165M	0.000E+00	8.484E-03	1.549E-02	2.429E-02	3.569E-02	5.104E-02	7.087E-02
DY166	0.000E+00	8.231E-03	1.072E-02	1.258E-02	1.443E-02	1.598E-02	1.770E-02
HO166	0.000E+00	3.362E-02	4.955E-02	6.773E-02	9.168E-02	1.238E-01	1.675E-01
ER167M	0.000E+00	3.955E-05	1.050E-04	2.028E-04	3.421E-04	5.491E-04	8.397E-04
ER169	0.000E+00	2.453E-06	1.013E-05	2.419E-05	4.532E-05	7.639E-05	1.174E-04
SUMTOT	0.000E+00	1.310E+06	1.275E+06	1.254E+06	1.238E+06	1.228E+06	1.220E+06
TOTAL	0.000E+00	1.310E+06	1.275E+06	1.254E+06	1.238E+06	1.228E+06	1.220E+06

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

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OUTPUT UNIT = 6

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
FISSION PRODUCTS
POWER= 2.16550E+01 MW, BURNUP= 3.39605E+04 MWD, FLUX= 2.07E+14 N/CM**2-SEC

9 SUMMARY TABLE: THERMAL POWER, WATTS

BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
H	0.000E+00	2.243E-03	4.537E-03	6.841E-03	9.150E-03	1.145E-02	1.374E-02

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CO	0.000E+00	5.263E-02	5.172E-02	5.259E-02	5.368E-02	5.594E-02	5.790E-02	6.146E-02	6.146E-02
NI	0.000E+00	1.071E+00	1.041E+00	1.046E+00	1.056E+00	1.056E+00	1.114E+00	1.114E+00	1.161E+00
CU	0.000E+00	9.455E+00	8.938E+00	8.711E+00	8.535E+00	8.515E+00	8.463E+00	8.354E+00	8.354E+00
ZN	0.000E+00	6.445E+01	5.975E+01	5.701E+01	5.464E+01	5.324E+01	5.167E+01	4.870E+01	4.870E+01
GA	0.000E+00	4.360E+02	4.015E+02	3.607E+02	3.160E+02	3.477E+02	3.337E+02	3.073E+02	3.073E+02
GE	0.000E+00	1.663E+03	1.526E+03	1.438E+03	1.360E+03	1.305E+03	1.246E+03	1.136E+03	1.136E+03
AS	0.000E+00	7.257E+03	6.643E+03	6.239E+03	5.878E+03	5.612E+03	5.332E+03	4.808E+03	4.808E+03
SE	0.000E+00	1.518E+04	1.389E+04	1.302E+04	1.224E+04	1.166E+04	1.104E+04	9.895E+03	9.895E+03
BR	0.000E+00	4.540E+04	4.124E+04	3.842E+04	3.588E+04	3.393E+04	3.190E+04	2.815E+04	2.815E+04
KR	0.000E+00	5.843E+04	5.338E+04	4.969E+04	4.689E+04	4.454E+04	4.210E+04	3.753E+04	3.753E+04
RB	0.000E+00	1.120E+05	1.031E+05	9.711E+04	9.172E+04	8.760E+04	8.332E+04	7.513E+04	7.513E+04
SR	0.000E+00	8.781E+04	8.262E+04	7.905E+04	7.594E+04	7.359E+04	7.120E+04	6.621E+04	6.621E+04
Y	0.000E+00	1.297E+05	1.238E+05	1.197E+05	1.163E+05	1.137E+05	1.112E+05	1.052E+05	1.052E+05
ZR	0.000E+00	5.761E+04	5.660E+04	5.574E+04	5.516E+04	5.476E+04	5.447E+04	5.307E+04	5.307E+04
NB	0.000E+00	1.103E+05	1.109E+05	1.109E+05	1.114E+05	1.118E+05	1.126E+05	1.118E+05	1.118E+05
MO	0.000E+00	3.542E+04	3.773E+04	3.953E+04	4.152E+04	4.312E+04	4.499E+04	4.710E+04	4.710E+04
TC	0.000E+00	4.048E+04	4.564E+04	4.962E+04	5.382E+04	5.723E+04	6.112E+04	6.622E+04	6.622E+04
RU	0.000E+00	7.088E+03	8.815E+03	1.005E+04	1.132E+04	1.232E+04	1.344E+04	1.496E+04	1.496E+04
RH	0.000E+00	5.233E+03	7.611E+03	9.673E+03	1.177E+04	1.365E+04	1.561E+04	1.863E+04	1.863E+04
PD	0.000E+00	9.244E+02	1.061E+03	1.182E+03	1.310E+03	1.430E+03	1.561E+03	1.763E+03	1.763E+03
AG	0.000E+00	1.272E+03	1.403E+03	1.556E+03	1.732E+03	1.929E+03	2.146E+03	2.546E+03	2.546E+03
CD	0.000E+00	8.552E+02	8.738E+02	9.034E+02	9.364E+02	9.767E+02	1.017E+03	1.077E+03	1.077E+03
IN	0.000E+00	3.728E+03	3.806E+03	3.912E+03	4.031E+03	4.165E+03	4.301E+03	4.479E+03	4.479E+03
SN	0.000E+00	1.026E+04	1.015E+04	1.014E+04	1.018E+04	1.024E+04	1.033E+04	1.031E+04	1.031E+04
SB	0.000E+00	4.215E+04	4.151E+04	4.123E+04	4.116E+04	4.118E+04	4.129E+04	4.077E+04	4.077E+04
TE	0.000E+00	4.946E+04	4.766E+04	4.659E+04	4.584E+04	4.532E+04	4.487E+04	4.337E+04	4.337E+04
I	0.000E+00	1.080E+05	1.054E+05	1.039E+05	1.030E+05	1.024E+05	1.020E+05	9.952E+04	9.952E+04
XE	0.000E+00	5.643E+04	5.430E+04	5.236E+04	5.195E+04	5.118E+04	5.051E+04	4.851E+04	4.851E+04
CS	0.000E+00	9.954E+04	9.604E+04	9.395E+04	9.246E+04	9.148E+04	9.068E+04	8.799E+04	8.799E+04
BA	0.000E+00	5.963E+04	5.752E+04	5.617E+04	5.511E+04	5.431E+04	5.359E+04	5.149E+04	5.149E+04
LA	0.000E+00	1.028E+05	9.935E+04	9.708E+04	9.530E+04	9.395E+04	9.274E+04	8.915E+04	8.915E+04
CE	0.000E+00	2.332E+04	2.285E+04	2.254E+04	2.230E+04	2.212E+04	2.196E+04	2.129E+04	2.129E+04
PR	0.000E+00	3.027E+04	3.138E+04	3.204E+04	3.243E+04	3.263E+04	3.276E+04	3.231E+04	3.231E+04
ND	0.000E+00	3.679E+03	3.775E+03	3.859E+03	3.962E+03	4.050E+03	4.156E+03	4.254E+03	4.254E+03
PM	0.000E+00	2.747E+03	3.360E+03	3.802E+03	4.157E+03	4.436E+03	4.676E+03	4.921E+03	4.921E+03
SM	0.000E+00	2.450E+02	3.371E+02	4.239E+02	5.129E+02	5.998E+02	6.890E+02	8.362E+02	8.362E+02
EU	0.000E+00	1.762E+02	2.697E+02	3.651E+02	4.845E+02	6.344E+02	8.268E+02	1.266E+03	1.266E+03
GD	0.000E+00	5.715E+00	8.155E+00	1.010E+01	1.218E+01	1.396E+01	1.599E+01	1.925E+01	1.925E+01
TB	0.000E+00	2.444E+00	3.642E+00	4.763E+00	6.029E+00	7.358E+00	8.907E+00	1.200E+01	1.200E+01
DY	0.000E+00	1.106E-01	1.916E-01	2.903E-01	4.117E-01	5.858E-01	8.033E-01	1.365E+00	1.365E+00
HO	0.000E+00	3.362E-02	4.955E-02	6.773E-02	9.169E-02	1.238E-01	1.675E-01	2.896E-01	2.896E-01
ER	0.000E+00	4.200E-05	1.152E-04	2.270E-04	3.874E-04	6.255E-04	9.570E-04	1.958E-03	1.958E-03
SUMTOT	0.000E+00	1.310E+06	1.275E+06	1.254E+06	1.238E+06	1.228E+06	1.220E+06	1.186E+06	1.186E+06
TOTAL	0.000E+00	1.310E+06	1.275E+06	1.254E+06	1.238E+06	1.228E+06	1.220E+06	1.186E+06	1.186E+06

CUMULATIVE TABLE TOTALS

AP+FP	0.000E+00	1.310E+06	1.275E+06	1.254E+06	1.238E+06	1.228E+06	1.220E+06	1.186E+06	1.186E+06
ACT+FP	6.533E-02	1.358E+06	1.324E+06	1.304E+06	1.291E+06	1.284E+06	1.279E+06	1.251E+06	1.251E+06
AP+ACT+FP	6.533E-02	1.358E+06	1.324E+06	1.304E+06	1.291E+06	1.284E+06	1.279E+06	1.251E+06	1.251E+06

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21
 IRRADIATION OF ONE METRIC TON OF BWRU FUEL
 (ALPHA, N) NEUTRON SOURCE, NEUTRONS/SEC

BASIS=	BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
U234	1.059E+03	9.985E+02	9.416E+02	8.864E+02	8.331E+02	7.806E+02	7.296E+02	6.394E+02
U235	3.107E+01	2.721E+01	2.384E+01	2.081E+01	1.809E+01	1.560E+01	1.337E+01	9.833E+00
U238	1.016E+02	1.013E+02	1.010E+02	1.007E+02	1.004E+02	1.001E+02	9.980E+01	9.915E+01
PU238	0.000E+00	1.530E+04	8.319E+04	2.345E+05	4.984E+05	9.087E+05	1.487E+06	3.053E+06
PU239	0.000E+00	8.450E+04	1.370E+05	1.735E+05	1.971E+05	2.166E+05	2.302E+05	2.515E+05
PU240	0.000E+00	2.592E+04	7.251E+04	1.237E+05	1.698E+05	2.183E+05	2.610E+05	3.438E+05
AM241	0.000E+00	7.573E+02	8.202E+03	2.695E+04	5.749E+04	9.617E+04	1.386E+05	2.137E+05
CM242	0.000E+00	4.225E+04	8.418E+05	3.857E+06	1.028E+07	2.013E+07	3.316E+07	6.076E+07
CM244	0.000E+00	5.382E+01	2.587E+03	2.291E+04	1.004E+05	3.092E+05	7.537E+05	2.672E+06

TOTALS
 TABLE 1.192E+03 1.700E+05 1.147E+06 4.441E+06 1.130E+07 2.189E+07 3.606E+07 6.734E+07
 ACTUAL 1.192E+03 1.700E+05 1.147E+06 4.441E+06 1.130E+07 2.189E+07 3.606E+07 6.734E+07

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21
 IRRADIATION OF ONE METRIC TON OF BWRU FUEL
 SPONTANEOUS FISSION NEUTRON SOURCE, NEUTRONS/SEC

BASIS=	BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
U235	1.385E+01	1.213E+01	1.063E+01	9.279E+00	8.065E+00	6.957E+00	5.962E+00	4.384E+00
U238	1.219E+04	1.215E+04	1.212E+04	1.208E+04	1.205E+04	1.201E+04	1.197E+04	1.189E+04
PU238	0.000E+00	2.495E+03	1.357E+04	3.824E+04	8.128E+04	1.482E+05	2.425E+05	4.979E+05
PU240	0.000E+00	1.366E+05	3.823E+05	6.519E+05	8.951E+05	1.151E+06	1.376E+06	1.812E+06
PU242	0.000E+00	1.563E+03	1.772E+04	6.098E+04	1.394E+05	2.498E+05	3.899E+05	6.961E+05
CM242	0.000E+00	2.050E+05	4.085E+06	1.871E+07	4.986E+07	9.767E+07	1.609E+08	2.948E+08
CM244	0.000E+00	6.480E+03	3.114E+05	2.759E+06	1.208E+07	3.723E+07	9.074E+07	3.217E+08
CM246	0.000E+00	2.276E-01	4.410E+01	9.286E+02	7.623E+03	3.870E+04	1.430E+05	9.571E+05

TOTALS
 TABLE 1.220E+04 3.644E+05 4.822E+06 2.224E+07 6.308E+07 1.365E+08 2.538E+08 6.206E+08
 ACTUAL 1.220E+04 3.644E+05 4.822E+06 2.224E+07 6.308E+07 1.365E+08 2.538E+08 6.206E+08

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21
 PHOTON SPECTRUM FOR ACTIVATION PRODUCTS
 IRRADIATION OF ONE METRIC TON OF BWRU FUEL

TOTALS
 TABLE 1.339E+04 5.343E+05 5.969E+06 2.668E+07 7.438E+07 1.584E+08 2.899E+08 6.879E+08
 ACTUAL 1.339E+04 5.343E+05 5.969E+06 2.668E+07 7.438E+07 1.584E+08 2.899E+08 6.879E+08

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TOTAL 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
GAM POW 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00

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OUTPUT UNIT = 6

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

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OUTPUT UNIT = 6

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

PHOTON SPECTRUM FOR ACTINIDES + DAUGHTERS

IRRADIATION OF ONE METRIC TON OF BWRU FUEL

POWER= 21.66 MW, BURNUP= 33960. MWD, FLUX= 2.07E+14 N/CM**2-SEC

18 GROUP PHOTON RELEASE RATES, PHOTONS/SECOND

BASIS=

EMEAN	BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
1.000E-02	1.283E+10	4.875E+17	4.878E+17	5.043E+17	5.218E+17	5.518E+17	5.785E+17	6.288E+17
2.500E-02	0.000E+00	2.147E+16	2.146E+16	2.217E+16	2.293E+16	2.424E+16	2.542E+16	2.768E+16
3.750E-02	2.870E+06	3.198E+16	3.182E+16	3.273E+16	3.371E+16	3.549E+16	3.706E+16	4.005E+16
5.750E-02	8.463E+07	2.521E+16	2.630E+16	2.815E+16	2.997E+16	3.247E+16	3.471E+16	3.877E+16
8.500E-02	2.452E+08	2.219E+17	2.212E+17	2.279E+17	2.350E+17	2.476E+17	2.587E+17	2.796E+17
1.250E-01	5.114E+08	1.745E+17	1.745E+17	1.802E+17	1.861E+17	1.963E+17	2.053E+17	2.218E+17
2.250E-01	1.713E+09	1.235E+17	1.235E+17	1.276E+17	1.318E+17	1.391E+17	1.454E+17	1.571E+17
3.750E-01	4.275E+06	1.347E+16	1.344E+16	1.385E+16	1.429E+16	1.507E+16	1.575E+16	1.703E+16
5.750E-01	2.424E+05	2.252E+15	2.240E+15	2.309E+15	2.383E+15	2.518E+15	2.638E+15	2.870E+15
8.500E-01	5.584E+04	3.326E+15	3.513E+15	3.905E+15	4.388E+15	5.070E+15	5.807E+15	7.383E+15
1.250E+00	1.183E+04	1.228E+14	2.517E+14	4.425E+14	6.860E+14	1.004E+15	1.371E+15	2.180E+15
1.750E+00	5.790E+03	3.806E+11	3.772E+11	3.992E+11	4.233E+11	4.689E+11	5.105E+11	5.940E+11
2.250E+00	3.350E+03	8.671E+04	1.043E+06	4.722E+06	1.327E+07	2.849E+07	5.259E+07	1.269E+08
2.750E+00	1.944E+03	3.212E+05	1.845E+06	6.076E+06	1.490E+07	3.012E+07	5.386E+07	1.263E+08
3.500E+00	1.736E+03	4.458E+04	5.405E+05	2.450E+06	6.889E+06	1.480E+07	2.733E+07	6.600E+07
5.000E+00	7.445E+02	1.896E+04	2.310E+05	1.048E+06	2.947E+06	6.331E+06	1.169E+07	2.824E+07
7.000E+00	8.556E+01	2.164E+03	2.650E+04	1.203E+05	3.385E+05	7.276E+05	1.344E+06	3.249E+06
9.500E+00	9.827E+00	2.483E+02	3.055E+03	1.387E+04	3.903E+04	8.387E+04	1.549E+05	3.741E+05
TOTAL	1.539E+10	1.105E+18	1.106E+18	1.143E+18	1.183E+18	1.251E+18	1.311E+18	1.423E+18
MEV/SEC	6.054E+08	8.585E+16	8.616E+16	8.943E+16	9.299E+16	9.886E+16	1.042E+17	1.146E+17

18 GROUP SPECIFIC ENERGY RELEASE RATES, MEV/WATT-SEC

BASIS=

EMEAN	BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
1.000E-02	5.926E+00	2.251E+08	2.252E+08	2.329E+08	2.410E+08	2.548E+08	2.671E+08	2.904E+08
2.500E-02	0.000E+00	2.479E+07	2.478E+07	2.559E+07	2.647E+07	2.799E+07	2.934E+07	3.195E+07
3.750E-02	4.970E-03	5.538E+07	5.510E+07	5.667E+07	5.837E+07	6.146E+07	6.418E+07	6.935E+07
5.750E-02	2.247E-01	6.693E+07	6.983E+07	7.474E+07	7.959E+07	8.620E+07	9.217E+07	1.029E+08
8.500E-02	9.624E-01	8.710E+08	8.683E+08	8.944E+08	9.223E+08	9.720E+08	1.016E+09	1.098E+09
1.250E-01	2.952E+00	1.007E+09	1.007E+09	1.040E+09	1.074E+09	1.133E+09	1.185E+09	1.280E+09
2.250E-01	1.780E+01	1.283E+09	1.284E+09	1.326E+09	1.369E+09	1.445E+09	1.511E+09	1.633E+09

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3.750E-01	7.403E-02	2.332E+08	2.327E+08	2.398E+08	2.475E+08	2.609E+08	2.727E+08	2.949E+08
5.750E-01	6.436E-03	5.979E+07	5.949E+07	6.131E+07	6.328E+07	6.687E+07	7.006E+07	7.619E+07
8.500E-01	2.192E-03	1.306E+08	1.379E+08	1.533E+08	1.722E+08	1.990E+08	2.279E+08	2.898E+08
1.250E+00	6.829E-04	7.088E+06	1.453E+07	2.544E+07	3.960E+07	5.794E+07	7.913E+07	1.258E+08
1.750E+00	4.679E-04	3.076E+04	3.048E+04	3.226E+04	3.421E+04	3.789E+04	4.126E+04	4.800E+04
2.250E+00	3.480E-04	9.009E-03	1.084E-01	4.906E-01	1.379E+00	2.960E+00	5.465E+00	1.318E+01
2.750E+00	2.469E-04	4.078E-02	2.343E-01	7.716E-01	1.892E+00	3.825E+00	6.839E+00	1.604E+01
3.500E+00	2.806E-04	7.205E-03	8.736E-02	3.959E-01	1.113E+00	2.392E+00	4.418E+00	1.067E+01
5.000E+00	1.719E-04	4.379E-03	5.334E-02	2.419E-01	6.804E-01	1.462E+00	2.700E+00	6.519E+00
7.000E+00	2.766E-05	6.995E-04	8.568E-03	3.889E-02	1.094E-01	2.352E-01	4.346E-01	1.050E+00
9.500E+00	4.311E-06	1.089E-04	1.340E-03	6.086E-03	1.712E-02	3.679E-02	6.796E-02	1.641E-01
TOTAL	2.796E+01	3.964E+09	3.979E+09	4.130E+09	4.294E+09	4.565E+09	4.814E+09	5.292E+09
GAM POW	9.704E-05	1.376E+04	1.381E+04	1.434E+04	1.491E+04	1.585E+04	1.671E+04	1.837E+04

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21
 OUTPUT UNIT = 6

PRINCIPAL PHOTON SOURCES IN GROUP 1, PHOTONS/SEC
 MEAN ENERGY= 0.010MEV

NUCLIDE	BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
U234	9.591E+09	9.043E+09	8.528E+09	8.029E+09	7.546E+09	7.070E+09	6.608E+09	5.791E+09
U235	1.880E+09	1.646E+09	1.443E+09	1.259E+09	1.094E+09	9.441E+08	8.091E+08	5.950E+08
U237	0.000E+00	4.681E+15	7.260E+15	9.801E+15	1.217E+16	1.470E+16	1.702E+16	2.091E+16
U238	1.362E+09	1.358E+09	1.354E+09	1.351E+09	1.347E+09	1.342E+09	1.338E+09	1.329E+09
U239	0.000E+00	1.578E+17	1.568E+17	1.611E+17	1.657E+17	1.741E+17	1.813E+17	1.950E+17
NP238	0.000E+00	2.244E+14	6.383E+14	1.243E+15	2.015E+15	3.020E+15	4.184E+15	6.751E+15
NP239	0.000E+00	3.244E+17	3.225E+17	3.313E+17	3.406E+17	3.579E+17	3.729E+17	4.008E+17

PRINCIPAL PHOTON SOURCES IN GROUP 2, PHOTONS/SEC
 MEAN ENERGY= 0.025MEV

NUCLIDE	BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
U237	0.000E+00	1.738E+14	2.695E+14	3.639E+14	4.517E+14	5.459E+14	6.319E+14	7.763E+14
U239	0.000E+00	1.704E+16	1.694E+16	1.740E+16	1.789E+16	1.880E+16	1.958E+16	2.105E+16
NP239	0.000E+00	4.239E+15	4.214E+15	4.329E+15	4.451E+15	4.677E+15	4.872E+15	5.238E+15

PRINCIPAL PHOTON SOURCES IN GROUP 3, PHOTONS/SEC
 MEAN ENERGY= 0.038MEV

NUCLIDE	BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
U235	2.870E+06	2.514E+06	2.203E+06	1.923E+06	1.671E+06	1.441E+06	1.235E+06	9.084E+05
U239	0.000E+00	2.906E+16	2.889E+16	2.968E+16	3.052E+16	3.207E+16	3.341E+16	3.591E+16
NP239	0.000E+00	2.880E+15	2.863E+15	2.941E+15	3.024E+15	3.177E+15	3.310E+15	3.558E+15

PRINCIPAL PHOTON SOURCES IN GROUP 4, PHOTONS/SEC
 MEAN ENERGY= 0.058MEV

NUCLIDE	BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
U234	7.687E+07	7.248E+07	6.835E+07	6.435E+07	6.048E+07	5.666E+07	5.296E+07	4.642E+07
U237	0.000E+00	2.197E+15	3.408E+15	4.601E+15	5.712E+15	6.903E+15	7.991E+15	9.817E+15
U238	7.205E+06	7.184E+06	7.164E+06	7.144E+06	7.123E+06	7.101E+06	7.077E+06	7.032E+06
U239	0.000E+00	1.522E+16	1.513E+16	1.554E+16	1.598E+16	1.679E+16	1.749E+16	1.880E+16
NP239	0.000E+00	7.778E+15	7.732E+15	7.942E+15	8.167E+15	8.581E+15	8.939E+15	9.609E+15

PRINCIPAL PHOTON SOURCES IN GROUP 5, PHOTONS/SEC
 MEAN ENERGY= 0.085MEV

NUCLIDE	BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
U235	2.452E+08	2.148E+08	1.882E+08	1.643E+08	1.428E+08	1.231E+08	1.055E+08	7.761E+07
U237	0.000E+00	1.020E+15	1.582E+15	2.136E+15	2.652E+15	3.205E+15	3.710E+15	4.558E+15
U239	0.000E+00	1.630E+17	1.621E+17	1.665E+17	1.712E+17	1.799E+17	1.874E+17	2.014E+17
NP239	0.000E+00	5.781E+16	5.747E+16	5.903E+16	6.070E+16	6.378E+16	6.644E+16	7.142E+16

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

OUTPUT UNIT = 6

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PRINCIPAL PHOTON SOURCES IN GROUP 6, PHOTONS/SEC
 MEAN ENERGY= 0.125MEV

NUCLIDE	BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
U234	2.729E+07	2.573E+07	2.427E+07	2.285E+07	2.147E+07	2.012E+07	1.880E+07	1.648E+07
U235	4.841E+08	4.240E+08	3.715E+08	3.243E+08	2.819E+08	2.431E+08	2.084E+08	1.532E+08
U237	0.000E+00	1.777E+15	2.756E+15	3.721E+15	4.619E+15	5.583E+15	6.462E+15	7.939E+15
U239	0.000E+00	5.925E+15	5.890E+15	6.050E+15	6.221E+15	6.537E+15	6.810E+15	7.322E+15
NP239	0.000E+00	1.668E+17	1.658E+17	1.703E+17	1.751E+17	1.840E+17	1.917E+17	2.060E+17

PRINCIPAL PHOTON SOURCES IN GROUP 7, PHOTONS/SEC
 MEAN ENERGY= 0.225MEV

NUCLIDE	BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
U235	1.713E+09	1.501E+09	1.315E+09	1.148E+09	9.975E+08	8.605E+08	7.374E+08	5.423E+08
U237	0.000E+00	1.340E+15	2.078E+15	2.805E+15	3.483E+15	4.209E+15	4.872E+15	5.985E+15
U239	0.000E+00	6.486E+15	6.448E+15	6.623E+15	6.810E+15	7.156E+15	7.455E+15	8.015E+15
NP239	0.000E+00	1.156E+17	1.149E+17	1.181E+17	1.214E+17	1.276E+17	1.329E+17	1.428E+17

PRINCIPAL PHOTON SOURCES IN GROUP 8, PHOTONS/SEC
 MEAN ENERGY= 0.375MEV

NUCLIDE	BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
U235	4.275E+06	3.745E+06	3.281E+06	2.864E+06	2.489E+06	2.147E+06	1.840E+06	1.353E+06
U237	0.000E+00	7.904E+13	1.226E+14	1.655E+14	2.055E+14	2.483E+14	2.874E+14	3.531E+14
U239	0.000E+00	2.198E+15	2.185E+15	2.245E+15	2.308E+15	2.425E+15	2.527E+15	2.716E+15
NP239	0.000E+00	1.114E+16	1.108E+16	1.138E+16	1.170E+16	1.229E+16	1.280E+16	1.376E+16

PRINCIPAL PHOTON SOURCES IN GROUP 9, PHOTONS/SEC
 MEAN ENERGY= 0.575MEV

NUCLIDE	BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
U234	3.209E+04	3.026E+04	2.853E+04	2.686E+04	2.524E+04	2.365E+04	2.211E+04	1.938E+04
U235	2.103E+05	1.842E+05	1.614E+05	1.409E+05	1.224E+05	1.056E+05	9.051E+04	6.656E+04
U239	0.000E+00	2.068E+15	2.056E+15	2.112E+15	2.172E+15	2.282E+15	2.378E+15	2.556E+15
NP238	0.000E+00	1.208E+12	3.435E+12	6.687E+12	1.085E+13	1.625E+13	2.251E+13	3.633E+13
NP239	0.000E+00	4.800E+13	4.771E+13	4.901E+13	5.040E+13	5.296E+13	5.516E+13	5.930E+13
NP240	0.000E+00	1.210E+14	1.200E+14	1.269E+14	1.346E+14	1.491E+14	1.623E+14	1.888E+14

PRINCIPAL PHOTON SOURCES IN GROUP 10, PHOTONS/SEC
 MEAN ENERGY= 0.850MEV

NUCLIDE	BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
U234	2.080E+03	1.962E+03	1.850E+03	1.742E+03	1.637E+03	1.534E+03	1.433E+03	1.256E+03
U235	2.867E+04	2.511E+04	2.200E+04	1.920E+04	1.669E+04	1.440E+04	1.234E+04	9.074E+03
U238	2.509E+04	2.502E+04	2.495E+04	2.488E+04	2.481E+04	2.473E+04	2.465E+04	2.449E+04
U239	0.000E+00	3.064E+15	3.046E+15	3.129E+15	3.217E+15	3.381E+15	3.522E+15	3.786E+15
NP238	0.000E+00	1.117E+14	3.177E+14	6.186E+14	1.003E+15	1.503E+15	2.083E+15	3.360E+15
NP240	0.000E+00	1.478E+14	1.465E+14	1.550E+14	1.644E+14	1.821E+14	1.983E+14	2.306E+14

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

PRINCIPAL PHOTON SOURCES IN GROUP 11, PHOTONS/SEC
 MEAN ENERGY= 1.250MEV

NUCLIDE	BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
U234	1.354E+02	1.277E+02	1.204E+02	1.133E+02	1.065E+02	9.981E+01	9.330E+01	8.176E+01
U238	1.167E+04	1.164E+04	1.161E+04	1.157E+04	1.154E+04	1.150E+04	1.147E+04	1.139E+04
U239	0.000E+00	3.611E+13	3.590E+13	3.687E+13	3.792E+13	3.984E+13	4.151E+13	4.462E+13
NP238	0.000E+00	7.012E+13	1.994E+14	3.882E+14	6.296E+14	9.435E+14	1.307E+15	2.109E+15
NP240	0.000E+00	1.558E+13	1.544E+13	1.634E+13	1.732E+13	1.919E+13	2.089E+13	2.430E+13

PRINCIPAL PHOTON SOURCES IN GROUP 12, PHOTONS/SEC
 MEAN ENERGY= 1.750MEV

NUCLIDE	BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
U234	6.777E+01	6.390E+01	6.026E+01	5.673E+01	5.332E+01	4.996E+01	4.670E+01	4.092E+01
U238	5.711E+03	5.695E+03	5.679E+03	5.663E+03	5.646E+03	5.629E+03	5.610E+03	5.574E+03
NP240M	0.000E+00	3.806E+11	3.772E+11	3.991E+11	4.233E+11	4.688E+11	5.104E+11	5.937E+11

PRINCIPAL PHOTON SOURCES IN GROUP 13, PHOTONS/SEC
 MEAN ENERGY= 2.250MEV

NUCLIDE

BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
U234	3.406E+01	3.212E+01	3.029E+01	2.851E+01	2.680E+01	2.511E+01	2.347E+01
U238	3.310E+03	3.300E+03	3.291E+03	3.282E+03	3.272E+03	3.262E+03	3.251E+03
Pu238	0.000E+00	8.802E+02	4.787E+03	1.349E+04	2.868E+04	5.229E+04	8.555E+04
Pu239	0.000E+00	2.060E+03	3.341E+03	4.228E+03	4.804E+03	5.279E+03	5.610E+03
Pu240	0.000E+00	3.492E+04	9.770E+04	1.666E+05	2.288E+05	2.941E+05	3.516E+05
CM242	0.000E+00	4.354E+04	8.675E+05	3.975E+06	1.059E+07	2.074E+07	3.418E+07
CM244	0.000E+00	1.274E+03	6.121E+04	5.422E+05	2.375E+06	7.317E+06	1.783E+07

PRINCIPAL PHOTON SOURCES IN GROUP 14, PHOTONS/SEC
 MEAN ENERGY= 2.750MEV

BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
TL208	0.000E+00	2.712E+05	1.242E+06	3.348E+06	7.230E+06	1.365E+07	2.345E+07
U238	1.924E+03	1.918E+03	1.913E+03	1.907E+03	1.902E+03	1.896E+03	1.890E+03
Pu240	0.000E+00	2.024E+04	5.664E+04	9.660E+04	1.326E+05	1.705E+05	2.038E+05
CM242	0.000E+00	2.515E+04	5.010E+05	2.295E+06	6.116E+06	1.198E+07	1.974E+07
CM244	0.000E+00	7.380E+02	3.547E+04	3.142E+05	1.376E+06	4.240E+06	1.033E+07

OUTPUT UNIT = 6

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

PRINCIPAL PHOTON SOURCES IN GROUP 15, PHOTONS/SEC
 MEAN ENERGY= 3.500MEV

BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
U238	1.716E+03	1.711E+03	1.706E+03	1.701E+03	1.696E+03	1.691E+03	1.679E+03
Pu239	0.000E+00	7.596E+02	1.232E+03	1.559E+03	1.772E+03	1.947E+03	2.069E+03
Pu240	0.000E+00	1.809E+04	5.062E+04	8.633E+04	1.185E+05	1.524E+05	1.822E+05
CM242	0.000E+00	2.258E+04	4.500E+05	2.062E+06	5.493E+06	1.076E+07	1.773E+07
CM244	0.000E+00	6.647E+02	3.194E+04	2.830E+05	1.239E+06	3.819E+06	9.308E+06

PRINCIPAL PHOTON SOURCES IN GROUP 16, PHOTONS/SEC
 MEAN ENERGY= 5.000MEV

BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
U238	7.396E+02	7.375E+02	7.355E+02	7.333E+02	7.312E+02	7.289E+02	7.265E+02
Pu239	0.000E+00	2.274E+02	3.688E+02	4.669E+02	5.305E+02	5.829E+02	6.195E+02
Pu240	0.000E+00	7.742E+03	2.166E+04	3.695E+04	5.073E+04	6.521E+04	7.797E+04
CM242	0.000E+00	9.663E+03	1.925E+05	8.821E+05	2.350E+06	4.604E+06	7.585E+06
CM244	0.000E+00	2.844E+02	1.367E+04	1.211E+05	5.302E+05	1.634E+06	3.982E+06

PRINCIPAL PHOTON SOURCES IN GROUP 17, PHOTONS/SEC
 MEAN ENERGY= 7.000MEV

BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
U238	8.519E+01	8.495E+01	8.471E+01	8.447E+01	8.422E+01	8.396E+01	8.368E+01
Pu240	0.000E+00	8.881E+02	2.485E+03	4.238E+03	5.819E+03	7.480E+03	8.943E+03

CM242 0.000E+00 1.109E+03 2.211E+04 1.013E+05 2.698E+05 5.286E+05 8.709E+05 1.596E+06
 CM244 0.000E+00 3.280E+01 1.576E+03 1.396E+04 6.115E+04 1.884E+05 4.593E+05 1.628E+06

PRINCIPAL PHOTON SOURCES IN GROUP 18, PHOTONS/SEC
 MEAN ENERGY= 9.500MEV

NUCLIDE	BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
U238	9.797E+00	9.770E+00	9.743E+00	9.715E+00	9.688E+00	9.656E+00	9.624E+00	9.562E+00
Pu240	0.000E+00	1.020E+02	2.853E+02	4.866E+02	6.681E+02	8.588E+02	1.027E+03	1.353E+03
CM242	0.000E+00	1.281E+02	2.552E+03	1.169E+04	3.115E+04	6.101E+04	1.005E+05	1.842E+05
CM244	0.000E+00	3.768E+00	1.811E+02	1.604E+03	7.026E+03	2.165E+04	5.277E+04	1.871E+05

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21
 PHOTON SPECTRUM FOR FISSION PRODUCTS
 OUTPUT UNIT = 6

IRRADIATION OF ONE METRIC TON OF BWRU FUEL
 POWER= 21.66 MW, BURNUP= 33960. MWD, FLUX= 2.07E+14 N/CM**2-SEC

18 GROUP PHOTON RELEASE RATES, PHOTONS/SECOND
 BASIS=

EMEAN	BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
1.000E-02	0.000E+00	1.376E+18	1.346E+18	1.326E+18	1.312E+18	1.302E+18	1.293E+18	1.258E+18
2.500E-02	0.000E+00	3.494E+17	3.432E+17	3.395E+17	3.371E+17	3.356E+17	3.346E+17	3.274E+17
3.750E-02	0.000E+00	2.881E+17	2.828E+17	2.796E+17	2.772E+17	2.757E+17	2.745E+17	2.680E+17
5.750E-02	0.000E+00	2.964E+17	2.895E+17	2.852E+17	2.820E+17	2.799E+17	2.781E+17	2.706E+17
8.500E-02	0.000E+00	2.189E+17	2.136E+17	2.103E+17	2.078E+17	2.061E+17	2.047E+17	1.989E+17
1.250E-01	0.000E+00	2.294E+17	2.256E+17	2.231E+17	2.213E+17	2.201E+17	2.191E+17	2.137E+17
2.250E-01	0.000E+00	5.218E+17	5.077E+17	4.985E+17	4.917E+17	4.864E+17	4.820E+17	4.664E+17
3.750E-01	0.000E+00	3.380E+17	3.357E+17	3.349E+17	3.355E+17	3.362E+17	3.379E+17	3.344E+17
5.750E-01	0.000E+00	5.671E+17	5.617E+17	5.593E+17	5.593E+17	5.601E+17	5.621E+17	5.565E+17
8.500E-01	0.000E+00	6.214E+17	6.178E+17	6.095E+17	6.027E+17	5.979E+17	5.941E+17	5.790E+17
1.250E+00	0.000E+00	3.736E+17	3.610E+17	3.528E+17	3.464E+17	3.417E+17	3.374E+17	3.248E+17
1.750E+00	0.000E+00	1.352E+17	1.313E+17	1.288E+17	1.270E+17	1.257E+17	1.245E+17	1.206E+17
2.250E+00	0.000E+00	7.361E+16	7.053E+16	6.849E+16	6.681E+16	6.552E+16	6.432E+16	6.131E+16
2.750E+00	0.000E+00	3.164E+16	3.032E+16	2.944E+16	2.871E+16	2.815E+16	2.762E+16	2.627E+16
3.500E+00	0.000E+00	1.845E+16	1.728E+16	1.649E+16	1.579E+16	1.524E+16	1.469E+16	1.355E+16
5.000E+00	0.000E+00	9.598E+15	8.778E+15	8.214E+15	7.704E+15	7.308E+15	6.897E+15	6.125E+15
7.000E+00	0.000E+00	7.896E+13	7.292E+13	6.884E+13	6.521E+13	6.242E+13	5.955E+13	5.398E+13
9.500E+00	0.000E+00	1.592E+10	1.472E+10	1.396E+10	1.331E+10	1.284E+10	1.235E+10	1.139E+10
TOTAL	0.000E+00	5.449E+18	5.343E+18	5.271E+18	5.219E+18	5.184E+18	5.156E+18	5.025E+18
MEV/SEC	0.000E+00	2.265E+18	2.212E+18	2.173E+18	2.143E+18	2.121E+18	2.102E+18	2.038E+18

18 GROUP SPECIFIC ENERGY RELEASE RATES, MEV/WATT-SEC
 BASIS=

EMEAN	BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
1.000E-02	0.000E+00	6.355E+08	6.215E+08	6.125E+08	6.058E+08	6.012E+08	5.972E+08	5.809E+08

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2.500E-02	0.000E+00	4.034E+08	3.963E+08	3.920E+08	3.892E+08	3.875E+08	3.863E+08	3.863E+08	3.780E+08
3.750E-02	0.000E+00	4.989E+08	4.897E+08	4.841E+08	4.800E+08	4.775E+08	4.753E+08	4.753E+08	4.641E+08
5.750E-02	0.000E+00	7.870E+08	7.686E+08	7.573E+08	7.488E+08	7.433E+08	7.385E+08	7.385E+08	7.186E+08
8.500E-02	0.000E+00	8.592E+08	8.384E+08	8.255E+08	8.158E+08	8.091E+08	8.033E+08	8.033E+08	7.807E+08
1.250E-01	0.000E+00	1.324E+09	1.302E+09	1.288E+09	1.277E+09	1.270E+09	1.265E+09	1.265E+09	1.233E+09
2.250E-01	0.000E+00	5.422E+09	5.275E+09	5.179E+09	5.109E+09	5.054E+09	5.008E+09	5.008E+09	4.846E+09
3.750E-01	0.000E+00	5.853E+09	5.813E+09	5.799E+09	5.810E+09	5.822E+09	5.851E+09	5.851E+09	5.790E+09
5.750E-01	0.000E+00	1.506E+10	1.492E+10	1.485E+10	1.485E+10	1.487E+10	1.493E+10	1.493E+10	1.478E+10
8.500E-01	0.000E+00	2.439E+10	2.425E+10	2.392E+10	2.366E+10	2.347E+10	2.332E+10	2.332E+10	2.273E+10
1.250E+00	0.000E+00	2.157E+10	2.084E+10	2.037E+10	2.000E+10	1.972E+10	1.948E+10	1.948E+10	1.875E+10
1.750E+00	0.000E+00	1.093E+10	1.061E+10	1.041E+10	1.026E+10	1.016E+10	1.006E+10	1.006E+10	9.744E+09
2.250E+00	0.000E+00	7.648E+09	7.329E+09	7.116E+09	6.941E+09	6.808E+09	6.683E+09	6.683E+09	6.370E+09
2.750E+00	0.000E+00	4.019E+09	3.851E+09	3.739E+09	3.647E+09	3.575E+09	3.507E+09	3.507E+09	3.366E+09
3.500E+00	0.000E+00	2.982E+09	2.793E+09	2.665E+09	2.551E+09	2.463E+09	2.374E+09	2.374E+09	2.191E+09
5.000E+00	0.000E+00	2.216E+09	2.027E+09	1.897E+09	1.779E+09	1.687E+09	1.592E+09	1.592E+09	1.414E+09
7.000E+00	0.000E+00	2.553E+07	2.357E+07	2.255E+07	2.108E+07	2.018E+07	1.925E+07	1.925E+07	1.745E+07
9.500E+00	0.000E+00	6.985E+03	6.459E+03	6.124E+03	5.839E+03	5.632E+03	5.420E+03	5.420E+03	4.996E+03
TOTAL	0.000E+00	1.046E+11	1.021E+11	1.003E+11	9.894E+10	9.794E+10	9.709E+10	9.709E+10	9.412E+10
GAM POW	0.000E+00	3.631E+05	3.546E+05	3.483E+05	3.435E+05	3.400E+05	3.370E+05	3.370E+05	3.267E+05

OUTPUT UNIT = 6

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ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

PRINCIPAL PHOTON SOURCES IN GROUP 1, PHOTONS/SEC
MEAN ENERGY= 0.010MEV

NUCLIDE	BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
BR 88	0.000E+00	2.064E+16	1.873E+16	1.742E+16	1.625E+16	1.534E+16	1.439E+16	1.265E+16
KR 88	0.000E+00	2.650E+16	2.439E+16	2.292E+16	2.159E+16	2.055E+16	1.947E+16	1.743E+16
KR 89	0.000E+00	2.250E+16	2.055E+16	1.920E+16	1.798E+16	1.703E+16	1.604E+16	1.419E+16
RB 89	0.000E+00	1.744E+16	1.601E+16	1.502E+16	1.411E+16	1.341E+16	1.267E+16	1.129E+16
KR 90	0.000E+00	2.311E+16	2.106E+16	1.966E+16	1.839E+16	1.741E+16	1.639E+16	1.449E+16
RB 90	0.000E+00	3.057E+16	2.796E+16	2.616E+16	2.452E+16	2.325E+16	2.192E+16	1.944E+16
SR 91	0.000E+00	1.385E+16	1.282E+16	1.211E+16	1.146E+16	1.096E+16	1.044E+16	9.432E+15
RB 92	0.000E+00	5.673E+16	5.238E+16	4.943E+16	4.681E+16	4.479E+16	4.271E+16	3.867E+16
Y 92	0.000E+00	3.182E+16	2.973E+16	2.828E+16	2.697E+16	2.594E+16	2.490E+16	2.279E+16
Y 93	0.000E+00	2.856E+16	2.698E+16	2.587E+16	2.489E+16	2.412E+16	2.335E+16	2.170E+16
RB 94	0.000E+00	2.399E+16	2.219E+16	2.104E+16	2.006E+16	1.935E+16	1.862E+16	1.716E+16
Y 94	0.000E+00	3.940E+16	3.754E+16	3.622E+16	3.506E+16	3.413E+16	3.321E+16	3.115E+16
Y 96	0.000E+00	6.170E+16	5.917E+16	5.745E+16	5.601E+16	5.489E+16	5.381E+16	5.112E+16
ZR 97	0.000E+00	1.608E+16	1.569E+16	1.543E+16	1.522E+16	1.506E+16	1.493E+16	1.445E+16
NB 98	0.000E+00	4.506E+16	4.422E+16	4.365E+16	4.325E+16	4.292E+16	4.267E+16	4.150E+16
NB 99	0.000E+00	3.595E+16	3.528E+16	3.486E+16	3.459E+16	3.438E+16	3.425E+16	3.341E+16
ZR101	0.000E+00	3.709E+16	3.571E+16	3.495E+16	3.445E+16	3.415E+16	3.391E+16	3.294E+16
MO101	0.000E+00	6.250E+16	6.247E+16	6.254E+16	6.285E+16	6.311E+16	6.356E+16	6.312E+16
TC102	0.000E+00	2.859E+16	2.916E+16	2.961E+16	3.016E+16	3.060E+16	3.116E+16	3.146E+16
TC104	0.000E+00	1.757E+16	1.983E+16	2.147E+16	2.331E+16	2.448E+16	2.598E+16	2.786E+16
RH106	0.000E+00	1.706E+15	3.490E+15	5.239E+15	6.951E+15	8.533E+15	1.006E+16	1.258E+16
I134	0.000E+00	1.869E+16	1.830E+16	1.806E+16	1.791E+16	1.779E+16	1.771E+16	1.725E+16

TE135	0.000E+00	3.021E+16	2.879E+16	2.799E+16	2.745E+16	2.710E+16	2.679E+16	2.584E+16
I136	0.000E+00	2.499E+16	2.426E+16	2.388E+16	2.367E+16	2.355E+16	2.349E+16	2.297E+16
I136M	0.000E+00	1.615E+16	1.569E+16	1.538E+16	1.516E+16	1.499E+16	1.484E+16	1.432E+16
XE137	0.000E+00	4.176E+16	4.099E+16	4.051E+16	4.023E+16	4.001E+16	3.988E+16	3.893E+16
I138	0.000E+00	2.014E+16	1.905E+16	1.843E+16	1.796E+16	1.767E+16	1.738E+16	1.666E+16
XE138	0.000E+00	1.712E+16	1.651E+16	1.613E+16	1.583E+16	1.560E+16	1.540E+16	1.480E+16
CS138	0.000E+00	3.118E+16	3.024E+16	2.964E+16	2.919E+16	2.883E+16	2.853E+16	2.753E+16
XE139	0.000E+00	3.344E+16	3.196E+16	3.104E+16	3.033E+16	2.980E+16	2.931E+16	2.800E+16
CS139	0.000E+00	4.149E+16	4.020E+16	3.938E+16	3.877E+16	3.829E+16	3.789E+16	3.654E+16
BA139	0.000E+00	2.254E+16	2.192E+16	2.153E+16	2.124E+16	2.101E+16	2.083E+16	2.015E+16
BA141	0.000E+00	2.030E+16	1.978E+16	1.941E+16	1.913E+16	1.890E+16	1.870E+16	1.804E+16
LA141	0.000E+00	2.189E+16	2.133E+16	2.094E+16	2.064E+16	2.039E+16	2.018E+16	1.947E+16
LA142	0.000E+00	1.925E+16	1.866E+16	1.825E+16	1.793E+16	1.767E+16	1.744E+16	1.675E+16
PR144	0.000E+00	9.776E+15	1.536E+16	1.854E+16	2.027E+16	2.116E+16	2.154E+16	2.146E+16

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21 OUTPUT UNIT = 6

PRINCIPAL PHOTON SOURCES IN GROUP 2, PHOTONS/SEC
 MEAN ENERGY= 0.025MEV

NUCLIDE	BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
BR 88	0.000E+00	4.647E+15	4.217E+15	3.924E+15	3.658E+15	3.454E+15	3.241E+15	2.848E+15
RB 88	0.000E+00	5.941E+15	5.467E+15	5.138E+15	4.839E+15	4.607E+15	4.365E+15	3.907E+15
KR 89	0.000E+00	4.903E+15	4.478E+15	4.184E+15	3.917E+15	3.710E+15	3.494E+15	3.091E+15
RB 89	0.000E+00	3.793E+15	3.482E+15	3.266E+15	3.069E+15	2.916E+15	2.756E+15	2.455E+15
KR 90	0.000E+00	4.567E+15	4.162E+15	3.885E+15	3.634E+15	3.440E+15	3.238E+15	2.863E+15
RB 90	0.000E+00	6.822E+15	6.240E+15	5.838E+15	5.472E+15	5.188E+15	4.892E+15	4.338E+15
RB 92	0.000E+00	1.291E+16	1.192E+16	1.125E+16	1.065E+16	1.019E+16	9.719E+15	8.800E+15
Y 92	0.000E+00	7.014E+15	6.553E+15	6.233E+15	5.944E+15	5.719E+15	5.487E+15	5.024E+15
Y 93	0.000E+00	6.197E+15	5.854E+15	5.615E+15	5.402E+15	5.235E+15	5.067E+15	4.709E+15
RB 94	0.000E+00	5.495E+15	5.081E+15	4.818E+15	4.594E+15	4.431E+15	4.264E+15	3.930E+15
Y 94	0.000E+00	8.747E+15	8.333E+15	8.041E+15	7.783E+15	7.576E+15	7.372E+15	6.915E+15
Y 96	0.000E+00	1.388E+16	1.331E+16	1.293E+16	1.260E+16	1.235E+16	1.211E+16	1.150E+16
NB 98	0.000E+00	9.984E+15	9.797E+15	9.671E+15	9.582E+15	9.508E+15	9.454E+15	9.194E+15
NB 99	0.000E+00	7.925E+15	7.776E+15	7.683E+15	7.624E+15	7.578E+15	7.549E+15	7.364E+15
ZR101	0.000E+00	8.369E+15	8.057E+15	7.885E+15	7.774E+15	7.705E+15	7.650E+15	7.431E+15
TC102	0.000E+00	6.315E+15	6.441E+15	6.541E+15	6.663E+15	6.759E+15	6.882E+15	6.949E+15
TC104	0.000E+00	3.844E+15	4.339E+15	4.699E+15	5.068E+15	5.356E+15	5.685E+15	6.096E+15
SN130	0.000E+00	3.834E+15	3.868E+15	3.901E+15	3.946E+15	3.987E+15	4.039E+15	4.053E+15
TE131	0.000E+00	3.799E+15	3.813E+15	3.825E+15	3.848E+15	3.866E+15	3.895E+15	3.869E+15
SB132M	0.000E+00	3.533E+15	3.474E+15	3.441E+15	3.426E+15	3.414E+15	3.412E+15	3.345E+15
TE132	0.000E+00	1.947E+16	1.947E+16	1.947E+16	1.954E+16	1.958E+16	1.968E+16	1.946E+16
TE134	0.000E+00	1.322E+16	1.255E+16	1.213E+16	1.181E+16	1.157E+16	1.135E+16	1.079E+16
I134	0.000E+00	4.471E+15	4.377E+15	4.319E+15	4.283E+15	4.254E+15	4.235E+15	4.126E+15
TE135	0.000E+00	6.771E+15	6.452E+15	6.273E+15	6.152E+15	6.073E+15	6.004E+15	5.791E+15
I136	0.000E+00	5.571E+15	5.409E+15	5.324E+15	5.278E+15	5.252E+15	5.237E+15	5.121E+15
I136M	0.000E+00	4.633E+15	4.500E+15	4.413E+15	4.350E+15	4.298E+15	4.256E+15	4.107E+15
XE137	0.000E+00	9.227E+15	9.057E+15	8.951E+15	8.889E+15	8.840E+15	8.812E+15	8.602E+15
I138	0.000E+00	4.589E+15	4.341E+15	4.199E+15	4.093E+15	4.026E+15	3.961E+15	3.795E+15
CS138	0.000E+00	6.787E+15	6.584E+15	6.452E+15	6.354E+15	6.277E+15	6.212E+15	5.993E+15

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XE139	0.000E+00	7.402E+15	7.075E+15	6.871E+15	6.713E+15	6.596E+15	6.488E+15	6.198E+15
CS139	0.000E+00	9.187E+15	8.902E+15	8.720E+15	8.585E+15	8.479E+15	8.390E+15	8.092E+15
BA139	0.000E+00	4.778E+15	4.648E+15	4.564E+15	4.503E+15	4.455E+15	4.416E+15	4.272E+15
BA140	0.000E+00	8.342E+15	8.123E+15	7.979E+15	7.873E+15	7.788E+15	7.718E+15	7.458E+15
BA141	0.000E+00	4.323E+15	4.211E+15	4.134E+15	4.073E+15	4.024E+15	3.982E+15	3.841E+15
LA141	0.000E+00	4.688E+15	4.568E+15	4.485E+15	4.420E+15	4.367E+15	4.321E+15	4.169E+15
LA142	0.000E+00	4.126E+15	3.998E+15	3.911E+15	3.842E+15	3.787E+15	3.737E+15	3.589E+15
PR144	0.000E+00	2.124E+15	3.337E+15	4.028E+15	4.404E+15	4.598E+15	4.679E+15	4.662E+15

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

OUTPUT UNIT = 6

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PRINCIPAL PHOTON SOURCES IN GROUP 3, PHOTONS/SEC
MEAN ENERGY= 0.038MEV

NUCLIDE	BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
BR 88	0.000E+00	3.177E+15	2.883E+15	2.683E+15	2.501E+15	2.362E+15	2.216E+15	1.947E+15
RB 88	0.000E+00	4.041E+15	3.719E+15	3.495E+15	3.292E+15	3.134E+15	2.970E+15	2.658E+15
KR 89	0.000E+00	3.278E+15	2.993E+15	2.797E+15	2.619E+15	2.480E+15	2.336E+15	2.067E+15
KR 90	0.000E+00	3.063E+15	2.791E+15	2.605E+15	2.437E+15	2.307E+15	2.172E+15	1.920E+15
RB 90	0.000E+00	4.642E+15	4.246E+15	3.973E+15	3.724E+15	3.530E+15	3.329E+15	2.952E+15
RB 92	0.000E+00	8.856E+15	8.178E+15	7.718E+15	7.308E+15	6.993E+15	6.668E+15	6.038E+15
Y 92	0.000E+00	4.688E+15	4.380E+15	4.166E+15	3.973E+15	3.822E+15	3.668E+15	3.358E+15
Y 93	0.000E+00	4.132E+15	3.903E+15	3.743E+15	3.602E+15	3.490E+15	3.378E+15	3.139E+15
RB 94	0.000E+00	3.781E+15	3.497E+15	3.315E+15	3.161E+15	3.049E+15	2.934E+15	2.705E+15
Y 94	0.000E+00	5.910E+15	5.630E+15	5.433E+15	5.258E+15	5.119E+15	4.981E+15	4.672E+15
Y 96	0.000E+00	9.487E+15	9.098E+15	8.834E+15	8.612E+15	8.439E+15	8.273E+15	7.860E+15
NB 98	0.000E+00	6.759E+15	6.633E+15	6.548E+15	6.487E+15	6.437E+15	6.401E+15	6.225E+15
NB 99	0.000E+00	5.348E+15	5.248E+15	5.185E+15	5.145E+15	5.114E+15	5.095E+15	4.969E+15
ZR101	0.000E+00	5.726E+15	5.512E+15	5.395E+15	5.319E+15	5.272E+15	5.234E+15	5.084E+15
TC102	0.000E+00	4.251E+15	4.336E+15	4.403E+15	4.485E+15	4.550E+15	4.633E+15	4.678E+15
TC104	0.000E+00	2.575E+15	2.906E+15	3.147E+15	3.394E+15	3.587E+15	3.807E+15	4.082E+15
TE132	0.000E+00	3.388E+15	3.388E+15	3.399E+15	3.400E+15	3.408E+15	3.425E+15	3.387E+15
XE133	0.000E+00	1.806E+16	1.781E+16	1.765E+16	1.755E+16	1.747E+16	1.743E+16	1.705E+16
TE135	0.000E+00	4.607E+15	4.390E+15	4.268E+15	4.185E+15	4.132E+15	4.085E+15	3.940E+15
II36	0.000E+00	3.789E+15	3.679E+15	3.621E+15	3.590E+15	3.572E+15	3.562E+15	3.483E+15
XE137	0.000E+00	6.363E+15	6.246E+15	6.173E+15	6.131E+15	6.096E+15	6.077E+15	5.933E+15
II38	0.000E+00	3.136E+15	2.967E+15	2.870E+15	2.798E+15	2.752E+15	2.707E+15	2.594E+15
XE138	0.000E+00	3.417E+15	3.295E+15	3.217E+15	3.159E+15	3.114E+15	3.074E+15	2.953E+15
CS138	0.000E+00	4.554E+15	4.417E+15	4.329E+15	4.263E+15	4.212E+15	4.168E+15	4.021E+15
XE139	0.000E+00	5.000E+15	4.779E+15	4.641E+15	4.534E+15	4.455E+15	4.382E+15	4.186E+15
CS139	0.000E+00	6.194E+15	6.002E+15	5.879E+15	5.788E+15	5.717E+15	5.657E+15	5.456E+15
BA139	0.000E+00	4.820E+15	4.689E+15	4.604E+15	4.543E+15	4.494E+15	4.455E+15	4.310E+15
BA141	0.000E+00	5.134E+15	5.001E+15	4.909E+15	4.837E+15	4.779E+15	4.729E+15	4.561E+15
LA141	0.000E+00	3.119E+15	3.039E+15	2.984E+15	2.940E+15	2.905E+15	2.875E+15	2.774E+15
CE141	0.000E+00	6.757E+15	6.710E+15	6.606E+15	6.520E+15	6.448E+15	6.385E+15	6.099E+15
BA142	0.000E+00	7.911E+15	7.656E+15	7.483E+15	7.345E+15	7.235E+15	7.136E+15	6.847E+15
CE143	0.000E+00	2.416E+16	2.324E+16	2.261E+16	2.209E+16	2.168E+16	2.130E+16	2.031E+16
CE144	0.000E+00	1.458E+15	2.299E+15	2.777E+15	3.037E+15	3.171E+15	3.227E+15	3.214E+15
PR144	0.000E+00	1.416E+15	2.225E+15	2.686E+15	2.936E+15	3.065E+15	3.119E+15	3.108E+15
CE145	0.000E+00	1.436E+16	1.385E+16	1.351E+16	1.324E+16	1.302E+16	1.283E+16	1.228E+16

ND147 0.000E+00 7.417E+15 7.245E+15 7.140E+15 7.070E+15 7.019E+15 6.983E+15 6.805E+15
 ND149 0.000E+00 2.880E+15 2.890E+15 2.909E+15 2.941E+15 2.973E+15 3.016E+15 3.036E+15
 SM153 0.000E+00 1.161E+15 1.739E+15 2.353E+15 2.978E+15 3.640E+15 4.293E+15 5.440E+15

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

PRINCIPAL PHOTON SOURCES IN GROUP 4, PHOTONS/SEC
 MEAN ENERGY= 0.058MEV

NUCLIDE	BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
BR 88	0.000E+00	4.870E+15	4.419E+15	4.112E+15	3.833E+15	3.620E+15	3.396E+15	2.985E+15
RB 88	0.000E+00	6.139E+15	5.649E+15	5.310E+15	5.001E+15	4.761E+15	4.511E+15	4.038E+15
KR 89	0.000E+00	4.931E+15	4.503E+15	4.208E+15	3.939E+15	3.731E+15	3.513E+15	3.108E+15
RB 89	0.000E+00	3.736E+15	3.429E+15	3.216E+15	3.023E+15	2.871E+15	2.714E+15	2.418E+15
KR 90	0.000E+00	4.567E+15	4.162E+15	3.885E+15	3.634E+15	3.440E+15	3.238E+15	2.863E+15
RB 90	0.000E+00	7.048E+15	6.447E+15	6.032E+15	5.654E+15	5.360E+15	5.054E+15	4.482E+15
KR 92	0.000E+00	3.001E+15	2.743E+15	2.578E+15	2.436E+15	2.334E+15	2.227E+15	2.025E+15
RB 92	0.000E+00	1.369E+16	1.264E+16	1.193E+16	1.130E+16	1.081E+16	1.031E+16	9.333E+15
Y 92	0.000E+00	7.051E+15	6.588E+15	6.266E+15	5.976E+15	5.749E+15	5.516E+15	5.051E+15
Y 93	0.000E+00	6.157E+15	5.816E+15	5.578E+15	5.367E+15	5.201E+15	5.034E+15	4.678E+15
RB 94	0.000E+00	5.871E+15	5.429E+15	5.147E+15	4.908E+15	4.734E+15	4.556E+15	4.199E+15
Y 94	0.000E+00	8.905E+15	8.483E+15	8.185E+15	7.923E+15	7.713E+15	7.505E+15	7.039E+15
Y 96	0.000E+00	1.454E+16	1.394E+16	1.354E+16	1.320E+16	1.293E+16	1.268E+16	1.205E+16
ZR 97	0.000E+00	3.215E+15	3.138E+15	3.086E+15	3.045E+15	3.013E+15	2.986E+15	2.890E+15
NB 98	0.000E+00	1.026E+16	1.006E+16	9.934E+15	9.843E+15	9.767E+15	9.712E+15	9.444E+15
NB 99	0.000E+00	8.003E+15	7.853E+15	7.758E+15	7.699E+15	7.653E+15	7.623E+15	7.436E+15
ZR101	0.000E+00	8.763E+15	8.436E+15	8.237E+15	8.140E+15	8.068E+15	8.010E+15	7.781E+15
TC102	0.000E+00	6.377E+15	6.504E+15	6.604E+15	6.728E+15	6.825E+15	6.949E+15	7.017E+15
TC104	0.000E+00	3.879E+15	4.379E+15	4.741E+15	5.114E+15	5.404E+15	5.737E+15	6.151E+15
RH106	0.000E+00	3.751E+14	7.672E+14	1.152E+15	1.528E+15	1.876E+15	2.212E+15	2.766E+15
TE132	0.000E+00	3.775E+15	3.774E+15	3.775E+15	3.788E+15	3.796E+15	3.816E+15	3.773E+15
II134	0.000E+00	3.678E+15	3.601E+15	3.553E+15	3.523E+15	3.499E+15	3.484E+15	3.394E+15
TE135	0.000E+00	7.050E+15	6.717E+15	6.532E+15	6.405E+15	6.323E+15	6.251E+15	6.029E+15
II136	0.000E+00	5.735E+15	5.568E+15	5.481E+15	5.433E+15	5.406E+15	5.391E+15	5.272E+15
II136M	0.000E+00	3.731E+15	3.624E+15	3.554E+15	3.503E+15	3.462E+15	3.428E+15	3.308E+15
XE137	0.000E+00	9.426E+15	9.252E+15	9.144E+15	9.081E+15	9.030E+15	9.002E+15	8.788E+15
II138	0.000E+00	4.842E+15	4.580E+15	4.431E+15	4.319E+15	4.248E+15	4.180E+15	4.005E+15
XE138	0.000E+00	3.207E+15	3.093E+15	3.020E+15	2.965E+15	2.923E+15	2.885E+15	2.772E+15
CS138	0.000E+00	6.743E+15	6.541E+15	6.410E+15	6.313E+15	6.236E+15	6.172E+15	5.954E+15
XE139	0.000E+00	7.565E+15	7.230E+15	7.021E+15	6.860E+15	6.740E+15	6.630E+15	6.334E+15
CS139	0.000E+00	9.353E+15	9.063E+15	8.878E+15	8.740E+15	8.633E+15	8.542E+15	8.239E+15
BA141	0.000E+00	4.169E+15	4.061E+15	3.986E+15	3.928E+15	3.880E+15	3.840E+15	3.704E+15
LA141	0.000E+00	4.572E+15	4.454E+15	4.373E+15	4.310E+15	4.259E+15	4.214E+15	4.066E+15
LA142	0.000E+00	4.011E+15	3.887E+15	3.803E+15	3.735E+15	3.681E+15	3.633E+15	3.489E+15
CE143	0.000E+00	6.059E+15	5.827E+15	5.670E+15	5.540E+15	5.438E+15	5.342E+15	5.093E+15
PR144	0.000E+00	2.111E+15	3.316E+15	4.003E+15	4.376E+15	4.569E+15	4.649E+15	4.632E+15
CE145	0.000E+00	5.582E+15	5.383E+15	5.251E+15	5.145E+15	5.062E+15	4.986E+15	4.775E+15

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

PRINCIPAL PHOTON SOURCES IN GROUP 5, PHOTONS/SEC
 MEAN ENERGY= 0.085MEV

NUCLIDE	BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
BR 88	0.000E+00	3.222E+15	2.924E+15	2.720E+15	2.536E+15	2.395E+15	2.247E+15	1.975E+15
RB 88	0.000E+00	4.019E+15	3.699E+15	3.476E+15	3.274E+15	3.117E+15	2.953E+15	2.644E+15
KR 89	0.000E+00	3.168E+15	2.893E+15	2.703E+15	2.531E+15	2.397E+15	2.257E+15	1.997E+15
RB 89	0.000E+00	2.362E+15	2.168E+15	2.034E+15	1.911E+15	1.816E+15	1.716E+15	1.529E+15
KR 90	0.000E+00	2.899E+15	2.642E+15	2.466E+15	2.307E+15	2.184E+15	2.055E+15	1.817E+15
RB 90	0.000E+00	4.614E+15	4.220E+15	3.948E+15	3.701E+15	3.509E+15	3.309E+15	2.934E+15
RB 92	0.000E+00	9.175E+15	8.472E+15	7.995E+15	7.571E+15	7.244E+15	6.908E+15	6.255E+15
Y 92	0.000E+00	4.541E+15	4.242E+15	4.035E+15	3.848E+15	3.702E+15	3.52E+15	3.252E+15
Y 93	0.000E+00	3.893E+15	3.677E+15	3.527E+15	3.393E+15	3.288E+15	3.182E+15	2.958E+15
RB 94	0.000E+00	3.958E+15	3.660E+15	3.470E+15	3.309E+15	3.192E+15	3.072E+15	2.831E+15
Y 94	0.000E+00	5.753E+15	5.480E+15	5.288E+15	5.118E+15	4.983E+15	4.849E+15	4.547E+15
Y 96	0.000E+00	9.641E+15	9.246E+15	8.977E+15	8.752E+15	8.576E+15	8.408E+15	7.988E+15
NB 98	0.000E+00	6.682E+15	6.557E+15	6.472E+15	6.413E+15	6.363E+15	6.327E+15	6.153E+15
NB 99	0.000E+00	5.153E+15	5.056E+15	4.986E+15	4.958E+15	4.927E+15	4.909E+15	4.788E+15
ZR101	0.000E+00	5.819E+15	5.602E+15	5.483E+15	5.405E+15	5.357E+15	5.319E+15	5.167E+15
MO101	0.000E+00	2.567E+15	2.566E+15	2.569E+15	2.582E+15	2.592E+15	2.611E+15	2.593E+15
TC102	0.000E+00	4.097E+15	4.179E+15	4.243E+15	4.322E+15	4.385E+15	4.465E+15	4.508E+15
TC104	0.000E+00	2.505E+15	2.827E+15	3.062E+15	3.302E+15	3.490E+15	3.704E+15	3.972E+15
SN132	0.000E+00	2.251E+15	2.128E+15	2.063E+15	2.017E+15	1.994E+15	1.971E+15	1.908E+15
TE133M	0.000E+00	2.588E+15	2.489E+15	2.420E+15	2.361E+15	2.312E+15	2.267E+15	2.151E+15
XE133	0.000E+00	1.617E+16	1.594E+16	1.579E+16	1.571E+16	1.564E+16	1.560E+16	1.526E+16
TE134	0.000E+00	9.000E+15	8.541E+15	8.258E+15	8.039E+15	7.878E+15	7.727E+15	7.347E+15
II34	0.000E+00	2.218E+15	2.171E+15	2.143E+15	2.124E+15	2.110E+15	2.101E+15	2.047E+15
TE135	0.000E+00	4.650E+15	4.430E+15	4.308E+15	4.224E+15	4.170E+15	4.123E+15	3.977E+15
II36	0.000E+00	3.769E+15	3.659E+15	3.602E+15	3.570E+15	3.552E+15	3.543E+15	3.464E+15
II36M	0.000E+00	2.441E+15	2.371E+15	2.326E+15	2.292E+15	2.265E+15	2.243E+15	2.165E+15
XE137	0.000E+00	6.125E+15	6.012E+15	5.942E+15	5.901E+15	5.868E+15	5.849E+15	5.710E+15
II38	0.000E+00	3.235E+15	3.060E+15	2.961E+15	2.886E+15	2.838E+15	2.793E+15	2.676E+15
CS138	0.000E+00	4.269E+15	4.141E+15	4.058E+15	3.997E+15	3.948E+15	3.907E+15	3.770E+15
XE139	0.000E+00	4.967E+15	4.748E+15	4.611E+15	4.505E+15	4.426E+15	4.354E+15	4.159E+15
CS139	0.000E+00	6.069E+15	5.881E+15	5.761E+15	5.671E+15	5.602E+15	5.543E+15	5.346E+15
BA139	0.000E+00	2.879E+15	2.801E+15	2.750E+15	2.714E+15	2.685E+15	2.661E+15	2.575E+15
BA141	0.000E+00	2.590E+15	2.523E+15	2.477E+15	2.440E+15	2.411E+15	2.386E+15	2.301E+15
LA141	0.000E+00	2.855E+15	2.782E+15	2.732E+15	2.692E+15	2.660E+15	2.632E+15	2.539E+15
LA142	0.000E+00	5.136E+15	4.971E+15	4.859E+15	4.769E+15	4.697E+15	4.633E+15	4.445E+15
LA142	0.000E+00	2.498E+15	2.421E+15	2.369E+15	2.327E+15	2.293E+15	2.263E+15	2.173E+15
PR144	0.000E+00	1.338E+15	2.103E+15	2.538E+15	2.775E+15	2.897E+15	2.948E+15	2.938E+15
ND147	0.000E+00	4.698E+15	4.589E+15	4.522E+15	4.478E+15	4.446E+15	4.423E+15	4.310E+15

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

PRINCIPAL PHOTON SOURCES IN GROUP 6, PHOTONS/SEC
 MEAN ENERGY= 0.125MEV

NUCLIDE	BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
BR 88	0.000E+00	2.316E+15	2.102E+15	1.956E+15	1.823E+15	1.722E+15	1.615E+15	1.419E+15
RB 88	0.000E+00	2.849E+15	2.621E+15	2.464E+15	2.321E+15	2.209E+15	2.093E+15	1.874E+15
KR 90	0.000E+00	1.160E+16	1.057E+16	9.863E+15	9.226E+15	8.735E+15	8.222E+15	7.269E+15
RB 90	0.000E+00	3.255E+15	2.978E+15	2.786E+15	2.611E+15	2.476E+15	2.334E+15	2.070E+15
KR 92	0.000E+00	5.014E+15	4.583E+15	4.308E+15	4.070E+15	3.900E+15	3.721E+15	3.383E+15
RB 92	0.000E+00	6.599E+15	6.093E+15	5.711E+15	5.445E+15	5.210E+15	4.968E+15	4.499E+15
Y 92	0.000E+00	3.134E+15	2.928E+15	2.785E+15	2.656E+15	2.555E+15	2.452E+15	2.245E+15
Y 93	0.000E+00	2.653E+15	2.506E+15	2.404E+15	2.313E+15	2.241E+15	2.169E+15	2.016E+15
RB 94	0.000E+00	2.864E+15	2.648E+15	2.511E+15	2.394E+15	2.309E+15	2.222E+15	2.048E+15
Y 94	0.000E+00	4.019E+15	3.829E+15	3.694E+15	3.576E+15	3.481E+15	3.387E+15	3.177E+15
Y 96	0.000E+00	6.865E+15	6.583E+15	6.392E+15	6.232E+15	6.106E+15	5.986E+15	5.687E+15
NB 98	0.000E+00	4.701E+15	4.613E+15	4.553E+15	4.511E+15	4.476E+15	4.451E+15	4.329E+15
NB 99	0.000E+00	3.568E+15	3.501E+15	3.459E+15	3.433E+15	3.412E+15	3.399E+15	3.315E+15
MO 99	0.000E+00	2.842E+15	2.810E+15	2.794E+15	2.790E+15	2.792E+15	2.800E+15	2.770E+15
TC 99M	0.000E+00	3.535E+16	3.494E+16	3.475E+16	3.470E+16	3.472E+16	3.483E+16	3.445E+16
TR101	0.000E+00	4.150E+15	3.995E+15	3.910E+15	3.855E+15	3.820E+15	3.793E+15	3.685E+15
TC102	0.000E+00	2.846E+15	2.903E+15	2.948E+15	3.003E+15	3.046E+15	3.102E+15	3.132E+15
TC104	0.000E+00	1.774E+15	2.003E+15	2.169E+15	2.339E+15	2.472E+15	2.624E+15	2.814E+15
TE131	0.000E+00	1.569E+16	1.575E+16	1.580E+16	1.589E+16	1.596E+16	1.608E+16	1.598E+16
SB132M	0.000E+00	2.612E+15	2.569E+15	2.544E+15	2.533E+15	2.524E+15	2.523E+15	2.473E+15
II134	0.000E+00	3.880E+15	3.799E+15	3.748E+15	3.717E+15	3.692E+15	3.675E+15	3.581E+15
TE135	0.000E+00	3.279E+15	3.124E+15	3.037E+15	2.978E+15	2.940E+15	2.907E+15	2.804E+15
II136	0.000E+00	2.642E+15	2.565E+15	2.525E+15	2.503E+15	2.491E+15	2.484E+15	2.429E+15
XE137	0.000E+00	4.255E+15	4.177E+15	4.128E+15	4.100E+15	4.077E+15	4.064E+15	3.967E+15
II138	0.000E+00	2.322E+15	2.196E+15	2.125E+15	2.071E+15	2.037E+15	2.004E+15	1.920E+15
CS138	0.000E+00	3.682E+15	3.572E+15	3.501E+15	3.447E+15	3.406E+15	3.370E+15	3.252E+15
XE139	0.000E+00	3.636E+15	3.476E+15	3.375E+15	3.298E+15	3.240E+15	3.187E+15	3.044E+15
CS139	0.000E+00	4.198E+15	4.068E+15	3.985E+15	3.923E+15	3.875E+15	3.834E+15	3.698E+15
CE141	0.000E+00	2.142E+16	2.127E+16	2.094E+16	2.066E+16	2.044E+16	2.024E+16	1.933E+16
CE144	0.000E+00	1.566E+15	2.469E+15	2.983E+15	3.262E+15	3.406E+15	3.466E+15	3.452E+15
SM153	0.000E+00	5.056E+14	7.576E+14	1.025E+15	1.297E+15	1.585E+15	1.870E+15	2.370E+15

PRINCIPAL PHOTON SOURCES IN GROUP 7, PHOTONS/SEC
 MEAN ENERGY= 0.225MEV

NUCLIDE	BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
KR 88	0.000E+00	5.947E+15	5.466E+15	5.133E+15	4.830E+15	4.594E+15	4.349E+15	3.885E+15
KR 89	0.000E+00	9.448E+15	8.628E+15	8.062E+15	7.548E+15	7.149E+15	6.732E+15	5.956E+15
KR 90	0.000E+00	7.028E+15	6.405E+15	5.978E+15	5.592E+15	5.294E+15	4.983E+15	4.406E+15
RB 92	0.000E+00	1.074E+16	9.915E+15	9.357E+15	8.860E+15	8.478E+15	8.084E+15	7.320E+15
Y 93	0.000E+00	7.129E+15	6.734E+15	6.459E+15	6.214E+15	6.022E+15	5.828E+15	5.417E+15
Y 94	0.000E+00	6.147E+15	5.856E+15	5.650E+15	5.469E+15	5.324E+15	5.181E+15	4.859E+15
Y 96	0.000E+00	1.099E+16	1.054E+16	1.023E+16	9.978E+15	9.777E+15	9.585E+15	9.106E+15
NB 98	0.000E+00	7.264E+15	7.129E+15	7.037E+15	6.972E+15	6.918E+15	6.879E+15	6.690E+15
NB 99	0.000E+00	5.387E+15	5.286E+15	5.223E+15	5.183E+15	5.151E+15	5.132E+15	5.006E+15

Calc. No. 2004-07600
 Project No. 11163-013
 Attachment B1

ZR101	0.000E+00	3.686E+16	3.549E+16	3.473E+16	3.424E+16	3.394E+16	3.369E+16	3.273E+16
MO101	0.000E+00	7.769E+15	7.765E+15	7.774E+15	7.812E+15	7.844E+15	7.900E+15	7.846E+15
TC102	0.000E+00	4.313E+15	4.399E+15	4.467E+15	4.550E+15	4.616E+15	4.700E+15	4.746E+15
TC104	0.000E+00	3.705E+15	4.182E+15	4.529E+15	4.885E+15	5.162E+15	5.480E+15	5.875E+15
SN130	0.000E+00	6.076E+15	6.129E+15	6.181E+15	6.253E+15	6.317E+15	6.400E+15	6.422E+15
TE132	0.000E+00	2.657E+16	2.657E+16	2.658E+16	2.667E+16	2.672E+16	2.686E+16	2.656E+16
TE133M	0.000E+00	6.765E+15	6.508E+15	6.326E+15	6.172E+15	6.045E+15	5.926E+15	5.623E+15
TE134	0.000E+00	3.092E+16	2.935E+16	2.838E+16	2.762E+16	2.707E+16	2.655E+16	2.525E+16
TE135	0.000E+00	8.293E+15	7.901E+15	7.693E+15	7.534E+15	7.437E+15	7.353E+15	7.092E+15
XE135	0.000E+00	2.071E+16	2.064E+16	2.024E+16	1.992E+16	1.933E+16	1.890E+16	1.778E+16
I136M	0.000E+00	1.053E+16	1.023E+16	1.003E+16	9.886E+15	9.769E+15	9.674E+15	9.335E+15
XE137	0.000E+00	6.602E+15	6.480E+15	6.405E+15	6.361E+15	6.325E+15	6.305E+15	6.155E+15
XE138	0.000E+00	1.974E+16	1.904E+16	1.859E+16	1.825E+16	1.799E+16	1.776E+16	1.707E+16
CS138	0.000E+00	5.298E+15	5.140E+15	5.037E+15	4.960E+15	4.900E+15	4.849E+15	4.678E+15
XE139	0.000E+00	4.091E+16	3.910E+16	3.797E+16	3.710E+16	3.645E+16	3.585E+16	3.425E+16
CS139	0.000E+00	6.485E+15	6.284E+15	6.155E+15	6.060E+15	5.985E+15	5.922E+15	5.712E+15
BA139	0.000E+00	9.555E+15	9.295E+15	9.127E+15	9.006E+15	8.910E+15	8.832E+15	8.545E+15
BA141	0.000E+00	2.887E+16	2.812E+16	2.761E+16	2.720E+16	2.688E+16	2.659E+16	2.565E+16
BA142	0.000E+00	1.597E+16	1.546E+16	1.511E+16	1.483E+16	1.461E+16	1.441E+16	1.382E+16
CE143	0.000E+00	2.291E+16	2.203E+16	2.144E+16	2.095E+16	2.056E+16	2.020E+16	1.926E+16
ND149	0.000E+00	5.292E+15	5.310E+15	5.345E+15	5.404E+15	5.463E+15	5.541E+15	5.578E+15

PRINCIPAL PHOTON SOURCES IN GROUP 8, PHOTONS/SEC
 MEAN ENERGY= 0.375MEV

NUCLIDE	BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
KR 87	0.000E+00	9.126E+15	8.390E+15	7.883E+15	7.423E+15	7.065E+15	6.694E+15	5.990E+15
KR 89	0.000E+00	4.986E+15	4.553E+15	4.255E+15	3.983E+15	3.772E+15	3.553E+15	3.143E+15
RB 92	0.000E+00	6.454E+15	5.960E+15	5.624E+15	5.326E+15	5.096E+15	4.859E+15	4.400E+15
Y 92	0.000E+00	3.478E+15	3.249E+15	3.090E+15	2.947E+15	2.835E+15	2.721E+15	2.491E+15
Y 94	0.000E+00	4.177E+15	3.979E+15	3.839E+15	3.716E+15	3.618E+15	3.520E+15	3.302E+15
Y 96	0.000E+00	6.325E+15	6.065E+15	5.889E+15	5.741E+15	5.626E+15	5.515E+15	5.240E+15
NB 98	0.000E+00	4.001E+15	3.927E+15	3.876E+15	3.840E+15	3.811E+15	3.789E+15	3.685E+15
ZR101	0.000E+00	7.535E+15	7.253E+15	7.099E+15	6.999E+15	6.937E+15	6.887E+15	6.690E+15
TC101	0.000E+00	2.585E+16	2.584E+16	2.587E+16	2.600E+16	2.611E+16	2.629E+16	2.611E+16
TC104	0.000E+00	1.675E+16	1.891E+16	2.047E+16	2.208E+16	2.334E+16	2.477E+16	2.656E+16
RU105	0.000E+00	2.469E+15	2.984E+15	3.355E+15	3.729E+15	4.021E+15	4.352E+15	4.793E+15
RH105	0.000E+00	2.352E+15	2.841E+15	3.189E+15	3.539E+15	3.808E+15	4.113E+15	4.513E+15
RH107	0.000E+00	3.656E+15	5.195E+15	6.342E+15	7.526E+15	8.453E+15	9.503E+15	1.095E+16
RH108	0.000E+00	1.649E+15	2.431E+15	3.020E+15	3.632E+15	4.112E+15	4.657E+15	5.413E+15
I131	0.000E+00	1.620E+16	1.632E+16	1.640E+16	1.653E+16	1.662E+16	1.677E+16	1.668E+16
TE133	0.000E+00	2.510E+16	2.463E+16	2.437E+16	2.426E+16	2.419E+16	2.418E+16	2.372E+16
TE133M	0.000E+00	3.752E+15	3.610E+15	3.509E+15	3.423E+15	3.353E+15	3.287E+15	3.119E+15
TE134	0.000E+00	9.469E+15	8.986E+15	8.689E+15	8.458E+15	8.289E+15	8.130E+15	7.730E+15
I134	0.000E+00	7.982E+15	7.815E+15	7.712E+15	7.646E+15	7.595E+15	7.561E+15	7.366E+15
I136M	0.000E+00	1.628E+16	1.581E+16	1.550E+16	1.528E+16	1.510E+16	1.495E+16	1.443E+16
XE137	0.000E+00	3.571E+15	3.506E+15	3.465E+15	3.441E+15	3.422E+15	3.411E+15	3.330E+15
XE138	0.000E+00	1.414E+16	1.364E+16	1.332E+16	1.307E+16	1.289E+16	1.272E+16	1.222E+16
CS138	0.000E+00	4.860E+15	4.715E+15	4.620E+15	4.550E+15	4.495E+15	4.448E+15	4.292E+15
XE139	0.000E+00	5.519E+15	5.275E+15	5.123E+15	5.005E+15	4.918E+15	4.837E+15	4.621E+15

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21
 CS139 0.000E+00 3.529E+15 3.420E+15 3.350E+15 3.298E+15 3.257E+15 3.223E+15 3.109E+15
 LA140 0.000E+00 8.456E+15 8.259E+15 8.139E+15 8.058E+15 8.001E+15 7.961E+15 7.760E+15
 BA141 0.000E+00 1.494E+16 1.455E+16 1.428E+16 1.408E+16 1.390E+16 1.376E+16 1.327E+16
 BA142 0.000E+00 6.899E+15 6.676E+15 6.525E+15 6.405E+15 6.309E+15 6.223E+15 5.971E+15
 CE145 0.000E+00 5.531E+15 5.334E+15 5.203E+15 5.098E+15 5.016E+15 4.941E+15 4.732E+15
 CE146 0.000E+00 5.255E+15 5.099E+15 4.999E+15 4.925E+15 4.868E+15 4.819E+15 4.655E+15
 PR148 0.000E+00 9.305E+15 9.167E+15 9.091E+15 9.059E+15 9.037E+15 9.039E+15 8.877E+15

PRINCIPAL PHOTON SOURCES IN GROUP 9, PHOTONS/SEC
 MEAN ENERGY= 0.575MEV

NUCLIDE	BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
KR 89	0.000E+00	1.058E+16	9.659E+15	9.026E+15	8.450E+15	8.003E+15	7.537E+15	6.668E+15
KR 90	0.000E+00	1.143E+16	1.042E+16	9.723E+15	9.096E+15	8.611E+15	8.105E+15	7.166E+15
SR 91	0.000E+00	5.753E+15	5.327E+15	5.030E+15	4.762E+15	4.552E+15	4.336E+15	3.918E+15
Y 91M	0.000E+00	1.900E+16	1.759E+16	1.661E+16	1.573E+16	1.504E+16	1.432E+16	1.294E+16
NB 97	0.000E+00	4.401E+16	4.300E+16	4.230E+16	4.177E+16	4.134E+16	4.099E+16	3.969E+16
MO101	0.000E+00	1.614E+16	1.613E+16	1.615E+16	1.623E+16	1.629E+16	1.641E+16	1.630E+16
TC102	0.000E+00	2.246E+16	2.291E+16	2.326E+16	2.369E+16	2.404E+16	2.447E+16	2.471E+16
RU103	0.000E+00	2.017E+16	2.255E+16	2.382E+16	2.502E+16	2.594E+16	2.698E+16	2.811E+16
TC104	0.000E+00	7.724E+15	8.718E+15	9.440E+15	1.018E+16	1.076E+16	1.142E+16	1.225E+16
RU105	0.000E+00	5.175E+15	6.254E+15	7.031E+15	7.814E+15	8.426E+15	9.120E+15	1.004E+16
SB131	0.000E+00	7.625E+15	7.572E+15	7.546E+15	7.550E+15	7.555E+15	7.580E+15	7.482E+15
SB132	0.000E+00	1.390E+16	1.347E+16	1.324E+16	1.309E+16	1.301E+16	1.295E+16	1.263E+16
SB132M	0.000E+00	9.785E+15	9.624E+15	9.532E+15	9.489E+15	9.457E+15	9.451E+15	9.265E+15
I132	0.000E+00	5.037E+16	5.047E+16	5.054E+16	5.077E+16	5.092E+16	5.123E+16	5.072E+16
TE133M	0.000E+00	8.502E+15	8.179E+15	7.951E+15	7.757E+15	7.598E+15	7.447E+15	7.067E+15
I133	0.000E+00	3.747E+16	3.691E+16	3.655E+16	3.634E+16	3.616E+16	3.606E+16	3.524E+16
TE134	0.000E+00	1.523E+16	1.445E+16	1.397E+16	1.360E+16	1.333E+16	1.307E+16	1.243E+16
I134	0.000E+00	2.501E+16	2.448E+16	2.416E+16	2.395E+16	2.379E+16	2.369E+16	2.308E+16
CS134	0.000E+00	1.648E+14	6.221E+14	1.325E+15	2.229E+15	3.330E+15	4.589E+15	7.297E+15
TE135	0.000E+00	2.038E+16	1.942E+16	1.888E+16	1.851E+16	1.828E+16	1.807E+16	1.743E+16
XE135M	0.000E+00	5.949E+15	6.046E+15	6.103E+15	6.168E+15	6.210E+15	6.273E+15	6.251E+15
XE137	0.000E+00	1.185E+16	1.163E+16	1.150E+16	1.142E+16	1.135E+16	1.132E+16	1.105E+16
I138	0.000E+00	1.662E+16	1.572E+16	1.521E+16	1.482E+16	1.458E+16	1.434E+16	1.374E+16
CS138	0.000E+00	1.681E+16	1.631E+16	1.598E+16	1.574E+16	1.555E+16	1.539E+16	1.485E+16
XE139	0.000E+00	6.039E+15	5.772E+15	5.605E+15	5.476E+15	5.381E+15	5.293E+15	5.056E+15
BA140	0.000E+00	7.609E+15	7.410E+15	7.279E+15	7.182E+15	7.104E+15	7.041E+15	6.803E+15
LA140	0.000E+00	1.507E+16	1.472E+16	1.451E+16	1.436E+16	1.426E+16	1.419E+16	1.383E+16
BA141	0.000E+00	1.073E+16	1.045E+16	1.026E+16	1.011E+16	9.988E+15	9.884E+15	9.533E+15
LA142	0.000E+00	2.369E+16	2.295E+16	2.245E+16	2.206E+16	2.174E+16	2.145E+16	2.060E+16

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21
 PRINCIPAL PHOTON SOURCES IN GROUP 10, PHOTONS/SEC
 MEAN ENERGY= 0.850MEV

NUCLIDE

Calc. No. 2004-07600
 Project No. 11163-013
 Attachment B1

BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
BR 88	0.000E+00	1.430E+16	1.297E+16	1.207E+16	1.125E+16	1.063E+16	9.970E+15
KR 89	0.000E+00	7.850E+15	7.169E+15	6.699E+15	6.272E+15	5.940E+15	5.594E+15
RB 90	0.000E+00	1.045E+16	9.554E+15	8.938E+15	8.379E+15	7.943E+15	7.490E+15
SR 91	0.000E+00	9.234E+15	8.549E+15	8.073E+15	7.642E+15	7.306E+15	6.959E+15
Y 92	0.000E+00	7.014E+15	6.553E+15	6.233E+15	5.944E+15	5.719E+15	5.487E+15
RB 94	0.000E+00	1.205E+16	1.114E+16	1.057E+16	1.008E+16	9.718E+15	9.352E+15
Y 94	0.000E+00	3.322E+16	3.164E+16	3.053E+16	2.955E+16	2.877E+16	2.800E+16
ZR 95	0.000E+00	3.199E+16	3.456E+16	3.406E+16	3.328E+16	3.262E+16	3.196E+16
NR 95	0.000E+00	2.891E+16	3.555E+16	3.557E+16	3.483E+16	3.414E+16	3.345E+16
NB 97M	0.000E+00	3.146E+16	3.071E+16	3.020E+16	2.981E+16	2.950E+16	2.924E+16
MO 99	0.000E+00	5.975E+15	5.907E+15	5.874E+15	5.866E+15	5.869E+15	5.887E+15
MO101	0.000E+00	5.791E+15	5.788E+15	5.795E+15	5.824E+15	5.847E+15	5.889E+15
TC104	0.000E+00	5.027E+15	5.675E+15	6.145E+15	6.627E+15	7.003E+15	7.435E+15
RU105	0.000E+00	5.872E+15	7.097E+15	7.978E+15	8.867E+15	9.561E+15	1.035E+16
SB128M	0.000E+00	6.023E+15	6.291E+15	6.471E+15	6.644E+15	6.784E+15	6.945E+15
SB130M	0.000E+00	1.902E+16	1.933E+16	1.954E+16	1.980E+16	2.001E+16	2.028E+16
SB131	0.000E+00	1.571E+16	1.560E+16	1.555E+16	1.556E+16	1.557E+16	1.562E+16
SB132	0.000E+00	1.709E+16	1.656E+16	1.628E+16	1.610E+16	1.599E+16	1.592E+16
SB132M	0.000E+00	8.778E+15	8.633E+15	8.551E+15	8.512E+15	8.484E+15	8.478E+15
I132	0.000E+00	3.268E+16	3.274E+16	3.279E+16	3.294E+16	3.304E+16	3.324E+16
TE133M	0.000E+00	3.142E+16	3.023E+16	2.938E+16	2.867E+16	2.808E+16	2.752E+16
TE134	0.000E+00	2.030E+16	1.927E+16	1.863E+16	1.814E+16	1.777E+16	1.743E+16
I134	0.000E+00	9.497E+16	9.299E+16	9.176E+16	9.098E+16	9.037E+16	8.997E+16
LA140	0.000E+00	1.699E+16	1.660E+16	1.636E+16	1.619E+16	1.608E+16	1.600E+16
BA142	0.000E+00	1.121E+16	1.085E+16	1.060E+16	1.041E+16	1.025E+16	1.011E+16
CE145	0.000E+00	1.626E+16	1.568E+16	1.530E+16	1.499E+16	1.475E+16	1.453E+16

PRINCIPAL PHOTON SOURCES IN GROUP 11, PHOTONS/SEC
 MEAN ENERGY= 1.250MEV

NUCLIDE	BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
KR 89	0.000E+00	6.831E+15	6.238E+15	5.829E+15	5.457E+15	5.169E+15	4.868E+15	4.307E+15
RB 89	0.000E+00	2.646E+16	2.429E+16	2.279E+16	2.141E+16	2.034E+16	1.923E+16	1.713E+16
KR 90	0.000E+00	1.116E+16	1.017E+16	9.491E+15	8.878E+15	8.405E+15	7.911E+15	6.994E+15
SR 91	0.000E+00	1.069E+16	9.897E+15	9.346E+15	8.847E+15	8.459E+15	8.057E+15	7.280E+15
KR 92	0.000E+00	4.110E+15	3.756E+15	3.531E+15	3.336E+15	3.197E+15	3.050E+15	2.773E+15
SR 92	0.000E+00	3.757E+16	3.508E+16	3.335E+16	3.180E+16	3.059E+16	2.934E+16	2.685E+16
Y 94	0.000E+00	5.910E+15	5.630E+15	5.433E+15	5.258E+15	5.119E+15	4.981E+15	4.672E+15
MO101	0.000E+00	1.285E+16	1.285E+16	1.283E+16	1.293E+16	1.298E+16	1.307E+16	1.298E+16
TC102	0.000E+00	3.543E+15	3.613E+15	3.669E+15	3.738E+15	3.792E+15	3.861E+15	3.898E+15
TC104	0.000E+00	3.514E+15	3.966E+15	4.295E+15	4.632E+15	4.895E+15	5.197E+15	5.572E+15
SB130M	0.000E+00	4.516E+15	4.587E+15	4.639E+15	4.701E+15	4.750E+15	4.814E+15	4.831E+15
SB131	0.000E+00	4.685E+15	4.653E+15	4.637E+15	4.633E+15	4.642E+15	4.658E+15	4.598E+15
I132	0.000E+00	7.016E+15	7.030E+15	7.040E+15	7.072E+15	7.093E+15	7.136E+15	7.065E+15
TE133	0.000E+00	6.051E+15	5.937E+15	5.876E+15	5.847E+15	5.830E+15	5.828E+15	5.719E+15

OUTPUT UNIT = 6

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

I134	0.000E+00	1.612E+16	1.578E+16	1.557E+16	1.544E+16	1.533E+16	1.527E+16	1.487E+16
I135	0.000E+00	3.110E+16	3.063E+16	3.034E+16	3.020E+16	3.008E+16	3.004E+16	2.941E+16

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 Project No. 11163-013
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II136	0.000E+00	2.069E+16	2.008E+16	1.977E+16	1.960E+16	1.950E+16	1.945E+16	1.902E+16
II136M	0.000E+00	1.352E+16	1.313E+16	1.288E+16	1.270E+16	1.255E+16	1.242E+16	1.199E+16
CS138	0.000E+00	5.123E+16	4.970E+16	4.870E+16	4.796E+16	4.738E+16	4.689E+16	4.524E+16
XE139	0.000E+00	3.961E+15	3.786E+15	3.676E+15	3.592E+15	3.529E+15	3.471E+15	3.316E+15
CS139	0.000E+00	4.697E+15	4.552E+15	4.459E+15	4.389E+15	4.336E+15	4.290E+15	4.138E+15
BA141	0.000E+00	5.404E+15	5.264E+15	5.167E+15	5.092E+15	5.030E+15	4.977E+15	4.801E+15
BA142	0.000E+00	1.770E+16	1.713E+16	1.674E+16	1.643E+16	1.618E+16	1.596E+16	1.532E+16
LA142	0.000E+00	6.915E+15	6.701E+15	6.555E+15	6.439E+15	6.346E+15	6.263E+15	6.015E+15

PRINCIPAL PHOTON SOURCES IN GROUP 12, PHOTONS/SEC
 MEAN ENERGY= 1.750MEV

NUCLIDE	BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
BR 88	0.000E+00	1.707E+15	1.549E+15	1.442E+15	1.344E+15	1.269E+15	1.191E+15	1.046E+15
KR 88	0.000E+00	2.842E+15	2.612E+15	2.453E+15	2.308E+15	2.196E+15	2.078E+15	1.857E+15
RB 88	0.000E+00	5.300E+15	4.877E+15	4.584E+15	4.317E+15	4.110E+15	3.895E+15	3.486E+15
KR 89	0.000E+00	5.647E+15	5.157E+15	4.819E+15	4.511E+15	4.273E+15	4.024E+15	3.560E+15
KR 90	0.000E+00	5.305E+15	4.835E+15	4.513E+15	4.221E+15	3.997E+15	3.762E+15	3.326E+15
RB 92	0.000E+00	1.383E+15	1.277E+15	1.206E+15	1.142E+15	1.092E+15	1.042E+15	9.432E+14
Y 94	0.000E+00	2.703E+15	2.575E+15	2.485E+15	2.405E+15	2.341E+15	2.278E+15	2.137E+15
MO101	0.000E+00	4.626E+15	4.624E+15	4.629E+15	4.652E+15	4.671E+15	4.704E+15	4.672E+15
TC104	0.000E+00	4.888E+15	5.518E+15	5.974E+15	6.444E+15	6.810E+15	7.229E+15	7.751E+15
SB131	0.000E+00	3.100E+15	3.078E+15	3.068E+15	3.069E+15	3.071E+15	3.082E+15	3.042E+15
SB132	0.000E+00	1.413E+15	1.369E+15	1.346E+15	1.331E+15	1.322E+15	1.316E+15	1.283E+15
TE133	0.000E+00	1.625E+15	1.594E+15	1.578E+15	1.570E+15	1.566E+15	1.565E+15	1.536E+15
TE133M	0.000E+00	2.052E+15	1.974E+15	1.919E+15	1.872E+15	1.833E+15	1.797E+15	1.705E+15
II134	0.000E+00	7.274E+15	7.123E+15	7.028E+15	6.969E+15	6.922E+15	6.891E+15	6.714E+15
II135	0.000E+00	1.014E+16	9.988E+15	9.895E+15	9.848E+15	9.809E+15	9.797E+15	9.592E+15
XE138	0.000E+00	8.059E+15	7.772E+15	7.588E+15	7.450E+15	7.343E+15	7.249E+15	6.966E+15
XE139	0.000E+00	2.575E+15	2.461E+15	2.390E+15	2.335E+15	2.294E+15	2.256E+15	2.156E+15
CS139	0.000E+00	1.380E+15	1.337E+15	1.310E+15	1.290E+15	1.274E+15	1.260E+15	1.216E+15
LA140	0.000E+00	3.562E+16	3.479E+16	3.429E+16	3.394E+16	3.370E+16	3.354E+16	3.269E+16
BA141	0.000E+00	1.884E+15	1.835E+15	1.801E+15	1.775E+15	1.753E+15	1.735E+15	1.673E+15
LA142	0.000E+00	8.404E+15	8.144E+15	7.968E+15	7.827E+15	7.713E+15	7.612E+15	7.311E+15

PRINCIPAL PHOTON SOURCES IN GROUP 13, PHOTONS/SEC
 MEAN ENERGY= 2.250MEV

NUCLIDE	BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
KR 88	0.000E+00	1.349E+16	1.240E+16	1.164E+16	1.096E+16	1.042E+16	9.864E+15	8.812E+15
KR 89	0.000E+00	1.622E+15	1.482E+15	1.384E+15	1.296E+15	1.228E+15	1.156E+15	1.023E+15
RB 89	0.000E+00	4.511E+15	4.141E+15	3.855E+15	3.650E+15	3.468E+15	3.278E+15	2.920E+15
KR 90	0.000E+00	8.013E+14	7.302E+14	6.816E+14	6.376E+14	6.036E+14	5.682E+14	5.023E+14
RB 90	0.000E+00	9.766E+14	8.933E+14	8.357E+14	7.834E+14	7.427E+14	7.003E+14	6.210E+14
Y 94	0.000E+00	9.811E+14	9.346E+14	9.018E+14	8.729E+14	8.498E+14	8.269E+14	7.756E+14
MO101	0.000E+00	3.122E+15	3.120E+15	3.124E+15	3.139E+15	3.152E+15	3.174E+15	3.152E+15
TC104	0.000E+00	1.298E+15	1.465E+15	1.586E+15	1.711E+15	1.808E+15	1.919E+15	2.058E+15
SB131	0.000E+00	1.493E+15	1.483E+15	1.477E+15	1.478E+15	1.479E+15	1.484E+15	1.465E+15

Calc. No. 2004-07600
 Project No. 11163-013
 Attachment B1

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

TE133M	0.000E+00	1.225E+15	1.179E+15	1.146E+15	1.118E+15	1.095E+15	1.073E+15	1.051E+15	1.019E+15
II35	0.000E+00	1.098E+15	1.082E+15	1.072E+15	1.066E+15	1.062E+15	1.061E+15	1.061E+15	1.039E+15
II36	0.000E+00	3.892E+15	3.778E+15	3.719E+15	3.687E+15	3.668E+15	3.658E+15	3.658E+15	3.577E+15
XE138	0.000E+00	8.341E+15	8.044E+15	7.854E+15	7.710E+15	7.600E+15	7.503E+15	7.410E+15	7.210E+15
CS138	0.000E+00	6.875E+15	6.669E+15	6.535E+15	6.436E+15	6.358E+15	6.292E+15	6.238E+15	6.070E+15
XE139	0.000E+00	1.698E+15	1.623E+15	1.576E+15	1.540E+15	1.513E+15	1.488E+15	1.462E+15	1.422E+15
CS139	0.000E+00	1.031E+15	9.990E+14	9.785E+14	9.633E+14	9.515E+14	9.415E+14	9.081E+14	9.081E+14
LA142	0.000E+00	1.356E+16	1.314E+16	1.286E+16	1.263E+16	1.245E+16	1.228E+16	1.180E+16	1.180E+16

PRINCIPAL PHOTON SOURCES IN GROUP 14, PHOTONS/SEC
 MEAN ENERGY= 2.750MEV

NUCLIDE	BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
KR 87	0.000E+00	1.964E+15	1.806E+15	1.697E+15	1.598E+15	1.521E+15	1.441E+15	1.289E+15
BR 88	0.000E+00	1.137E+15	1.032E+15	9.602E+14	8.952E+14	8.454E+14	7.931E+14	6.970E+14
RB 88	0.000E+00	5.190E+14	4.776E+14	4.489E+14	4.227E+14	4.024E+14	3.813E+14	3.413E+14
KR 89	0.000E+00	1.548E+15	1.414E+15	1.321E+15	1.237E+15	1.171E+15	1.103E+15	9.760E+14
RB 89	0.000E+00	3.247E+15	2.981E+15	2.796E+15	2.627E+15	2.496E+15	2.359E+15	2.102E+15
KR 90	0.000E+00	4.075E+14	3.713E+14	3.466E+14	3.242E+14	3.069E+14	2.889E+14	2.554E+14
RB 90M	0.000E+00	9.812E+14	9.178E+14	8.721E+14	8.301E+14	7.964E+14	7.618E+14	6.932E+14
RB 92	0.000E+00	5.181E+14	4.784E+14	4.515E+14	4.275E+14	4.091E+14	3.901E+14	3.532E+14
Y 94	0.000E+00	5.319E+14	5.067E+14	4.890E+14	4.733E+14	4.607E+14	4.483E+14	4.205E+14
TC104	0.000E+00	1.155E+15	1.304E+15	1.412E+15	1.522E+15	1.609E+15	1.708E+15	1.832E+15
SB132M	0.000E+00	2.792E+14	2.746E+14	2.719E+14	2.707E+14	2.698E+14	2.696E+14	2.643E+14
II36	0.000E+00	2.396E+15	2.327E+15	2.290E+15	2.270E+15	2.259E+15	2.253E+15	2.203E+15
CS138	0.000E+00	3.433E+15	3.330E+15	3.263E+15	3.214E+15	3.175E+15	3.142E+15	3.031E+15
XE139	0.000E+00	5.578E+14	5.154E+14	4.890E+14	4.686E+14	4.534E+14	4.394E+14	4.019E+14
CS139	0.000E+00	5.071E+14	4.914E+14	4.814E+14	4.739E+14	4.681E+14	4.632E+14	4.467E+14
LA140	0.000E+00	1.356E+15	1.325E+15	1.305E+15	1.292E+15	1.283E+15	1.277E+15	1.245E+15
LA142	0.000E+00	8.175E+15	7.922E+15	7.750E+15	7.613E+15	7.503E+15	7.405E+15	7.111E+15

PRINCIPAL PHOTON SOURCES IN GROUP 15, PHOTONS/SEC
 MEAN ENERGY= 3.500MEV

NUCLIDE	BOC #1	200.0D	400.0D	600.0D	800.0D	1000.0D	1200.0D	EOC #1
BR 84	0.000E+00	9.251E+14	8.593E+14	8.141E+14	7.735E+14	7.422E+14	7.099E+14	6.466E+14
BR 88	0.000E+00	1.811E+15	1.644E+15	1.529E+15	1.426E+15	1.346E+15	1.263E+15	1.110E+15
KR 89	0.000E+00	2.647E+15	2.417E+15	2.259E+15	2.115E+15	2.003E+15	1.886E+15	1.669E+15
RB 89	0.000E+00	4.052E+14	3.719E+14	3.489E+14	3.278E+14	3.114E+14	2.944E+14	2.623E+14
RB 90	0.000E+00	5.039E+15	4.609E+15	4.312E+15	4.042E+15	3.832E+15	3.613E+15	3.204E+15
RB 90M	0.000E+00	1.421E+15	1.329E+15	1.263E+15	1.202E+15	1.153E+15	1.103E+15	1.004E+15
RB 92	0.000E+00	3.936E+14	3.635E+14	3.430E+14	3.248E+14	3.108E+14	2.964E+14	2.684E+14
RB 94	0.000E+00	2.267E+14	2.096E+14	1.987E+14	1.895E+14	1.828E+14	1.759E+14	1.621E+14
TC104	0.000E+00	6.175E+14	6.971E+14	7.548E+14	8.114E+14	8.603E+14	9.133E+14	9.792E+14
II36	0.000E+00	4.199E+14	4.077E+14	4.013E+14	3.978E+14	3.958E+14	3.947E+14	3.860E+14
CS138	0.000E+00	2.277E+14	2.209E+14	2.165E+14	2.132E+14	2.106E+14	2.084E+14	2.010E+14
XE139	0.000E+00	2.075E+14	1.983E+14	1.926E+14	1.881E+14	1.849E+14	1.818E+14	1.737E+14
CS139	0.000E+00	2.768E+14	2.683E+14	2.628E+14	2.587E+14	2.555E+14	2.528E+14	2.439E+14
LA142	0.000E+00	2.953E+15	2.862E+15	2.800E+15	2.750E+15	2.710E+15	2.675E+15	2.569E+15

SIZE OF MMAX(I): MMAX= 1 # = 876 MMAX= 2 # = 431 MMAX= 3 # = 143 MMAX= 4 # = 51 MMAX= 5 # = 86 MMAX= 6 # = 58
 MMAX= 7 # = 44 MMAX= 8 # = 0 MMAX= 9 # = 0 MMAX= 10 # = 0 MMAX= 11 # = 0 MMAX= 12 # = 0

THE NUMBER OF NON-ZERO TERMS IN A=6473
 THE NUMBER OF NON-ZERO FISSION PRODUCT YIELDS=3254
 ILITE= 688 IACT= 129 IFF= 879 ITOT=1696
 THE NUMBER OF NON-ZERO NATURAL ABUNDANCES= 437
 THE NUMBER OF NON-ZERO PHOTON YIELDS= 7903
 THE MAXIMUM NUMBER OF TERMS IN AP= 1246
 SUMTOT 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
 TOTAL 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21 OUTPUT UNIT = 6 PAGE 91

* 1 MTIHM, E=3.93%, 33960 MWD/MT (BWRUE)
 ACTIVATION PRODUCTS
 POWER= 1.00000E+00 MW, BURNUP= 1.00000E+00 MWD, FLUX= 1.00E+00 N/CM**2-SEC

5 SUMMARY TABLE: CONCENTRATIONS, GRAMS

BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
SUMTOT	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TOTAL	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

CUMULATIVE TABLE TOTALS

AP+FP	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ACT+FP	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AP+ACT+FP	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SUMTOT	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TOTAL	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21 OUTPUT UNIT = 6 PAGE 92

* 1 MTIHM, E=3.93%, 33960 MWD/MT (BWRUE)
 ACTIVATION PRODUCTS
 POWER= 1.00000E+00 MW, BURNUP= 1.00000E+00 MWD, FLUX= 1.00E+00 N/CM**2-SEC

7 SUMMARY TABLE: RADIOACTIVITY, CURIES

BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
SUMTOT	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TOTAL	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

CUMULATIVE TABLE TOTALS

AP+FP 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
 ACT+FP 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
 AP+ACT+FP 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
 SUMTOT 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
 TOTAL 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00

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ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21 OUTPUT UNIT = 6

* 1 MTHM, E=3.93%, 33960 MWD/MT (BWRUE)

ACTIVATION PRODUCTS

POWER= 1.00000E+00 MW, BURNUP= 1.00000E+00 MWD, FLUX= 1.00E+00 N/CM**2-SEC

9 SUMMARY TABLE: THERMAL POWER, WATTS

BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
SUMTOT	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TOTAL	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

CUMULATIVE TABLE TOTALS

AP+FP 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
 ACT+FP 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
 AP+ACT+FP 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00

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ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21 OUTPUT UNIT = 6

* 1 MTHM, E=3.93%, 33960 MWD/MT (BWRUE)

ACTINIDES+DAUGHTERS

POWER= 1.00000E+00 MW, BURNUP= 1.00000E+00 MWD, FLUX= 1.00E+00 N/CM**2-SEC

5 SUMMARY TABLE: CONCENTRATIONS, GRAMS

BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
HE 4	0.000E+00	4.961E-01	4.961E-01	4.962E-01	4.964E-01	4.972E-01	5.005E-01	5.038E-01	5.112E-01	5.185E-01	5.276E-01
TH230	0.000E+00	2.030E-03	2.030E-03	2.031E-03	2.031E-03	2.032E-03	2.036E-03	2.040E-03	2.050E-03	2.060E-03	2.073E-03
TH232	0.000E+00	3.408E-04	3.408E-04	3.408E-04	3.409E-04	3.411E-04	3.423E-04	3.434E-04	3.460E-04	3.486E-04	3.519E-04
PA231	0.000E+00	5.353E-04	5.353E-04	5.353E-04	5.354E-04	5.361E-04	5.369E-04	5.370E-04	5.373E-04	5.375E-04	5.378E-04
U232	0.000E+00	7.004E-04	7.004E-04	7.004E-04	7.007E-04	7.016E-04	7.045E-04	7.069E-04	7.122E-04	7.174E-04	7.241E-04
U233	0.000E+00	1.574E-03	1.574E-03	1.574E-03	1.574E-03	1.574E-03	1.576E-03	1.577E-03	1.581E-03	1.584E-03	1.589E-03
U234	3.050E+02	1.842E+02	1.842E+02	1.842E+02	1.842E+02	1.842E+02	1.842E+02	1.842E+02	1.842E+02	1.842E+02	1.843E+02
U235	3.930E+04	1.244E+04	1.244E+04	1.244E+04	1.244E+04	1.244E+04	1.244E+04	1.244E+04	1.244E+04	1.244E+04	1.244E+04
U236	0.000E+00	4.671E+03	4.671E+03	4.671E+03	4.671E+03	4.671E+03	4.671E+03	4.671E+03	4.671E+03	4.671E+03	4.671E+03
U237	0.000E+00	8.291E+00	8.290E+00	8.256E+00	8.081E+00	7.822E+00	5.498E+00	4.041E+00	1.969E+00	9.596E-01	3.808E-01
U238	9.604E+05	9.373E+05	9.373E+05	9.373E+05	9.373E+05	9.373E+05	9.373E+05	9.373E+05	9.373E+05	9.373E+05	9.373E+05
U239	0.000E+00	3.502E-01	3.400E-01	3.302E-01	5.981E-02	8.696E-06	1.332E-19	0.000E+00	0.000E+00	0.000E+00	0.000E+00
NP236	0.000E+00	5.504E-04	5.504E-04	5.504E-04	5.504E-04	5.504E-04	5.504E-04	5.504E-04	5.504E-04	5.504E-04	5.504E-04
NP237	0.000E+00	5.653E+02	5.653E+02	5.653E+02	5.654E+02	5.655E+02	5.681E+02	5.696E+02	5.716E+02	5.727E+02	5.732E+02

NP238	0.000E+00	1.052E+00	1.052E+00	1.038E+00	9.695E-01	7.584E-01	2.840E-01	1.063E-01	1.075E-02	1.087E-03	5.759E-05
NP239	0.000E+00	5.043E+01	5.043E+01	5.010E+01	4.718E+01	3.783E+01	1.565E+01	6.472E+00	8.249E-01	1.052E-01	7.516E-03
NP240	0.000E+00	6.941E-04	6.867E-04	6.660E-04	1.493E-05	1.487E-10	1.464E-30	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PU236	0.000E+00	1.180E-03	1.180E-03	1.180E-03	1.180E-03	1.181E-03	1.181E-03	1.179E-03	1.173E-03	1.168E-03	1.161E-03
PU237	0.000E+00	1.894E-04	1.894E-04	1.894E-04	1.886E-04	1.865E-04	1.782E-04	1.702E-04	1.531E-04	1.376E-04	1.200E-04
PU238	0.000E+00	1.874E+02	1.874E+02	1.874E+02	1.875E+02	1.877E+02	1.884E+02	1.887E+02	1.891E+02	1.895E+02	1.899E+02
PU239	0.000E+00	5.552E+03	5.552E+03	5.553E+03	5.556E+03	5.565E+03	5.587E+03	5.596E+03	5.602E+03	5.603E+03	5.603E+03
PU240	0.000E+00	1.990E+03	1.990E+03	1.990E+03	1.990E+03	1.990E+03	1.990E+03	1.990E+03	1.990E+03	1.990E+03	1.990E+03
PU241	0.000E+00	1.392E+03	1.392E+03	1.392E+03	1.392E+03	1.392E+03	1.391E+03	1.391E+03	1.390E+03	1.388E+03	1.387E+03
PU242	0.000E+00	4.130E+02	4.130E+02	4.130E+02	4.130E+02	4.130E+02	4.130E+02	4.130E+02	4.130E+02	4.130E+02	4.130E+02
PU243	0.000E+00	7.865E-02	7.846E-02	7.828E-02	6.838E-02	3.398E-02	2.740E-03	1.159E-07	4.942E-12	3.990E-14	3.990E-14
PU244	0.000E+00	2.018E-02	2.018E-02	2.018E-02	2.018E-02	2.018E-02	2.018E-02	2.018E-02	2.018E-02	2.018E-02	2.018E-02
AM241	0.000E+00	6.490E+01	6.490E+01	6.491E+01	6.495E+01	6.509E+01	6.563E+01	6.618E+01	6.746E+01	6.874E+01	7.039E+01
AM242M	0.000E+00	3.033E+00	3.033E+00	3.033E+00	3.033E+00	3.033E+00	3.033E+00	3.033E+00	3.033E+00	3.033E+00	3.032E+00
AM242	0.000E+00	8.922E-02	8.915E-02	8.909E-02	8.544E-02	6.883E-02	3.161E-02	1.437E-03	9.841E-05	3.635E-05	3.628E-05
AM243	0.000E+00	9.070E+01	9.070E+01	9.071E+01	9.074E+01	9.078E+01	9.078E+01	9.078E+01	9.078E+01	9.078E+01	9.078E+01
AM244M	0.000E+00	2.273E-03	2.273E-03	2.155E-03	4.591E-04	1.544E-07	4.833E-20	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AM244	0.000E+00	2.784E-03	2.781E-03	2.777E-03	2.599E-03	1.844E-03	5.362E-04	3.831E-06	2.738E-08	2.693E-13	2.648E-18
CM242	0.000E+00	1.368E+01	1.368E+01	1.368E+01	1.368E+01	1.369E+01	1.367E+01	1.352E+01	1.296E+01	1.258E+01	1.211E+01
CM243	0.000E+00	4.471E-01	4.471E-01	4.471E-01	4.471E-01	4.471E-01	4.470E-01	4.469E-01	4.467E-01	4.465E-01	4.462E-01
CM244	0.000E+00	2.893E+01	2.893E+01	2.893E+01	2.893E+01	2.893E+01	2.892E+01	2.891E+01	2.889E+01	2.887E+01	2.884E+01
CM245	0.000E+00	1.253E+00	1.253E+00	1.253E+00	1.253E+00	1.253E+00	1.253E+00	1.253E+00	1.253E+00	1.253E+00	1.253E+00
CM246	0.000E+00	1.075E-01	1.075E-01	1.075E-01	1.075E-01	1.075E-01	1.075E-01	1.075E-01	1.075E-01	1.075E-01	1.075E-01
CM247	0.000E+00	1.119E-03	1.119E-03	1.119E-03	1.119E-03	1.119E-03	1.119E-03	1.119E-03	1.119E-03	1.119E-03	1.119E-03
SUMTOT	1.000E+06	9.650E+05	9.650E+05	9.650E+05	9.650E+05	9.650E+05	9.650E+05	9.650E+05	9.650E+05	9.650E+05	9.650E+05
TOTAL	1.000E+06	9.650E+05	9.650E+05	9.650E+05	9.650E+05	9.650E+05	9.650E+05	9.650E+05	9.650E+05	9.650E+05	9.650E+05

OUTPUT UNIT = 6

at 11:32:21

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04

* 1 MTHM, E=3.93%, 33960 MWD/MT (BWRUE)
 ACTINIDES+DAUGHTERS
 POWER= 1.00000E+00 MW, BURNUP= 1.00000E+00 MWD, FLUX= 1.00E+00 N/CM**2-SEC

5 SUMMARY TABLE: CONCENTRATIONS, GRAMS

BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
HE	0.000E+00	4.961E-01	4.961E-01	4.962E-01	4.964E-01	4.972E-01	5.005E-01	5.038E-01	5.112E-01	5.185E-01	5.276E-01
TH	0.000E+00	2.393E-03	2.393E-03	2.393E-03	2.393E-03	2.394E-03	2.398E-03	2.404E-03	2.416E-03	2.429E-03	2.445E-03
PA	0.000E+00	5.565E-04	5.565E-04	5.565E-04	5.565E-04	5.567E-04	5.568E-04	5.569E-04	5.570E-04	5.572E-04	5.574E-04
U	1.000E+06	9.546E+05	9.546E+05	9.546E+05	9.546E+05	9.546E+05	9.546E+05	9.546E+05	9.546E+05	9.546E+05	9.546E+05
NP	0.000E+00	6.168E+02	6.168E+02	6.165E+02	6.137E+02	6.047E+02	5.840E+02	5.761E+02	5.725E+02	5.728E+02	5.732E+02
PU	0.000E+00	9.535E+03	9.535E+03	9.535E+03	9.538E+03	9.548E+03	9.570E+03	9.579E+03	9.584E+03	9.584E+03	9.583E+03
AM	0.000E+00	1.587E+02	1.587E+02	1.587E+02	1.588E+02	1.589E+02	1.594E+02	1.600E+02	1.613E+02	1.626E+02	1.642E+02
CM	0.000E+00	4.442E+01	4.442E+01	4.443E+01	4.443E+01	4.441E+01	4.426E+01	4.408E+01	4.367E+01	4.326E+01	4.277E+01
SUMTOT	1.000E+06	9.650E+05	9.650E+05	9.650E+05	9.650E+05	9.650E+05	9.650E+05	9.650E+05	9.650E+05	9.650E+05	9.650E+05
TOTAL	1.000E+06	9.650E+05	9.650E+05	9.650E+05	9.650E+05	9.650E+05	9.650E+05	9.650E+05	9.650E+05	9.650E+05	9.650E+05

CUMULATIVE TABLE TOTALS

AP+FP	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ACT+FP	1.000E+06	9.650E+05	9.650E+05	9.650E+05	9.650E+05	9.650E+05	9.650E+05	9.650E+05	9.650E+05	9.650E+05	9.650E+05	9.650E+05	9.650E+05	9.650E+05	9.650E+05	9.650E+05	9.650E+05	9.650E+05	9.650E+05
AP+ACT+FP	1.000E+06	9.650E+05	9.650E+05	9.650E+05	9.650E+05	9.650E+05	9.650E+05	9.650E+05	9.650E+05	9.650E+05	9.650E+05	9.650E+05	9.650E+05	9.650E+05	9.650E+05	9.650E+05	9.650E+05	9.650E+05	9.650E+05

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

* 1 MTIHM, E=3.93%, 33960 MWD/MT (BWRUE)

ACTINIDES+DAUGHTERS

POWER= 1.000000E+00 MW, BURNUP= 1.000000E+00 MWD, FLUX= 1.00E+00 N/CM**2-SEC

7 SUMMARY TABLE: RADIOACTIVITY, CURIES

	BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
TL208	0.000E+00	1.507E-03	1.507E-03	1.507E-03	1.549E-03	1.510E-03	1.555E-03	1.510E-03	1.517E-03	1.540E-03	1.566E-03	1.600E-03
PB210	0.000E+00	4.195E-03	4.195E-03	4.195E-03	4.195E-03	4.194E-03	4.193E-03	4.200E-03	4.217E-03	4.285E-03	4.358E-03	4.454E-03
BI212	0.000E+00	4.195E-03	4.195E-03	4.195E-03	4.196E-03	4.196E-03	4.329E-03	4.204E-03	4.221E-03	4.285E-03	4.358E-03	4.454E-03
PO212	0.000E+00	2.688E-03	2.688E-03	2.688E-03	2.688E-03	2.688E-03	2.774E-03	2.693E-03	2.704E-03	2.746E-03	2.792E-03	2.854E-03
PO216	0.000E+00	4.195E-03	4.200E-03	4.200E-03	4.195E-03	4.195E-03	4.195E-03	4.204E-03	4.223E-03	4.285E-03	4.358E-03	4.454E-03
RN220	0.000E+00	4.195E-03	4.195E-03	4.195E-03	4.196E-03	4.195E-03	4.195E-03	4.204E-03	4.223E-03	4.285E-03	4.358E-03	4.454E-03
RA224	0.000E+00	4.195E-03	4.195E-03	4.195E-03	4.195E-03	4.195E-03	4.195E-03	4.203E-03	4.222E-03	4.285E-03	4.358E-03	4.454E-03
TH228	0.000E+00	4.187E-03	4.187E-03	4.187E-03	4.189E-03	4.189E-03	4.197E-03	4.230E-03	4.262E-03	4.338E-03	4.413E-03	4.511E-03
TH230	0.000E+00	4.100E-05	4.100E-05	4.100E-05	4.100E-05	4.101E-05	4.103E-05	4.112E-05	4.120E-05	4.140E-05	4.160E-05	4.185E-05
TH231	0.000E+00	8.208E-01	8.204E-01	8.201E-01	7.995E-01	7.014E-01	4.406E-01	8.542E-02	3.518E-02	2.699E-02	2.690E-02	2.690E-02
TH233	0.000E+00	1.574E-02	1.526E-02	1.479E-02	2.398E-02	1.965E-02	3.824E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TH234	0.000E+00	3.154E-01	3.154E-01	3.154E-01	3.154E-01	3.154E-01	3.154E-01	3.154E-01	3.154E-01	3.154E-01	3.153E-01	3.153E-01
PA231	0.000E+00	2.530E-05	2.530E-05	2.530E-05	2.530E-05	2.531E-05	2.533E-05	2.537E-05	2.538E-05	2.539E-05	2.540E-05	2.541E-05
PA232	0.000E+00	5.361E-01	5.359E-01	5.357E-01	5.244E-01	4.697E-01	3.158E-01	6.459E-02	1.321E-02	3.255E-04	8.021E-06	6.861E-08
PA233	0.000E+00	4.127E-01	4.127E-01	4.127E-01	4.127E-01	4.126E-01	4.123E-01	4.114E-01	4.107E-01	4.093E-01	4.084E-01	4.075E-01
PA234M	0.000E+00	3.194E-01	3.176E-01	3.166E-01	3.166E-01	3.154E-01	3.154E-01	3.154E-01	3.154E-01	3.154E-01	3.154E-01	3.153E-01
PA234	0.000E+00	4.346E-03	4.339E-03	4.333E-03	3.959E-03	2.526E-03	7.383E-04	4.105E-04	4.103E-04	4.100E-04	4.100E-04	4.099E-04
U232	0.000E+00	1.500E-02	1.500E-02	1.500E-02	1.500E-02	1.500E-02	1.502E-02	1.508E-02	1.514E-02	1.525E-02	1.536E-02	1.550E-02
U234	1.907E+00	1.151E+00	1.151E+00	1.151E+00	1.151E+00	1.151E+00	1.151E+00	1.151E+00	1.151E+00	1.152E+00	1.152E+00	1.152E+00
U235	8.498E-02	2.690E-02	2.690E-02	2.690E-02	2.690E-02	2.690E-02	2.690E-02	2.690E-02	2.690E-02	2.690E-02	2.690E-02	2.690E-02
U236	0.000E+00	3.023E-01	3.023E-01	3.023E-01	3.023E-01	3.023E-01	3.023E-01	3.023E-01	3.023E-01	3.023E-01	3.023E-01	3.023E-01
U237	0.000E+00	6.770E+05	6.770E+05	6.769E+05	6.741E+05	6.599E+05	6.110E+05	4.490E+05	3.299E+05	1.608E+05	7.836E+04	3.110E+04
U238	3.230E-01	3.152E-01	3.152E-01	3.152E-01	3.152E-01	3.152E-01	3.152E-01	3.152E-01	3.152E-01	3.152E-01	3.152E-01	3.152E-01
U239	0.000E+00	1.171E+07	1.137E+07	1.104E+07	2.000E+06	2.908E+02	4.453E-12	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U240	0.000E+00	7.350E+00	7.350E+00	7.344E+00	7.004E+00	5.477E+00	2.261E+00	6.563E-02	1.906E-03	8.511E-07	3.578E-07	3.576E-07
NP235	0.000E+00	6.803E-03	6.803E-03	6.803E-03	6.803E-03	6.800E-03	6.791E-03	6.791E-03	6.720E-03	6.639E-03	6.558E-03	6.455E-03
NP236M	0.000E+00	5.295E+00	5.292E+00	5.292E+00	5.137E+00	4.404E+00	2.529E+00	2.752E-01	2.995E-02	1.693E-04	9.572E-07	1.238E-09
NP237	0.000E+00	3.987E-01	3.987E-01	3.987E-01	3.987E-01	3.988E-01	3.992E-01	4.006E-01	4.017E-01	4.031E-01	4.038E-01	4.042E-01
NP238	0.000E+00	2.728E+05	2.728E+05	2.727E+05	2.691E+05	2.514E+05	1.966E+05	7.363E+04	2.757E+04	2.786E+03	2.817E+02	1.493E+01
NP239	0.000E+00	1.170E+07	1.170E+07	1.170E+07	1.163E+07	1.095E+07	8.780E+06	3.631E+06	1.502E+06	1.914E+05	2.441E+04	1.744E+03
NP240M	0.000E+00	1.367E+03	1.245E+03	1.245E+03	1.248E+03	1.248E+03	2.281E+00	6.621E-02	1.922E-03	8.555E-07	3.578E-07	3.576E-07
NP240	0.000E+00	8.369E+03	8.280E+03	8.192E+03	4.414E+03	1.801E+02	1.794E-03	1.765E-23	0.000E+00	0.000E+00	0.000E+00	0.000E+00
P236	0.000E+00	6.271E-01	6.271E-01	6.271E-01	6.272E-01	6.274E-01	6.279E-01	6.276E-01	6.265E-01	6.236E-01	6.207E-01	6.169E-01
P237	0.000E+00	2.289E+00	2.289E+00	2.289E+00	2.287E+00	2.280E+00	2.254E+00	2.154E+00	2.058E+00	1.850E+00	1.663E+00	1.451E+00
P238	0.000E+00	3.209E+03	3.209E+03	3.209E+03	3.209E+03	3.211E+03	3.215E+03	3.226E+03	3.232E+03	3.239E+03	3.245E+03	3.253E+03
P239	0.000E+00	3.453E+02	3.453E+02	3.453E+02	3.453E+02	3.455E+02	3.461E+02	3.474E+02	3.480E+02	3.484E+02	3.484E+02	3.484E+02
P240	0.000E+00	4.537E+02	4.537E+02	4.537E+02	4.537E+02	4.537E+02	4.537E+02	4.537E+02	4.537E+02	4.537E+02	4.537E+02	4.537E+02
P241	0.000E+00	1.435E+05	1.435E+05	1.435E+05	1.435E+05	1.435E+05	1.435E+05	1.434E+05	1.433E+05	1.432E+05	1.431E+05	1.429E+05

PU242	0.000E+00	1.577E+00	1.577E+00	1.577E+00	1.577E+00	1.577E+00	1.577E+00	1.577E+00	1.577E+00	1.577E+00	1.577E+00	1.577E+00	1.577E+00	1.577E+00	1.577E+00	1.577E+00	1.577E+00	1.577E+00	1.577E+00
PU243	0.000E+00	2.043E+05	2.038E+05	1.780E+05	8.846E+04	7.134E+03	3.017E-01	1.287E-05	1.039E-07	1.039E-07	1.039E-07	1.039E-07	1.039E-07	1.039E-07	1.039E-07	1.039E-07	1.039E-07	1.039E-07	1.039E-07
PU245	0.000E+00	3.435E-01	3.435E-01	3.222E-01	2.323E-01	2.323E-01	2.323E-01	2.323E-01	2.323E-01	2.323E-01	2.323E-01	2.323E-01	2.323E-01	2.323E-01	2.323E-01	2.323E-01	2.323E-01	2.323E-01	2.323E-01
AM240	0.000E+00	2.888E-01	2.887E-01	2.887E-01	2.849E-01	2.661E-01	2.082E-01	7.795E-02	2.919E-02	2.950E-03	2.981E-04	1.565E-05	0.000E+00	2.228E+02	2.228E+02	2.228E+02	2.228E+02	2.228E+02	2.228E+02
AM241	0.000E+00	2.228E+02	2.228E+02	2.229E+02	2.229E+02	2.230E+02	2.235E+02	2.254E+02	2.272E+02	2.316E+02	2.360E+02	2.417E+02	0.000E+00	2.949E+01	2.949E+01	2.949E+01	2.949E+01	2.949E+01	2.949E+01
AM242M	0.000E+00	2.949E+01	2.949E+01	2.949E+01	2.949E+01	2.949E+01	2.949E+01	2.949E+01	2.949E+01	2.949E+01	2.949E+01	2.949E+01	2.949E+01	2.949E+01	2.949E+01	2.949E+01	2.949E+01	2.949E+01	2.949E+01
AM242	0.000E+00	7.210E+04	7.210E+04	7.205E+04	6.910E+04	5.566E+04	1.162E+03	7.959E+01	2.940E+01	2.936E+01	2.936E+01	2.936E+01	2.936E+01	2.936E+01	2.936E+01	2.936E+01	2.936E+01	2.936E+01	2.936E+01
AM243	0.000E+00	1.809E+01	1.809E+01	1.809E+01	1.809E+01	1.810E+01	1.810E+01	1.810E+01	1.810E+01	1.810E+01	1.810E+01	1.810E+01	1.810E+01	1.810E+01	1.810E+01	1.810E+01	1.810E+01	1.810E+01	1.810E+01
AM244M	0.000E+00	6.740E+04	6.563E+04	6.390E+04	1.361E+04	4.577E+00	1.433E-12	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AM244	0.000E+00	3.541E+03	3.537E+03	3.533E+03	3.307E+03	2.346E+03	6.821E+02	4.874E+02	3.483E+02	3.426E+02	3.426E+02	3.426E+02	3.426E+02	3.426E+02	3.426E+02	3.426E+02	3.426E+02	3.426E+02	3.426E+02
AM245	0.000E+00	3.439E-01	3.439E-01	3.406E-01	2.775E-01	8.894E-02	8.026E-04	7.254E-06	1.364E-08	1.364E-08	1.364E-08	1.364E-08	1.364E-08	1.364E-08	1.364E-08	1.364E-08	1.364E-08	1.364E-08	1.364E-08
CM241	0.000E+00	1.033E-02	1.033E-02	1.033E-02	1.032E-02	1.028E-02	1.013E-02	9.561E-03	9.024E-03	7.887E-03	6.892E-03	5.796E-03	0.000E+00	4.526E+04	4.526E+04	4.526E+04	4.526E+04	4.526E+04	4.526E+04
CM242	0.000E+00	4.526E+04	4.526E+04	4.526E+04	4.526E+04	4.527E+04	4.527E+04	4.527E+04	4.527E+04	4.527E+04	4.527E+04	4.527E+04	4.527E+04	4.527E+04	4.527E+04	4.527E+04	4.527E+04	4.527E+04	4.527E+04

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21
 OUTPUT UNIT = 6

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* 1 MTHM, E=3.93%, 33960 MWD/MT (BWRUE)
 ACTINIDES+DAUGHTERS
 POWER= 1.00000E+00 MW, BURNUP= 1.00000E+00 MWD, FLUX= 1.00E+00 N/CM**2-SEC

7 SUMMARY TABLE: RADIOACTIVITY, CURIES

BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
CM243	0.000E+00	2.309E+01	2.309E+01	2.309E+01	2.309E+01	2.309E+01	2.309E+01	2.308E+01	2.307E+01	2.306E+01	2.304E+01
CM244	0.000E+00	2.342E+03	2.342E+03	2.342E+03	2.342E+03	2.342E+03	2.341E+03	2.340E+03	2.339E+03	2.337E+03	2.335E+03
CM245	0.000E+00	2.153E-01	2.153E-01	2.153E-01	2.153E-01	2.153E-01	2.153E-01	2.153E-01	2.153E-01	2.153E-01	2.153E-01
CM246	0.000E+00	3.305E-02	3.305E-02	3.305E-02	3.305E-02	3.305E-02	3.305E-02	3.305E-02	3.305E-02	3.305E-02	3.305E-02
CM249	0.000E+00	5.690E-03	5.629E-03	5.569E-03	2.976E-03	1.164E-04	1.913E-09	1.702E-09	1.296E-09	9.873E-10	6.956E-10
BK249	0.000E+00	9.601E-04	9.601E-04	9.601E-04	9.601E-04	9.588E-04	9.588E-04	9.588E-04	9.588E-04	9.588E-04	9.588E-04
SUMTOT	2.315E+00	2.492E+07	2.424E+07	1.503E+07	1.220E+07	9.816E+06	4.350E+06	2.054E+06	5.478E+05	2.945E+05	2.226E+05
TOTAL	2.315E+00	2.492E+07	2.424E+07	1.503E+07	1.220E+07	9.816E+06	4.350E+06	2.054E+06	5.478E+05	2.945E+05	2.226E+05

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21
 OUTPUT UNIT = 6

PAGE 98

* 1 MTHM, E=3.93%, 33960 MWD/MT (BWRUE)
 ACTINIDES+DAUGHTERS
 POWER= 1.00000E+00 MW, BURNUP= 1.00000E+00 MWD, FLUX= 1.00E+00 N/CM**2-SEC

7 SUMMARY TABLE: RADIOACTIVITY, CURIES

BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
TL	0.000E+00	1.508E-03	1.508E-03	1.550E-03	1.511E-03	1.557E-03	1.512E-03	1.518E-03	1.541E-03	1.567E-03	1.602E-03
PB	0.000E+00	4.197E-03	4.197E-03	4.197E-03	4.196E-03	4.195E-03	4.202E-03	4.219E-03	4.287E-03	4.359E-03	4.456E-03
BI	0.000E+00	4.197E-03	4.197E-03	4.198E-03	4.198E-03	4.331E-03	4.206E-03	4.223E-03	4.287E-03	4.359E-03	4.456E-03
PO	0.000E+00	6.885E-03	6.890E-03	6.886E-03	6.886E-03	6.971E-03	6.899E-03	6.929E-03	7.033E-03	7.151E-03	7.310E-03
RN	0.000E+00	4.196E-03	4.196E-03	4.197E-03	4.197E-03	4.196E-03	4.205E-03	4.224E-03	4.287E-03	4.359E-03	4.456E-03
RA	0.000E+00	4.197E-03	4.197E-03	4.197E-03	4.197E-03	4.196E-03	4.205E-03	4.224E-03	4.287E-03	4.359E-03	4.456E-03
TH	0.000E+00	1.156E+00	1.155E+00	1.122E+00	1.021E+00	7.602E-01	4.051E-01	3.549E-01	3.467E-01	3.467E-01	3.468E-01
PA	0.000E+00	1.272E+00	1.271E+00	1.269E+00	1.256E+00	1.044E+00	7.919E-01	7.397E-01	7.255E-01	7.242E-01	7.233E-01

U	2.315E+00	1.239E+07	1.205E+07	1.172E+07	2.675E+06	6.602E+05	6.110E+05	4.490E+05	3.239E+05	1.608E+05	7.836E+04	3.110E+04
NP	0.000E+00	1.198E+07	1.198E+07	1.198E+07	1.190E+07	8.976E+06	3.705E+06	1.529E+06	1.529E+06	1.942E+05	2.470E+04	1.759E+03
PU	0.000E+00	3.522E+05	3.518E+05	3.513E+05	3.255E+05	2.360E+05	1.546E+05	1.474E+05	1.474E+05	1.473E+05	1.471E+05	1.470E+05
AM	0.000E+00	1.434E+05	1.415E+05	1.398E+05	8.629E+04	5.828E+04	2.651E+04	1.440E+03	3.545E+02	3.086E+02	3.130E+02	3.186E+02
CM	0.000E+00	4.763E+04	4.763E+04	4.763E+04	4.763E+04	4.763E+04	4.759E+04	4.710E+04	4.654E+04	4.524E+04	4.399E+04	4.242E+04
BK	0.000E+00	2.629E-03	2.623E-03	2.618E-03	2.307E-03	1.419E-03	9.684E-04	9.526E-04	9.465E-04	9.322E-04	9.182E-04	9.005E-04
CF	0.000E+00	2.497E-05	2.497E-05	2.497E-05	2.497E-05	2.499E-05	2.498E-05	2.489E-05	2.481E-05	2.464E-05	2.451E-05	2.437E-05
SUMTOT	2.315E+00	2.492E+07	2.457E+07	2.424E+07	1.503E+07	1.220E+07	9.816E+06	4.350E+06	2.054E+06	5.478E+05	2.945E+05	2.226E+05
TOTAL	2.315E+00	2.492E+07	2.457E+07	2.424E+07	1.503E+07	1.220E+07	9.816E+06	4.350E+06	2.054E+06	5.478E+05	2.945E+05	2.226E+05

CUMULATIVE TABLE TOTALS

AP+FP	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ACT+FP	2.315E+00	2.492E+07	2.457E+07	2.424E+07	1.503E+07	1.220E+07	9.816E+06	4.350E+06	2.054E+06	5.478E+05	2.945E+05	2.226E+05
AP+ACT+FP	2.315E+00	2.492E+07	2.457E+07	2.424E+07	1.503E+07	1.220E+07	9.816E+06	4.350E+06	2.054E+06	5.478E+05	2.945E+05	2.226E+05

OUTPUT UNIT = 6 PAGE 99

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

* 1 MTHM, E=3.93%, 33960 MWD/MT (BWRUE)

ACTINIDES+DAUGHTERS

POWER= 1.000000E+00 MW, BURNUP= 1.000000E+00 MWD, FLUX= 1.00E+00 N/CM**2-SEC

9 SUMMARY TABLE: THERMAL POWER, WATTS

BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
TL208	0.000E+00	3.547E-05	3.547E-05	3.646E-05	3.554E-05	3.661E-05	3.555E-05	3.569E-05	3.624E-05	3.685E-05	3.766E-05
BI212	0.000E+00	7.987E-06	7.987E-06	7.987E-06	7.986E-06	7.986E-06	7.986E-06	7.986E-06	8.159E-06	8.297E-06	8.481E-06
PO212	0.000E+00	1.424E-04	1.424E-04	1.425E-04	1.425E-04	1.425E-04	1.425E-04	1.425E-04	1.425E-04	1.425E-04	1.425E-04
PO216	0.000E+00	1.717E-04	1.717E-04	1.718E-04	1.717E-04	1.717E-04	1.721E-04	1.729E-04	1.754E-04	1.784E-04	1.823E-04
RA224	0.000E+00	1.440E-04	1.440E-04	1.440E-04	1.440E-04	1.440E-04	1.443E-04	1.449E-04	1.471E-04	1.496E-04	1.529E-04
TH228	0.000E+00	1.369E-04	1.369E-04	1.369E-04	1.370E-04	1.373E-04	1.383E-04	1.394E-04	1.419E-04	1.443E-04	1.475E-04
TH230	0.000E+00	1.160E-06	1.160E-06	1.160E-06	1.161E-06	1.161E-06	1.164E-06	1.166E-06	1.172E-06	1.177E-06	1.184E-06
TH231	0.000E+00	4.603E-04	4.601E-04	4.486E-04	3.936E-04	2.472E-04	4.793E-05	1.974E-05	1.514E-05	1.509E-05	1.509E-05
TH233	0.000E+00	3.985E-05	3.862E-05	3.742E-05	6.069E-06	4.974E-10	9.678E-25	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TH234	0.000E+00	1.279E-04	1.279E-04	1.279E-04	1.279E-04	1.279E-04	1.279E-04	1.279E-04	1.279E-04	1.279E-04	1.279E-04
PA231	0.000E+00	7.622E-07	7.622E-07	7.622E-07	7.622E-07	7.633E-07	7.643E-07	7.646E-07	7.650E-07	7.653E-07	7.657E-07
PA232	0.000E+00	3.505E-03	3.504E-03	3.502E-03	3.428E-03	3.071E-03	2.065E-03	8.637E-05	2.128E-06	5.244E-08	4.486E-10
PA233	0.000E+00	9.367E-04	9.367E-04	9.367E-04	9.367E-04	9.359E-04	9.338E-04	9.321E-04	9.291E-04	9.269E-04	9.249E-04
PA234M	0.000E+00	1.578E-03	1.570E-03	1.565E-03	1.559E-03	1.559E-03	1.559E-03	1.559E-03	1.559E-03	1.558E-03	1.558E-03
PA234	0.000E+00	6.242E-05	6.232E-05	6.223E-05	5.687E-05	3.628E-05	5.895E-06	5.893E-06	5.889E-06	5.888E-06	5.888E-06
U232	0.000E+00	4.815E-04	4.815E-04	4.815E-04	4.815E-04	4.823E-04	4.843E-04	4.859E-04	4.895E-04	4.931E-04	4.977E-04
U233	0.000E+00	4.430E-07	4.430E-07	4.430E-07	4.430E-07	4.430E-07	4.436E-07	4.440E-07	4.450E-07	4.460E-07	4.473E-07
U234	5.491E-02	3.316E-02	3.316E-02	3.316E-02	3.316E-02	3.316E-02	3.316E-02	3.316E-02	3.317E-02	3.317E-02	3.318E-02
U235	2.226E-03	7.044E-04	7.044E-04	7.044E-04	7.044E-04	7.044E-04	7.044E-04	7.044E-04	7.044E-04	7.044E-04	7.044E-04
U236	0.000E+00	8.190E-03	8.190E-03	8.190E-03	8.190E-03	8.190E-03	8.190E-03	8.190E-03	8.190E-03	8.190E-03	8.190E-03
U237	0.000E+00	1.281E+03	1.281E+03	1.276E+03	1.249E+03	1.156E+03	8.495E+02	6.243E+02	3.042E+02	1.483E+02	5.884E+01
U238	8.193E-03	7.996E-03	7.996E-03	7.996E-03	7.996E-03	7.996E-03	7.996E-03	7.996E-03	7.996E-03	7.996E-03	7.996E-03
U239	0.000E+00	3.153E+04	3.061E+04	2.972E+04	5.385E+03	7.829E-01	1.199E-14	0.000E+00	0.000E+00	0.000E+00	0.000E+00

U240	0.000E+00	6.035E-03	6.030E-03	6.025E-03	5.746E-03	4.494E-03	1.855E-03	5.384E-05	1.563E-06	6.982E-10	2.936E-10	2.934E-10
NP235	0.000E+00	3.952E-07	3.952E-07	3.952E-07	3.952E-07	3.950E-07	3.950E-07	3.924E-07	3.904E-07	3.856E-07	3.809E-07	3.750E-07
NP236M	0.000E+00	4.18E-03	4.184E-03	4.182E-03	4.05E-03	3.479E-03	1.998E-03	2.175E-04	2.366E-05	1.338E-07	7.563E-10	9.784E-13
NP237	0.000E+00	1.218E-02	1.218E-02	1.218E-02	1.219E-02	1.219E-02	1.220E-02	1.224E-02	1.228E-02	1.232E-02	1.234E-02	1.236E-02
NP238	0.000E+00	1.307E+03	1.306E+03	1.306E+03	1.289E+03	1.204E+03	9.418E+02	3.527E+02	1.321E+02	1.335E+01	1.349E+00	7.151E-02
NP239	0.000E+00	2.829E+04	2.829E+04	2.829E+04	2.810E+04	2.647E+04	2.122E+04	8.778E+03	3.631E+03	4.628E+02	5.902E+01	4.216E+00
NP240M	0.000E+00	8.693E+00	7.920E+00	7.215E+00	7.231E-02	3.202E-02	1.322E-02	3.837E-04	1.114E-05	4.957E-09	2.074E-09	2.072E-09
NP240	0.000E+00	8.870E+01	8.776E+01	8.683E+01	4.678E+01	1.908E-01	1.901E-05	1.871E-25	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PU236	0.000E+00	2.182E-02	2.182E-02	2.182E-02	2.183E-02	2.183E-02	2.185E-02	2.184E-02	2.180E-02	2.170E-02	2.160E-02	2.147E-02
PU237	0.000E+00	8.439E-04	8.439E-04	8.439E-04	8.439E-04	8.407E-04	8.312E-04	7.941E-04	7.587E-04	6.822E-04	6.133E-04	5.349E-04
PU238	0.000E+00	1.064E+02	1.064E+02	1.064E+02	1.064E+02	1.064E+02	1.066E+02	1.069E+02	1.071E+02	1.074E+02	1.076E+02	1.078E+02
PU239	0.000E+00	1.064E+01	1.064E+01	1.064E+01	1.064E+01	1.066E+01	1.066E+01	1.071E+01	1.074E+01	1.074E+01	1.074E+01	1.074E+01
PU240	0.000E+00	1.413E+01	1.413E+01	1.413E+01	1.413E+01	1.413E+01	1.413E+01	1.413E+01	1.413E+01	1.413E+01	1.413E+01	1.413E+01
PU241	0.000E+00	4.448E+00	4.448E+00	4.448E+00	4.448E+00	4.448E+00	4.448E+00	4.446E+00	4.444E+00	4.440E+00	4.436E+00	4.431E+00
PU242	0.000E+00	4.658E-02	4.658E-02	4.658E-02	4.658E-02	4.658E-02	4.658E-02	4.658E-02	4.658E-02	4.658E-02	4.658E-02	4.658E-02
PU243	0.000E+00	2.363E+02	2.358E+02	2.352E+02	2.055E+02	1.021E+02	8.233E+00	3.482E-04	1.485E-08	1.199E-10	1.199E-10	1.199E-10
PU245	0.000E+00	8.155E-04	8.146E-04	8.137E-04	7.638E-04	5.508E-04	1.698E-04	1.531E-06	1.382E-08	2.341E-13	3.965E-18	2.911E-24
AM240	0.000E+00	1.890E-03	1.890E-03	1.889E-03	1.864E-03	1.741E-03	1.362E-03	5.101E-04	1.910E-04	1.930E-05	1.951E-06	1.024E-07
AM241	0.000E+00	7.402E+00	7.402E+00	7.402E+00	7.403E+00	7.408E+00	7.423E+00	7.486E+00	7.548E+00	7.695E+00	7.840E+00	8.028E+00
AM242M	0.000E+00	1.165E-02	1.165E-02	1.165E-02	1.165E-02	1.165E-02	1.165E-02	1.165E-02	1.165E-02	1.165E-02	1.165E-02	1.165E-02
AM242	0.000E+00	8.190E+01	8.184E+01	8.178E+01	7.844E+01	6.318E+01	2.902E+01	1.319E+00	9.034E-02	3.337E-02	3.333E-02	3.330E-02
AM243	0.000E+00	5.814E-01	5.814E-01	5.815E-01	5.815E-01	5.817E-01	5.819E-01	5.820E-01	5.820E-01	5.819E-01	5.819E-01	5.819E-01
AM244M	0.000E+00	2.039E+02	1.985E+02	1.933E+02	4.118E+01	1.384E-02	4.335E-15	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AM244	0.000E+00	1.856E+01	1.854E+01	1.851E+01	1.733E+01	1.229E+01	3.574E+00	2.554E-02	1.825E-04	1.795E-09	1.765E-14	6.442E-21
AM245	0.000E+00	6.381E-04	6.381E-04	6.381E-04	6.320E-04	5.148E-04	1.650E-04	1.489E-06	1.346E-08	2.531E-11	2.471E-11	2.423E-11
CM241	0.000E+00	4.244E-05	4.244E-05	4.244E-05	4.241E-05	4.224E-05	4.163E-05	3.930E-05	3.709E-05	3.242E-05	2.833E-05	2.382E-05

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21 OUTPUT UNIT = 6 PAGE 100

* 1 MTHM, E=3.93%, 33960 MWD/MT (BWRUE)

ACTINIDES+DAUGHTERS

POWER= 1.00000E+00 MW, BURNUP= 1.00000E+00 MWD, FLUX= 1.00E+00 N/CM**2-SEC

9 SUMMARY TABLE: THERMAL POWER, WATTS

BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
CM242	0.000E+00	1.668E+03	1.668E+03	1.668E+03	1.668E+03	1.666E+03	1.648E+03	1.628E+03	1.580E+03	1.534E+03	1.476E+03
CM243	0.000E+00	8.470E-01	8.470E-01	8.470E-01	8.470E-01	8.470E-01	8.468E-01	8.466E-01	8.463E-01	8.459E-01	8.454E-01
CM244	0.000E+00	8.190E+01	8.190E+01	8.191E+01	8.191E+01	8.191E+01	8.188E+01	8.186E+01	8.180E+01	8.174E+01	8.166E+01
CM245	0.000E+00	7.144E-03	7.144E-03	7.144E-03	7.144E-03	7.144E-03	7.144E-03	7.144E-03	7.144E-03	7.144E-03	7.144E-03
CM246	0.000E+00	1.082E-03	1.082E-03	1.082E-03	1.082E-03	1.082E-03	1.082E-03	1.082E-03	1.082E-03	1.082E-03	1.082E-03
CM249	0.000E+00	9.903E-06	9.797E-06	9.691E-06	5.179E-06	2.025E-07	5.474E-12	2.963E-12	2.256E-12	1.718E-12	1.211E-12
BK249	0.000E+00	7.114E-07	7.114E-07	7.116E-07	7.116E-07	7.105E-07	7.059E-07	7.013E-07	6.908E-07	6.804E-07	6.672E-07
BK250	0.000E+00	1.155E-05	1.153E-05	1.153E-05	1.153E-05	1.153E-05	1.153E-05	1.153E-05	1.153E-05	1.153E-05	1.153E-05
CF250	0.000E+00	4.553E-07	4.553E-07	4.556E-07	4.556E-07	4.565E-07	4.567E-07	4.567E-07	4.561E-07	4.556E-07	4.550E-07
CF252	0.000E+00	8.127E-07	8.127E-07	8.126E-07	8.126E-07	8.121E-07	8.104E-07	8.086E-07	8.046E-07	8.005E-07	7.954E-07
SUMTOT	6.533E-02	6.493E+04	6.401E+04	6.311E+04	3.834E+04	3.099E+04	2.526E+04	1.186E+04	6.242E+03	2.588E+03	1.970E+03
TOTAL	6.533E-02	6.493E+04	6.401E+04	6.311E+04	3.834E+04	3.099E+04	2.526E+04	1.186E+04	6.242E+03	2.588E+03	1.970E+03

ZN 72	0.000E+00	4.152E-05	4.151E-05	4.150E-05	4.091E-05	3.797E-05	2.903E-05	3.394E-06	2.774E-07	2.267E-08	9.061E-10
GA 72	0.000E+00	1.263E-05	1.263E-05	1.263E-05	1.263E-05	1.247E-05	1.096E-05	1.271E-06	1.475E-06	1.211E-07	9.898E-09
GA 73	0.000E+00	2.069E-02	2.069E-02	2.069E-02	2.069E-02	2.069E-02	2.069E-02	2.073E-02	2.074E-02	2.074E-02	2.074E-02
GA 74	0.000E+00	8.830E-06	8.820E-06	8.801E-06	7.672E-06	3.771E-06	2.926E-07	1.060E-11	3.841E-16	1.668E-26	7.247E-37
GE 73	0.000E+00	4.370E-02	4.370E-02	4.370E-02	4.370E-02	4.370E-02	4.370E-02	4.371E-02	4.371E-02	4.371E-02	4.371E-02
GE 74	0.000E+00	9.653E-02	9.653E-02	9.653E-02	9.653E-02	9.653E-02	9.653E-02	9.653E-02	9.653E-02	9.653E-02	9.653E-02
GE 75	0.000E+00	1.050E-05	1.049E-05	1.046E-05	6.515E-06	5.287E-07	6.263E-11	1.233E-26	2.417E-42	0.000E+00	0.000E+00
AS 75	0.000E+00	2.012E-01	2.012E-01	2.012E-01	2.012E-01	2.012E-01	2.012E-01	2.012E-01	2.012E-01	2.012E-01	2.012E-01
GE 76	0.000E+00	5.116E-01	5.116E-01	5.116E-01	5.116E-01	5.116E-01	5.116E-01	5.116E-01	5.116E-01	5.116E-01	5.116E-01
AS 76	0.000E+00	1.427E-05	1.427E-05	1.390E-05	1.390E-05	1.219E-05	7.586E-06	1.139E-06	1.710E-07	2.049E-09	2.455E-11
SE 76	0.000E+00	6.255E-03	6.255E-03	6.255E-03	6.255E-03	6.257E-03	6.261E-03	6.268E-03	6.269E-03	6.269E-03	6.269E-03
GE 77	0.000E+00	1.544E-04	1.544E-04	1.542E-04	1.445E-04	1.070E-04	3.546E-05	4.283E-07	5.172E-09	1.731E-13	5.790E-18
AS 77	0.000E+00	1.459E-03	1.459E-03	1.459E-03	1.443E-03	1.356E-03	1.043E-03	3.014E-04	8.346E-05	4.152E-06	4.360E-09
SE 77	0.000E+00	1.062E+00	1.062E+00	1.062E+00	1.062E+00	1.062E+00	1.062E+00	1.063E+00	1.063E+00	1.063E+00	1.063E+00
GE 78	0.000E+00	1.219E-04	1.210E-04	1.201E-04	7.563E-05	6.929E-06	1.270E-09	1.432E-24	1.616E-39	0.000E+00	0.000E+00
AS 78	0.000E+00	1.307E-04	1.307E-04	1.306E-04	1.191E-04	2.943E-05	2.075E-08	2.032E-22	1.055E-36	0.000E+00	0.000E+00
SE 78	0.000E+00	2.470E+00	2.470E+00	2.470E+00	2.470E+00	2.470E+00	2.470E+00	2.470E+00	2.470E+00	2.470E+00	2.470E+00
AS 79	0.000E+00	3.143E-05	3.039E-05	2.863E-05	3.327E-07	3.074E-17	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SE 79	0.000E+00	6.071E+00	6.071E+00	6.071E+00	6.071E+00	6.071E+00	6.071E+00	6.071E+00	6.071E+00	6.071E+00	6.071E+00
SE 79M	0.000E+00	1.362E-05	1.359E-05	1.345E-05	2.537E-07	2.340E-17	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR 79	0.000E+00	1.437E-04	1.437E-04	1.437E-04	1.437E-04	1.437E-04	1.439E-04	1.444E-04	1.449E-04	1.462E-04	1.474E-04
SE 80	0.000E+00	1.384E+01	1.384E+01	1.384E+01	1.384E+01	1.384E+01	1.384E+01	1.384E+01	1.384E+01	1.384E+01	1.384E+01
KR 80	0.000E+00	2.178E-04	2.178E-04	2.178E-04	2.178E-04	2.178E-04	2.178E-04	2.178E-04	2.178E-04	2.178E-04	2.178E-04
AS 81	0.000E+00	6.497E-06	6.231E-06	6.156E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SE 81	0.000E+00	2.419E-04	2.386E-04	2.316E-04	3.008E-05	1.258E-07	2.657E-13	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SE 81M	0.000E+00	2.047E-05	2.023E-05	1.998E-05	9.908E-07	6.630E-07	5.572E-13	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR 81	0.000E+00	2.245E+01	2.245E+01	2.245E+01	2.245E+01	2.245E+01	2.245E+01	2.245E+01	2.245E+01	2.245E+01	2.245E+01
KR 81	0.000E+00	2.055E-05	2.055E-05	2.055E-05	2.055E-05	2.055E-05	2.055E-05	2.055E-05	2.055E-05	2.055E-05	2.055E-05
AS 82	0.000E+00	3.793E-06	3.699E-07	8.418E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SE 82	0.000E+00	3.522E+01	3.522E+01	3.522E+01	3.522E+01	3.522E+01	3.522E+01	3.522E+01	3.522E+01	3.522E+01	3.522E+01
BR 82	0.000E+00	3.193E-03	3.193E-03	3.192E-03	3.135E-03	2.842E-03	1.996E-03	4.855E-04	1.181E-04	4.364E-06	1.612E-07
BR 82M	0.000E+00	3.530E-06	3.152E-06	2.815E-06	3.985E-09	7.382E-24	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
KR 82	0.000E+00	1.086E+00	1.086E+00	1.086E+00	1.086E+00	1.086E+00	1.087E+00	1.089E+00	1.089E+00	1.089E+00	1.089E+00
AS 83	0.000E+00	4.399E-06	2.100E-07	9.645E-09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SE 83	0.000E+00	2.664E-04	2.598E-04	2.520E-04	4.221E-05	4.090E-09	1.453E-23	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SE 83M	0.000E+00	2.071E-05	1.327E-05	7.409E-06	8.028E-21	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR 83	0.000E+00	4.335E-03	4.332E-03	4.325E-03	3.449E-03	8.207E-04	4.437E-06	3.788E-15	3.234E-24	0.000E+00	0.000E+00
KR 83	0.000E+00	4.536E+01	4.536E+01	4.536E+01	4.536E+01	4.537E+01	4.537E+01	4.537E+01	4.537E+01	4.537E+01	4.537E+01
KR 83M	0.000E+00	3.326E-03	3.326E-03	3.326E-03	3.215E-03	1.445E-03	1.314E-05	1.237E-14	1.056E-23	0.000E+00	0.000E+00
SE 84	0.000E+00	1.680E-04	1.375E-04	1.114E-04	5.704E-10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR 84	0.000E+00	1.677E-03	1.673E-03	1.663E-03	5.047E-04	7.322E-07	4.375E-17	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR 84M	0.000E+00	1.147E-05	1.022E-05	9.103E-06	1.122E-08	9.952E-24	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
KR 84	0.000E+00	1.170E+02	1.170E+02	1.170E+02	1.170E+02	1.170E+02	1.170E+02	1.170E+02	1.170E+02	1.170E+02	1.170E+02

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

* 1 MTIHM, E=3.93%, 33960 MWD/MT (BWRUE)

FISSION PRODUCTS

POWER= 1.00000E+00 MW, BURNUP= 1.00000E+00 MWD, FLUX= 1.00E+00 N/CM**2-SEC

5 SUMMARY TABLE: CONCENTRATIONS, GRAMS

BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1d	FUEL 4d	FUEL 7d	FUEL 14d	FUEL 21d	FUEL 30d
SE 85	0.000E+00	1.942E-05	6.782E-06	2.335E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SE 85M	0.000E+00	7.000E-06	7.843E-07	8.787E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR 85	0.000E+00	1.837E-04	1.608E-04	1.307E-04	1.086E-10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
KR 85	0.000E+00	2.398E+01	2.398E+01	2.398E+01	2.398E+01	2.398E+01	2.397E+01	2.396E+01	2.393E+01	2.390E+01	2.386E+01
KR 85M	0.000E+00	1.746E-02	1.746E-02	1.745E-02	1.514E-02	6.985E-03	4.313E-04	6.272E-09	9.121E-14	4.708E-25	2.430E-36
RB 85	0.000E+00	1.044E+02	1.044E+02	1.044E+02	1.044E+02	1.044E+02	1.044E+02	1.044E+02	1.045E+02	1.045E+02	1.045E+02
SE 86	0.000E+00	1.638E-05	1.344E-06	1.097E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR 86	0.000E+00	4.254E-05	2.455E-05	1.190E-05	1.074E-24	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
KR 86	0.000E+00	2.014E+02	2.014E+02	2.014E+02	2.014E+02	2.014E+02	2.014E+02	2.014E+02	2.014E+02	2.014E+02	2.014E+02
KR 86M	0.000E+00	1.692E-02	1.692E-02	1.689E-02	1.676E-02	1.676E-02	1.676E-02	1.676E-02	1.676E-02	1.676E-02	1.676E-02
SR 86	0.000E+00	4.770E-01	4.770E-01	4.770E-01	4.772E-01	4.772E-01	4.773E-01	4.773E-01	4.839E-01	4.862E-01	4.884E-01
SE 87	0.000E+00	4.495E-06	2.681E-09	1.596E-12	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR 87	0.000E+00	9.946E-05	4.957E-05	2.353E-05	3.958E-24	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
KR 87	0.000E+00	9.686E-03	9.653E-03	9.591E-03	5.677E-03	3.720E-04	2.039E-08	1.843E-25	1.707E-42	0.000E+00	0.000E+00
RB 87	0.000E+00	2.585E+02	2.585E+02	2.585E+02	2.586E+02	2.586E+02	2.586E+02	2.586E+02	2.586E+02	2.586E+02	2.586E+02
SR 87	0.000E+00	3.412E-03	3.412E-03	3.412E-03	3.412E-03	3.412E-03	3.412E-03	3.412E-03	3.412E-03	3.412E-03	3.412E-03
BR 88	0.000E+00	3.126E-05	2.477E-06	1.931E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
KR 88	0.000E+00	3.077E-02	3.067E-02	3.055E-02	2.413E-02	7.117E-03	8.783E-05	2.037E-12	4.722E-20	7.241E-38	0.000E+00
RB 88	0.000E+00	3.270E-03	3.268E-03	3.265E-03	2.784E-03	3.066E-04	1.025E-05	2.377E-13	5.511E-21	8.449E-39	0.000E+00
SR 88	0.000E+00	3.715E+02	3.715E+02	3.715E+02	3.716E+02	3.716E+02	3.716E+02	3.716E+02	3.716E+02	3.716E+02	3.716E+02
BR 89	0.000E+00	6.096E-06	5.943E-10	5.757E-14	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
KR 89	0.000E+00	7.041E-04	5.706E-04	4.585E-04	1.424E-09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB 89	0.000E+00	3.616E-03	3.591E-03	3.541E-03	2.926E-04	3.348E-10	1.367E-31	1.700E+00	0.000E+00	0.000E+00	0.000E+00
SR 89	0.000E+00	1.796E+01	1.796E+01	1.796E+01	1.795E+01	1.795E+01	1.795E+01	1.795E+01	1.795E+01	1.795E+01	1.795E+01
Y 89	0.000E+00	4.680E+02	4.680E+02	4.680E+02	4.680E+02	4.680E+02	4.682E+02	4.682E+02	4.682E+02	4.682E+02	4.682E+02
KR 90	0.000E+00	1.194E-04	3.335E-05	9.209E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB 90	0.000E+00	5.937E-04	5.190E-04	4.147E-04	1.060E-09	9.960E-31	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB 90M	0.000E+00	2.366E-02	2.110E-04	1.823E-04	1.597E-08	1.590E-29	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SR 90	0.000E+00	5.567E+02	5.567E+02	5.567E+02	5.567E+02	5.567E+02	5.566E+02	5.566E+02	5.566E+02	5.566E+02	5.566E+02
Y 90	0.000E+00	1.432E-01	1.432E-01	1.432E-01	1.430E-01	1.424E-01	1.424E-01	1.401E-01	1.396E-01	1.394E-01	1.393E-01
KR 91	0.000E+00	3.251E+01	3.251E+01	3.251E+01	3.251E+01	3.252E+01	3.254E+01	3.276E+01	3.302E+01	3.327E+01	3.360E+01
RB 91	0.000E+00	2.419E-05	2.046E-07	1.717E-09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB 91	0.000E+00	2.857E-04	1.536E-04	7.529E-05	7.532E-23	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SR 91	0.000E+00	1.803E-01	1.802E-01	1.801E-01	1.679E-01	1.166E-01	3.135E-02	1.640E-04	8.576E-07	4.072E-12	1.934E-17
Y 91	0.000E+00	2.765E+01	2.765E+01	2.765E+01	2.765E+01	2.764E+01	2.748E+01	2.655E+01	2.563E+01	2.359E+01	2.171E+01
Y 91M	0.000E+00	9.128E-03	9.128E-03	9.127E-03	8.923E-03	6.455E-03	1.737E-03	9.088E-06	4.753E-08	2.257E-13	1.072E-18
ZR 91	0.000E+00	5.965E+02	5.965E+02	5.965E+02	5.965E+02	5.966E+02	5.968E+02	5.978E+02	5.987E+02	6.007E+02	6.026E+02
RB 92	0.000E+00	1.948E-05	2.217E-09	2.061E-13	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SR 92	0.000E+00	5.660E-02	5.638E-02	5.614E-02	4.384E-02	1.220E-02	1.222E-04	1.228E-12	1.234E-20	2.690E-39	0.000E+00
Y 92	0.000E+00	7.424E-02	7.424E-02	7.423E-02	7.259E-02	4.546E-02	2.350E-03	2.150E-09	1.618E-15	8.286E-30	0.000E+00
ZR 92	0.000E+00	6.726E+02	6.726E+02	6.726E+02	6.726E+02	6.726E+02	6.727E+02	6.727E+02	6.727E+02	6.727E+02	6.727E+02
RB 93	0.000E+00	1.942E-05	1.556E-08	1.196E-11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SR 93	0.000E+00	3.008E-03	2.761E-03	2.517E-03	1.183E-05	1.076E-17	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Y 93	0.000E+00	2.493E-01	2.493E-01	2.492E-01	2.356E-01	1.672E-01	4.861E-02	3.473E-04	2.482E-06	2.441E-11	2.400E-16
ZR 93	0.000E+00	7.524E+02	7.524E+02	7.524E+02	7.524E+02	7.525E+02	7.526E+02	7.527E+02	7.527E+02	7.527E+02	7.527E+02
NB 93	0.000E+00	1.008E-04	1.008E-04	1.008E-04	1.008E-04	1.008E-04	1.009E-04	1.018E-04	1.028E-04	1.038E-04	1.051E-04
NB 93M	0.000E+00	6.886E-04	6.886E-04	6.886E-04	6.886E-04	6.888E-04	6.918E-04	6.941E-04	6.997E-04	7.052E-04	7.123E-04
RB 94	0.000E+00	4.790E-06	9.324E-13	1.799E-19	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SR 94	0.000E+00	4.835E-04	2.815E-04	1.624E-04	2.257E-18	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Y 94	0.000E+00	8.037E-03	7.953E-03	7.786E-03	7.700E-04	1.814E-08	1.726E-25	0.000E+00	0.000E+00	0.000E+00	0.000E+00

SB126	0.000E+00	7.792E-03	7.792E-03	7.792E-03	7.775E-03	7.685E-03	7.369E-03	6.231E-03	5.269E-03	3.563E-03	2.409E-03	1.457E-03
SB126M	0.000E+00	3.541E-06	3.414E-06	3.292E-06	4.053E-07	9.710E-09	9.703E-09	9.703E-09	9.703E-09	9.703E-09	9.703E-09	9.703E-09
TE126	0.000E+00	7.464E-01	7.464E-01	7.464E-01	7.465E-01	7.465E-01	7.468E-01	7.489E-01	7.489E-01	7.507E-01	7.518E-01	7.528E-01
SN127	0.000E+00	3.370E-03	3.353E-03	3.334E-03	3.423E-03	4.652E-04	1.223E-06	5.840E-17	2.789E-27	0.000E+00	0.000E+00	0.000E+00
SN127M	0.000E+00	5.258E-05	4.446E-05	3.760E-05	2.244E-09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SB127	0.000E+00	2.334E-01	2.334E-01	2.334E-01	2.327E-01	2.260E-01	1.979E-01	1.153E-01	6.718E-02	1.905E-02	5.401E-03	1.068E-03
TE127	0.000E+00	2.352E-02	2.352E-02	2.352E-02	2.351E-02	2.340E-02	2.189E-02	1.432E-02	9.622E-03	4.847E-03	3.400E-03	2.822E-03
TE127M	0.000E+00	9.057E-01	9.057E-01	9.057E-01	9.057E-01	9.057E-01	9.057E-01	8.996E-01	8.892E-01	8.570E-01	8.216E-01	7.764E-01
I127	0.000E+00	5.251E+01	5.251E+01	5.251E+01	5.252E+01	5.255E+01	5.255E+01	5.271E+01	5.271E+01	5.280E+01	5.285E+01	5.290E+01
SN128	0.000E+00	3.764E-03	3.721E-03	3.677E-03	1.860E-03	5.482E-05	1.693E-10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SB128	0.000E+00	3.110E-03	3.106E-03	3.102E-03	2.876E-03	1.960E-03	4.909E-04	1.931E-06	7.599E-09	1.856E-14	4.531E-20	2.757E-27
SB128M	0.000E+00	7.213E-04	7.173E-04	7.131E-04	3.966E-04	1.173E-05	3.622E-11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TE128	0.000E+00	1.099E+02	1.099E+02	1.099E+02	1.099E+02	1.099E+02	1.099E+02	1.099E+02	1.099E+02	1.099E+02	1.099E+02	1.099E+02
I128	0.000E+00	1.322E-04	1.286E-04	1.251E-04	2.503E-05	6.076E-09	5.895E-22	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
XE128	0.000E+00	3.359E+00	3.359E+00	3.359E+00	3.359E+00	3.359E+00	3.359E+00	3.359E+00	3.359E+00	3.359E+00	3.359E+00	3.359E+00
SN129	0.000E+00	3.235E-04	2.950E-04	2.690E-04	1.264E-06	1.150E-18	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SN129M	0.000E+00	1.228E-04	9.312E-05	7.057E-05	7.323E-12	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SB129	0.000E+00	3.282E-02	3.279E-02	3.275E-02	2.834E-02	1.270E-02	7.072E-04	6.787E-09	6.515E-14	1.275E-25	2.497E-37	0.000E+00
TE129	0.000E+00	8.679E-03	8.677E-03	8.675E-03	8.353E-03	4.823E-03	1.060E-03	7.846E-04	3.775E-04	6.384E-04	5.525E-04	4.589E-04
TE129M	0.000E+00	9.056E-01	9.056E-01	9.056E-01	9.055E-01	9.037E-01	8.913E-01	8.379E-01	7.876E-01	6.817E-01	5.901E-01	4.901E-01
I129	0.000E+00	1.793E+02	1.793E+02	1.793E+02	1.793E+02	1.793E+02	1.793E+02	1.794E+02	1.794E+02	1.795E+02	1.796E+02	1.797E+02
XE129	0.000E+00	1.807E-02	1.807E-02	1.807E-02	1.807E-02	1.808E-02	1.808E-02	1.808E-02	1.809E-02	1.809E-02	1.810E-02	1.810E-02
XE129M	0.000E+00	2.898E-05	2.898E-05	2.898E-05	2.888E-05	2.836E-05	2.657E-05	2.049E-05	1.580E-05	8.616E-06	4.698E-06	2.154E-06
SN130	0.000E+00	5.178E-04	4.299E-04	3.568E-04	7.226E-09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SB130	0.000E+00	1.659E-03	1.631E-03	1.603E-03	5.866E-06	3.241E-06	2.415E-14	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SB130M	0.000E+00	1.163E-03	1.125E-03	1.077E-03	3.284E-06	1.527E-20	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TE130	0.000E+00	3.570E+02	3.570E+02	3.570E+02	3.570E+02	3.570E+02	3.570E+02	3.570E+02	3.570E+02	3.570E+02	3.570E+02	3.570E+02
I130	0.000E+00	1.024E-02	1.023E-02	1.022E-02	9.716E-03	7.340E-03	2.675E-03	4.720E-05	8.328E-07	6.749E-11	5.469E-15	3.004E-20
I130M	0.000E+00	4.836E-05	4.477E-05	4.146E-05	4.760E-07	4.398E-17	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
XE130	0.000E+00	1.041E+01	1.041E+01	1.041E+01	1.041E+01	1.041E+01	1.042E+01	1.042E+01	1.042E+01	1.042E+01	1.042E+01	1.042E+01
SN131	0.000E+00	1.291E-04	6.674E-05	3.449E-05	8.113E-22	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SB131	0.000E+00	7.570E-03	7.407E-03	7.218E-03	1.263E-03	1.496E-07	1.096E-21	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TE131	0.000E+00	8.755E-03	8.732E-03	8.704E-03	4.203E-03	2.852E-04	1.863E-04	3.529E-05	6.687E-06	1.379E-07	2.843E-09	1.933E-11
TE131M	0.000E+00	1.032E-01	1.032E-01	1.032E-01	1.013E-01	9.030E-02	5.958E-02	1.129E-02	2.139E-03	4.409E-05	9.091E-07	6.183E-09
I131	0.000E+00	4.580E+00	4.580E+00	4.580E+00	4.577E+00	4.511E+00	4.259E+00	3.329E+00	2.578E+00	1.412E+00	7.720E-01	3.554E-01
XE131	0.000E+00	4.143E+02	4.143E+02	4.143E+02	4.143E+02	4.144E+02	4.146E+02	4.156E+02	4.164E+02	4.176E+02	4.182E+02	4.186E+02
XE131M	0.000E+00	7.539E-02	7.539E-02	7.539E-02	7.539E-02	7.538E-02	7.524E-02	7.310E-02	6.909E-02	5.639E-02	4.322E-02	2.906E-02
SN132	0.000E+00	4.443E-05	1.571E-05	5.554E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SB132	0.000E+00	5.498E-04	4.542E-04	3.634E-04	2.154E-10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SB132M	0.000E+00	5.428E-04	4.602E-04	3.902E-04	2.718E-08	8.552E-30	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TE132	0.000E+00	2.644E+00	2.644E+00	2.644E+00	2.622E+00	2.508E+00	2.138E+00	1.129E+00	5.966E-01	1.346E-01	3.035E-02	4.473E-03

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OUTPUT UNIT = 6

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

* 1 MTRM, E=3.93%, 33960 MWD/MT (BWRUE)

FISSION PRODUCTS

POWER= 1.00000E+00 MW, BURNUP= 1.00000E+00 MWD, FLUX= 1.00E+00 N/CM**2-SEC

5 SUMMARY TABLE: CONCENTRATIONS, GRAMS

BOC #1 DISCHARGE FUEL 1m FUEL 2m FUEL 1h FUEL 6h FUEL 1D FUEL 4D FUEL 7D FUEL 14D FUEL 21D FUEL 30D

PR147	0.000E+00	3.499E-03	3.454E-03	3.346E-03	1.216E-04	3.624E-12	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	
ND147	0.000E+00	4.663E+00	4.663E+00	4.663E+00	4.655E+00	4.384E+00	3.632E+00	3.010E+00	1.941E+00	1.252E+00	7.121E-01	1.242E+02	1.242E+02	1.242E+02	1.242E+02	1.242E+02	1.242E+02	1.242E+02	1.242E+02	1.242E+02
PM147	0.000E+00	1.242E+02	1.242E+02	1.242E+02	1.242E+02	1.242E+02	1.242E+02	1.242E+02	1.242E+02	1.242E+02	1.242E+02	1.242E+02	1.242E+02	1.242E+02	1.242E+02	1.242E+02	1.242E+02	1.242E+02	1.242E+02	1.242E+02
SM147	0.000E+00	8.800E+01	8.800E+01	8.800E+01	8.803E+01	8.803E+01	8.803E+01	8.803E+01	8.803E+01	8.803E+01	8.803E+01	8.803E+01	8.803E+01	8.803E+01	8.803E+01	8.803E+01	8.803E+01	8.803E+01	8.803E+01	8.803E+01
CE148	0.000E+00	1.497E-04	5.751E-05	2.186E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PR148	0.000E+00	5.355E-04	4.752E-04	3.816E-04	1.059E-11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ND148	0.000E+00	3.779E+02	3.779E+02	3.779E+02	3.779E+02	3.779E+02	3.779E+02	3.779E+02	3.779E+02	3.779E+02	3.779E+02	3.779E+02	3.779E+02	3.779E+02	3.779E+02	3.779E+02	3.779E+02	3.779E+02	3.779E+02	3.779E+02
PM148	0.000E+00	9.566E-01	9.565E-01	9.564E-01	9.515E-01	9.265E-01	8.418E-01	5.741E-01	3.922E-01	1.630E-01	6.968E-02	2.547E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PM148M	0.000E+00	1.300E+00	1.300E+00	1.300E+00	1.299E+00	1.295E+00	1.278E+00	1.216E+00	1.156E+00	1.028E+00	9.138E-01	7.857E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

* 1 MTHM, E=3.93%, 33960 MWD/MT (BWRUE)
 FISSION PRODUCTS
 POWER= 1.00000E+00 MW, BURNUP= 1.00000E+00 MWD, FLUX= 1.00E+00 N/CM**2-SEC

5 SUMMARY TABLE: CONCENTRATIONS, GRAMS

	BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
SM148	0.000E+00	1.932E+02	1.932E+02	1.932E+02	1.932E+02	1.932E+02	1.932E+02	1.932E+02	1.932E+02	1.942E+02	1.944E+02	1.946E+02
PR149	0.000E+00	3.769E-04	2.808E-04	2.077E-04	1.323E-12	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ND149	0.000E+00	1.800E-02	1.798E-02	1.793E-02	1.661E-03	1.226E-06	3.630E-19	1.075E-31	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PM149	0.000E+00	7.882E-01	7.882E-01	7.882E-01	7.840E-01	7.447E-01	5.901E-01	2.305E-01	9.001E-02	1.004E-02	1.119E-03	6.667E-05
SM149	0.000E+00	3.017E+00	3.018E+00	3.018E+00	3.028E+00	3.078E+00	3.234E+00	3.594E+00	3.734E+00	3.814E+00	3.823E+00	3.824E+00
PR150	0.000E+00	2.277E-05	8.312E-07	2.905E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ND150	0.000E+00	1.781E+02	1.781E+02	1.781E+02	1.781E+02	1.781E+02	1.781E+02	1.781E+02	1.781E+02	1.781E+02	1.781E+02	1.781E+02
PM150	0.000E+00	2.544E-04	2.533E-04	2.522E-04	1.964E-04	5.389E-05	5.124E-07	4.190E-15	3.427E-23	4.624E-42	0.000E+00	0.000E+00
SM150	0.000E+00	3.014E+02	3.014E+02	3.014E+02	3.014E+02	3.014E+02	3.014E+02	3.014E+02	3.014E+02	3.014E+02	3.014E+02	3.014E+02
PR151	0.000E+00	4.111E-06	1.368E-10	4.174E-15	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ND151	0.000E+00	1.137E-03	1.079E-03	1.020E-03	3.987E-05	2.078E-12	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SM151	0.000E+00	1.566E-01	1.566E-01	1.566E-01	1.539E-01	1.363E-01	8.780E-02	1.514E-02	2.609E-03	4.316E-05	7.140E-07	3.658E-09
PM151	0.000E+00	1.866E+01	1.866E+01	1.866E+01	1.866E+01	1.868E+01	1.872E+01	1.880E+01	1.881E+01	1.881E+01	1.880E+01	1.880E+01
EU151	0.000E+00	2.565E-02	2.565E-02	2.565E-02	2.567E-02	2.575E-02	2.605E-02	2.723E-02	2.842E-02	3.120E-02	3.398E-02	3.754E-02
PR152	0.000E+00	3.816E-06	8.092E-08	3.394E-09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ND152	0.000E+00	7.327E-04	6.942E-04	6.537E-04	1.982E-05	2.781E-13	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PM152	0.000E+00	2.673E-04	2.653E-04	2.614E-04	1.100E-05	1.541E-13	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PM152M	0.000E+00	9.074E-06	8.273E-06	7.542E-06	3.546E-08	3.225E-20	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SM152	0.000E+00	1.233E+02	1.233E+02	1.233E+02	1.233E+02	1.233E+02	1.233E+02	1.233E+02	1.233E+02	1.233E+02	1.233E+02	1.233E+02
EU152	0.000E+00	8.508E-02	8.508E-02	8.508E-02	8.508E-02	8.508E-02	8.507E-02	8.503E-02	8.500E-02	8.491E-02	8.483E-02	8.472E-02
EU152M	0.000E+00	5.581E-05	5.575E-05	5.568E-05	5.181E-05	3.572E-05	9.365E-06	4.426E-08	2.091E-10	7.829E-16	2.931E-21	3.090E-28
GD152	0.000E+00	7.091E-02	7.091E-02	7.091E-02	7.093E-02	7.093E-02	7.095E-02	7.096E-02	7.097E-02	7.100E-02	7.102E-02	7.105E-02
ND153	0.000E+00	4.267E-05	2.375E-05	1.284E-05	3.960E-21	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PM153	0.000E+00	2.325E-04	2.232E-04	2.065E-04	1.302E-07	2.458E-24	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SM153	0.000E+00	6.082E-01	6.081E-01	6.080E-01	5.996E-01	5.567E-01	4.261E-01	1.463E-01	5.026E-02	4.115E-03	3.428E-04	1.389E-05
EU153	0.000E+00	1.174E+02	1.174E+02	1.174E+02	1.174E+02	1.174E+02	1.175E+02	1.178E+02	1.179E+02	1.180E+02	1.180E+02	1.180E+02
GD153	0.000E+00	4.355E-03	4.355E-03	4.355E-03	4.355E-03	4.352E-03	4.343E-03	4.306E-03	4.269E-03	4.184E-03	4.101E-03	3.997E-03
ND154	0.000E+00	1.324E-05	4.699E-06	1.661E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PM154	0.000E+00	6.836E-05	6.103E-05	5.042E-05	3.113E-11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PM154M	0.000E+00	7.458E-06	5.074E-06	3.453E-06	6.890E-16	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SM154	0.000E+00	3.579E+01	3.579E+01	3.579E+01	3.579E+01	3.579E+01	3.579E+01	3.579E+01	3.579E+01	3.579E+01	3.579E+01	3.579E+01
EU154	0.000E+00	3.447E+01	3.447E+01	3.447E+01	3.447E+01	3.447E+01	3.447E+01	3.444E+01	3.442E+01	3.437E+01	3.432E+01	3.425E+01

Calc. No. 2004-07600
Project No. 11163-013
Attachment B1

GD154	0.000E+00	3.645E+00	3.645E+00	3.645E+00	3.647E+00	3.653E+00	3.676E+00	3.699E+00	3.752E+00	3.805E+00	3.873E+00
PM155	0.000E+00	4.426E-06	1.707E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SM155	0.000E+00	4.099E-04	3.957E-04	6.501E-05	5.559E-09	1.260E-23	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
EU155	0.000E+00	1.409E+01	1.409E+01	1.409E+01	1.408E+01	1.408E+01	1.406E+01	1.405E+01	1.401E+01	1.397E+01	1.393E+01
GD155	0.000E+00	9.738E-01	9.738E-01	9.740E-01	9.751E-01	9.792E-01	9.953E-01	1.011E+00	1.049E+00	1.087E+00	1.135E+00
SM156	0.000E+00	6.564E-03	6.559E-03	6.552E-03	6.102E-03	4.220E-03	1.119E-03	5.537E-06	2.740E-08	1.142E-13	4.759E-19
EU156	0.000E+00	1.755E+00	1.755E+00	1.752E+00	1.738E+00	1.682E+00	1.468E+00	1.280E+00	9.299E-01	6.756E-01	4.480E-01
GD156	0.000E+00	5.245E+01	5.245E+01	5.245E+01	5.245E+01	5.247E+01	5.253E+01	5.274E+01	5.293E+01	5.328E+01	5.354E+01
SM157	0.000E+00	4.834E-06	4.654E-06	1.440E-06	5.717E-22	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PM157	0.000E+00	6.194E-05	5.893E-05	5.520E-05	3.737E-07	1.923E-18	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
EU157	0.000E+00	9.160E-03	9.158E-03	9.156E-03	8.819E-03	7.019E-03	3.089E-03	1.158E-04	4.344E-06	2.045E-09	9.628E-13
GD157	0.000E+00	7.343E-01	7.343E-01	7.343E-01	7.347E-01	7.365E-01	7.404E-01	7.435E-01	7.435E-01	7.435E-01	7.435E-01
SM158	0.000E+00	1.867E-04	1.839E-04	1.810E-04	7.256E-05	6.419E-07	2.605E-14	0.000E+00	0.000E+00	0.000E+00	0.000E+00
EU158	0.000E+00	2.084E-04	2.081E-04	2.079E-04	1.542E-04	5.017E-06	1.060E-12	0.000E+00	0.000E+00	0.000E+00	0.000E+00
GD158	0.000E+00	1.543E+01	1.543E+01	1.543E+01	1.544E+01	1.544E+01	1.544E+01	1.544E+01	1.544E+01	1.544E+01	1.544E+01
SM159	0.000E+00	5.448E-06	4.234E-06	3.276E-06	1.140E-12	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
EU159	0.000E+00	4.421E-05	4.376E-05	4.306E-05	5.089E-06	5.214E-11	5.691E-29	0.000E+00	0.000E+00	0.000E+00	0.000E+00
GD159	0.000E+00	3.355E-03	3.355E-03	3.354E-03	3.277E-03	2.724E-03	1.393E-03	9.519E-05	6.506E-06	1.246E-08	2.386E-11
TB159	0.000E+00	2.339E+00	2.339E+00	2.339E+00	2.339E+00	2.339E+00	2.341E+00	2.342E+00	2.342E+00	2.342E+00	2.342E+00

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

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* 1 MTHM, E=3.93%, 33960 MWD/MT (BWRUE)

FSSION PRODUCTS

POWER= 1.00000E+00 MW, BURNUP= 1.00000E+00 MWD, FLUX= 1.00E+00 N/CM**2-SEC

5 SUMMARY TABLE: CONCENTRATIONS, GRAMS

BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1d	FUEL 4d	FUEL 7d	FUEL 14d	FUEL 21d	FUEL 30d
SM160	0.000E+00	4.272E-06	3.793E-06	3.360E-09	1.011E-24	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
GD160	0.000E+00	1.174E+00	1.174E+00	1.174E+00	1.174E+00	1.174E+00	1.174E+00	1.174E+00	1.174E+00	1.174E+00	1.174E+00
TB160	0.000E+00	6.045E-02	6.044E-02	6.042E-02	6.030E-02	5.987E-02	5.817E-02	5.652E-02	5.285E-02	4.942E-02	4.534E-02
DY160	0.000E+00	2.252E-01	2.252E-01	2.252E-01	2.254E-01	2.258E-01	2.275E-01	2.292E-01	2.328E-01	2.363E-01	2.404E-01
TB161	0.000E+00	6.336E-03	6.336E-03	6.312E-03	6.182E-03	5.735E-03	4.246E-03	3.144E-03	1.560E-03	7.736E-04	3.140E-04
DY161	0.000E+00	4.063E-01	4.063E-01	4.064E-01	4.065E-01	4.069E-01	4.084E-01	4.095E-01	4.111E-01	4.119E-01	4.124E-01
DY162	0.000E+00	3.221E-01	3.221E-01	3.221E-01	3.221E-01	3.221E-01	3.221E-01	3.221E-01	3.221E-01	3.221E-01	3.221E-01
DY163	0.000E+00	2.637E-01	2.637E-01	2.637E-01	2.637E-01	2.637E-01	2.637E-01	2.637E-01	2.637E-01	2.637E-01	2.637E-01
DY164	0.000E+00	7.229E-02	7.229E-02	7.229E-02	7.230E-02	7.230E-02	7.230E-02	7.230E-02	7.230E-02	7.230E-02	7.230E-02
DY165	0.000E+00	3.266E-05	3.258E-05	3.247E-05	2.447E-05	5.600E-06	2.771E-08	1.658E-17	9.919E-27	0.000E+00	0.000E+00
HO165	0.000E+00	1.165E-01	1.165E-01	1.165E-01	1.165E-01	1.165E-01	1.165E-01	1.165E-01	1.165E-01	1.165E-01	1.165E-01
DY166	0.000E+00	7.487E-05	7.486E-05	7.485E-05	7.423E-05	6.104E-05	3.309E-05	1.794E-05	4.298E-06	1.163E-06	1.640E-07
HO166	0.000E+00	9.586E-05	9.583E-05	9.580E-05	9.404E-05	8.553E-05	6.172E-05	2.115E-05	9.556E-06	5.046E-07	8.036E-08
HO166M	0.000E+00	1.123E-03	1.123E-03	1.123E-03	1.123E-03	1.123E-03	1.123E-03	1.123E-03	1.123E-03	1.123E-03	1.123E-03
ER166	0.000E+00	3.508E-02	3.508E-02	3.508E-02	3.509E-02	3.512E-02	3.519E-02	3.522E-02	3.524E-02	3.525E-02	3.525E-02
ER167	0.000E+00	3.453E-03	3.453E-03	3.453E-03	3.453E-03	3.453E-03	3.453E-03	3.453E-03	3.453E-03	3.453E-03	3.453E-03
ER168	0.000E+00	5.280E-03	5.280E-03	5.280E-03	5.280E-03	5.280E-03	5.280E-03	5.280E-03	5.280E-03	5.280E-03	5.280E-03
TM169	0.000E+00	3.518E-05	3.518E-05	3.518E-05	3.519E-05	3.521E-05	3.528E-05	3.535E-05	3.573E-05	3.626E-05	3.640E-05
TM170	0.000E+00	4.165E-06	4.165E-06	4.165E-06	4.160E-06	4.143E-06	4.077E-06	4.011E-06	3.863E-06	3.720E-06	3.544E-06
YB170	0.000E+00	7.328E-06	7.328E-06	7.328E-06	7.329E-06	7.333E-06	7.350E-06	7.417E-06	7.482E-06	7.773E-06	7.949E-06
SUMTOT	0.000E+00	3.502E+04	3.502E+04	3.502E+04	3.502E+04	3.502E+04	3.502E+04	3.502E+04	3.502E+04	3.502E+04	3.502E+04

OUTPUT UNIT = 6

DY	0.000E+00	1.290E+00	1.290E+00	1.290E+00	1.290E+00	1.291E+00	1.294E+00	1.297E+00	1.302E+00	1.306E+00	1.311E+00
HO	0.000E+00	1.177E-01	1.177E-01	1.177E-01	1.177E-01	1.177E-01	1.177E-01	1.177E-01	1.177E-01	1.177E-01	1.177E-01
ER	0.000E+00	4.381E-02	4.381E-02	4.381E-02	4.382E-02	4.386E-02	4.393E-02	4.395E-02	4.397E-02	4.398E-02	4.398E-02
TM	0.000E+00	3.968E-05	3.968E-05	3.968E-05	3.970E-05	3.976E-05	3.994E-05	4.008E-05	4.026E-05	4.031E-05	4.027E-05
YB	0.000E+00	7.727E-06	7.727E-06	7.728E-06	7.733E-06	7.750E-06	7.817E-06	7.884E-06	8.034E-06	8.179E-06	8.358E-06
SUMTOT	0.000E+00	3.502E+04	3.502E+04	3.502E+04	3.502E+04	3.502E+04	3.502E+04	3.502E+04	3.502E+04	3.502E+04	3.502E+04
TOTAL	0.000E+00	3.502E+04	3.502E+04	3.502E+04	3.502E+04	3.502E+04	3.502E+04	3.502E+04	3.502E+04	3.502E+04	3.502E+04

CUMULATIVE TABLE TOTALS

AP+FP	0.000E+00	3.502E+04	3.502E+04	3.502E+04	3.502E+04	3.502E+04	3.502E+04	3.502E+04	3.502E+04	3.502E+04	3.502E+04
ACT+FP	1.000E+06	1.000E+06	1.000E+06	1.000E+06	1.000E+06	1.000E+06	1.000E+06	1.000E+06	1.000E+06	1.000E+06	1.000E+06
AP+ACT+FP	1.000E+06	1.000E+06	1.000E+06	1.000E+06	1.000E+06	1.000E+06	1.000E+06	1.000E+06	1.000E+06	1.000E+06	1.000E+06

OUTPUT UNIT = 6

at 11:32:21

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04

* 1 MTHM, E=3.93%, 33960 MWD/MT (BWRUE)

FISSION PRODUCTS

POWER= 1.00000E+00 MW, BURNUP= 1.00000E+00 MWD, FLUX= 1.00E+00 N/CM**2-SEC

7 SUMMARY TABLE: RADIOACTIVITY, CURIES

BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1d	FUEL 4d	FUEL 7d	FUEL 14d	FUEL 21d	FUEL 30d
H 3	0.000E+00	5.323E+02	5.323E+02	5.323E+02	5.323E+02	5.322E+02	5.320E+02	5.317E+02	5.311E+02	5.306E+02	5.298E+02
ZN 69	0.000E+00	9.780E-03	9.670E-03	9.561E-03	9.445E-03	9.324E-03	9.198E-03	9.068E-03	8.934E-03	8.796E-03	8.654E-03
CO 72	0.000E+00	8.867E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
NI 72	0.000E+00	1.697E+01	5.812E-07	1.984E-14	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CU 72	0.000E+00	3.316E+01	4.371E-02	4.278E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ZN 72	0.000E+00	3.888E+01	3.887E+01	3.886E+01	3.831E+01	3.555E+01	2.719E+01	9.295E+00	3.178E+00	2.597E-01	2.123E-02
GA 72	0.000E+00	3.901E+01	3.901E+01	3.899E+01	3.852E+01	3.386E+01	1.319E+01	4.557E+00	3.740E-01	3.057E-02	1.218E-03
NI 73	0.000E+00	1.403E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CU 73	0.000E+00	4.405E+01	1.214E-03	3.230E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ZN 73	0.000E+00	7.386E+01	1.415E+01	2.411E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
GA 73	0.000E+00	7.770E+01	7.761E+01	7.744E+01	6.751E+01	3.319E+01	2.575E+00	9.329E-05	3.380E-09	1.468E-19	6.377E-30
GE 73M	0.000E+00	7.776E+01	7.761E+01	7.744E+01	6.751E+01	3.319E+01	2.575E+00	9.329E-05	3.380E-09	1.468E-19	6.386E-30
CO 74	0.000E+00	5.614E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
NI 74	0.000E+00	8.747E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CU 74	0.000E+00	6.035E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ZN 74	0.000E+00	1.415E+02	9.159E+01	5.912E+01	5.552E-10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
GA 74	0.000E+00	1.511E+02	1.481E+02	1.420E+02	1.093E+00	7.749E-12	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
NI 75	0.000E+00	3.546E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CU 75	0.000E+00	6.002E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ZN 75	0.000E+00	2.623E+02	2.637E+00	2.596E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
GA 75	0.000E+00	3.143E+02	2.340E+02	1.626E+02	1.051E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
GE 75	0.000E+00	3.181E+02	3.178E+02	3.168E+02	1.974E+01	1.897E-03	3.734E-19	7.322E-35	0.000E+00	0.000E+00	0.000E+00
GE 75M	0.000E+00	1.438E+01	1.237E+01	9.664E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
NI 76	0.000E+00	9.199E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CU 76	0.000E+00	4.569E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ZN 76	0.000E+00	4.550E+02	2.066E-01	9.339E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

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MO101 0.000E+00 9.641E+05 9.302E+05 8.872E+05 5.673E+04 3.773E-02 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
TC101 0.000E+00 9.644E+05 9.637E+05 9.611E+05 2.109E+05 5.431E-01 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

* 1 MTIHM, E=3.93%, 33960 MWD/MT (BWRUE)

FISSION PRODUCTS

POWER= 1.00000E+00 MW, BURNUP= 1.00000E+00 MWD, FLUX= 1.00E+00 N/CM**2-SEC

7 SUMMARY TABLE: RADIOACTIVITY, CURIES

BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1d	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
SR102	0.000E+00	7.123E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Y102	0.000E+00	1.086E+04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ZR102	0.000E+00	3.139E+05	7.344E+04	1.717E+04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
NB102	0.000E+00	7.626E+05	8.204E+04	1.918E+04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
MO102	0.000E+00	9.153E+05	8.727E+05	8.225E+05	2.201E+04	1.610E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TC102	0.000E+00	9.164E+05	8.800E+05	8.294E+05	2.219E+04	1.622E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TC102M	0.000E+00	1.063E+03	9.066E+02	7.731E+02	7.490E-02	1.300E-22	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RH102	0.000E+00	9.466E-01	9.466E-01	9.466E-01	9.464E-01	9.459E-01	9.441E-01	9.422E-01	9.379E-01	9.336E-01	9.282E-01
SR103	0.000E+00	2.371E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Y103	0.000E+00	1.558E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ZR103	0.000E+00	1.154E+05	7.232E-06	4.514E-16	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
NB103	0.000E+00	5.268E+05	3.811E+04	2.681E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
MO103	0.000E+00	8.770E+05	5.208E+05	2.662E+05	9.264E-13	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TC103	0.000E+00	8.907E+05	7.708E+05	5.407E+05	5.557E-12	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RU103	0.000E+00	8.972E+05	8.972E+05	8.972E+05	8.966E+05	8.933E+05	8.815E+05	8.361E+05	7.930E+05	6.194E+05	5.285E+05
RH103M	0.000E+00	8.080E+05	8.080E+05	8.080E+05	8.079E+05	8.053E+05	7.947E+05	7.537E+05	7.149E+05	6.318E+05	5.584E+05
SR104	0.000E+00	9.664E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Y104	0.000E+00	1.383E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ZR104	0.000E+00	2.690E+04	4.523E-01	7.601E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
NB104	0.000E+00	2.516E+05	6.148E-01	1.033E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
MO104	0.000E+00	6.974E+05	4.547E+05	2.948E+05	3.607E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TC104	0.000E+00	7.457E+05	7.391E+05	7.252E+05	8.276E+04	9.033E-01	1.237E-18	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RH104	0.000E+00	5.729E+05	2.356E+05	1.063E+05	3.072E+00	4.775E-21	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RH104M	0.000E+00	3.739E+04	3.187E+04	2.717E+04	2.576E+00	4.004E-21	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Y105	0.000E+00	7.112E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ZR105	0.000E+00	3.638E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
NB105	0.000E+00	8.469E+04	7.978E-06	7.367E-16	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
MO105	0.000E+00	4.939E+05	2.300E+05	1.065E+05	4.240E-15	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TC105	0.000E+00	6.086E+05	5.867E+05	5.513E+05	3.711E+03	1.909E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RU105	0.000E+00	6.199E+05	6.199E+05	6.198E+05	5.478E+05	2.510E+05	1.510E+04	1.978E-01	2.591E-06	1.048E-17	4.237E-29
RH105	0.000E+00	5.923E+05	5.923E+05	5.923E+05	5.923E+05	5.723E+05	4.253E+05	1.042E+05	2.541E+04	9.437E+02	3.505E+01
RH105M	0.000E+00	1.736E+05	1.736E+05	1.736E+05	1.538E+05	7.048E+04	4.240E+03	5.553E-02	7.274E-07	2.942E-18	1.190E-29
ZR106	0.000E+00	4.302E+02	1.604E-16	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
NB106	0.000E+00	2.259E+04	3.534E-16	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
MO106	0.000E+00	2.645E+05	2.618E+03	2.577E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TC106	0.000E+00	4.259E+05	1.653E+05	5.399E+04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RU106	0.000E+00	3.870E+05	3.870E+05	3.870E+05	3.869E+05	3.868E+05	3.862E+05	3.841E+05	3.819E+05	3.769E+05	3.657E+05
RH106	0.000E+00	4.063E+05	3.918E+05	3.882E+05	3.869E+05	3.862E+05	3.841E+05	3.819E+05	3.769E+05	3.720E+05	3.657E+05
RH106M	0.000E+00	8.713E+03	8.667E+03	8.622E+03	6.358E+03	1.316E+03	4.529E+00	6.370E-10	8.959E-20	0.000E+00	0.000E+00

ZR107	0.000E+00	1.966E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
NB107	0.000E+00	3.466E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
MO107	0.000E+00	9.696E+04	1.450E+02	2.168E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TC107	0.000E+00	2.353E+05	6.260E+04	1.493E+04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RUI107	0.000E+00	3.580E+05	3.238E+05	2.795E+05	1.960E+01	6.168E-21	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RHI107	0.000E+00	3.598E+05	3.593E+05	3.575E+05	6.664E+04	4.592E+00	4.785E-15	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PD107M	0.000E+00	1.054E-01	1.054E-01	1.054E-01	1.054E-01	1.054E-01	1.054E-01	1.054E-01	1.054E-01	1.054E-01	1.054E-01	1.054E-01	1.054E-01	1.054E-01	1.054E-01	1.054E-01	1.054E-01	1.054E-01	1.054E-01	1.054E-01
ZR108	0.000E+00	4.973E+01	7.057E+00	1.001E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
NB108	0.000E+00	5.390E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
NB108	0.000E+00	7.178E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
MO108	0.000E+00	2.765E+04	2.526E-08	2.296E-20	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TC108	0.000E+00	1.363E+05	4.962E+01	1.668E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

* 1 MTHM, E=3.93%, 33960 MWD/MT (BWRUE)

FISSION PRODUCTS

POWER= 1.00000E+00 MW, BURNUP= 1.00000E+00 MWD, FLUX= 1.00E+00 N/CM**2-SEC

7 SUMMARY TABLE: RADIOACTIVITY, CURIES

BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1d	FUEL 4d	FUEL 7d	FUEL 14d	FUEL 21d	FUEL 30d
RUI08	0.000E+00	2.470E+05	2.141E+05	1.836E+05	2.420E+01	2.066E-19	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RHI08	0.000E+00	2.493E+05	2.269E+05	1.956E+05	2.581E+01	2.203E-19	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RHI08M	0.000E+00	2.334E+03	2.076E+03	1.846E+03	2.024E+00	9.989E-16	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AG108	0.000E+00	8.974E-01	6.699E-01	5.000E-01	2.469E-06	2.448E-06	2.448E-06	2.448E-06	2.447E-06	2.447E-06	2.447E-06
ZR109	0.000E+00	3.944E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
NB109	0.000E+00	1.378E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
MO109	0.000E+00	8.645E+03	2.849E-14	9.186E-32	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TC109	0.000E+00	6.269E+04	2.781E+04	1.231E+04	3.541E-17	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RUI09	0.000E+00	1.519E+05	7.390E+04	3.473E+04	1.172E-16	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RHI09	0.000E+00	1.583E+05	1.460E+05	1.204E+05	5.755E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RHI09M	0.000E+00	7.914E+04	6.364E+04	4.164E+04	1.801E-15	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PD109M	0.000E+00	1.935E+05	1.935E+05	1.934E+05	1.848E+05	1.428E+05	5.653E+04	1.387E+03	3.404E+01	5.957E-03	1.042E-06
AG109M	0.000E+00	7.969E+04	7.930E+04	7.930E+04	2.254E+01	1.251E-18	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CD109	0.000E+00	1.934E+05	1.934E+05	1.934E+05	1.848E+05	1.428E+05	5.653E+04	1.388E+03	3.405E+01	6.869E-03	9.016E-04
NB110	0.000E+00	9.292E-04	9.292E-04	9.292E-04	9.292E-04	9.292E-04	9.292E-04	9.292E-04	9.292E-04	9.292E-04	9.292E-04
MO110	0.000E+00	1.717E+03	4.884E-07	1.387E-16	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TC110	0.000E+00	1.565E+04	8.702E-07	2.472E-16	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RUI10	0.000E+00	6.656E+04	5.029E+03	3.738E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RHI10	0.000E+00	7.170E+04	3.075E+04	8.342E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RHI10M	0.000E+00	5.146E+03	4.908E-03	4.679E-09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AG110M	0.000E+00	9.017E+04	1.666E+04	3.106E+03	4.095E+01	4.084E+01	4.050E+01	4.017E+01	3.939E+01	3.864E+01	3.768E+01
NB111	0.000E+00	1.317E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
MO111	0.000E+00	3.519E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TC111	0.000E+00	5.053E+02	1.573E-10	4.755E-24	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RUI11	0.000E+00	2.919E+04	2.000E+03	1.348E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RHI11	0.000E+00	3.973E+04	2.485E+04	1.313E+04	3.100E-13	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PD111	0.000E+00	4.084E+04	4.059E+04	3.992E+04	6.849E+03	2.108E+02	2.175E+01	2.493E-03	2.858E-07	1.823E-16	1.164E-25

SE 87 0.000E+00 2.616E+03 1.560E+00 9.286E-04 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

OUTPUT UNIT = 6

FUEL 1m FUEL 2m FUEL 1h FUEL 6h FUEL 1d FUEL 4d FUEL 7d FUEL 14d FUEL 21d FUEL 30d

0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00

* 1 MTHM, E=3.93%, 33960 MWD/MT (BWRUE)

FISSION PRODUCTS

POWER= 1.00000E+00 MW, BURNUP= 1.00000E+00 MWD, FLUX= 1.00E+00 N/CM**2-SEC

9 SUMMARY TABLE: THERMAL POWER, WATTS

Table with columns for Reactor Element IDs (BR 87, KR 87, SR 87M, GE 88, AS 88, SE 88, BR 88, KR 88, RB 88, AS 89, SE 89, BR 89, KR 89, RB 89, SR 89, Y 89M, SE 90, BR 90, KR 90, RB 90, SR 90, Y 90, SE 91, BR 91, KR 91, RB 91, SR 91, Y 91M, SE 92, BR 92, KR 92, RB 92, SR 92, Y 92, BR 93, KR 93, RB 93) and rows for various fuel cycle parameters (BOC #1, DISCHARGE, FUEL 1m, FUEL 2m, FUEL 1h, FUEL 6h, FUEL 1d, FUEL 4d, FUEL 7d, FUEL 14d, FUEL 21d, FUEL 30d) showing numerical values in scientific notation.

PD109	0.000E+00	5.145E+02	5.144E+02	5.144E+02	4.913E+02	3.798E+02	1.503E+02	3.689E+00	9.052E-02	1.584E-05	2.772E-09	4.096E-14
PD109M	0.000E+00	8.837E+01	8.645E+01	8.645E+01	2.512E-02	1.394E-21	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AG109M	0.000E+00	9.970E+01	9.969E+01	9.969E+01	9.527E+01	7.364E+01	2.915E+01	7.153E-01	1.755E-02	3.541E-06	4.647E-07	4.580E-07
NB110	0.000E+00	7.184E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
MO110	0.000E+00	3.571E+01	1.016E-08	2.885E-18	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TC110	0.000E+00	5.229E+02	2.908E-08	8.260E-18	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RH110	0.000E+00	6.072E+02	4.588E+01	3.410E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RH110M	0.000E+00	1.536E+03	6.585E+02	1.787E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AG110	0.000E+00	7.739E+01	7.381E-05	7.037E-11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AG110M	0.000E+00	6.478E+02	1.197E+02	2.231E+01	2.942E-01	2.940E-01	2.934E-01	2.910E-01	2.886E-01	2.830E-01	2.776E-01	2.707E-01
NB111	0.000E+00	5.142E+01	5.142E+01	5.142E+01	5.141E+01	5.138E+01	5.128E+01	5.085E+01	5.043E+01	4.946E+01	4.851E+01	4.731E+01
MO111	0.000E+00	1.143E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TC111	0.000E+00	1.368E+02	4.259E-12	1.287E-25	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RH111	0.000E+00	5.609E+02	3.844E+01	2.591E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RH111M	0.000E+00	3.352E+02	3.352E+02	1.711E+02	4.181E-15	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PD111M	0.000E+00	2.171E+02	2.158E+02	2.122E+02	3.642E+01	1.121E+01	1.157E-01	1.326E-05	1.519E-09	9.695E-19	6.187E-28	0.000E+00
AG111	0.000E+00	2.140E+00	2.137E+00	2.133E+00	1.889E+00	1.006E+00	1.041E-01	1.193E-05	1.367E-09	8.723E-19	5.566E-28	0.000E+00
AG111M	0.000E+00	9.234E+01	9.234E+01	9.234E+01	9.216E+01	9.044E+01	8.437E+01	6.382E+01	4.828E+01	2.517E+01	1.312E+01	5.681E+00
CD111M	0.000E+00	1.573E+01	1.569E+01	1.558E+01	2.814E+00	1.163E-01	1.201E-02	1.379E-06	1.581E-10	1.009E-19	6.438E-29	0.000E+00
MO112	0.000E+00	3.580E-02	3.529E-02	3.479E-02	1.524E-02	2.131E-04	4.496E-11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TC112	0.000E+00	1.648E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RH112	0.000E+00	6.586E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RH112M	0.000E+00	1.646E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PD112	0.000E+00	4.829E+02	7.758E-02	1.114E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AG112	0.000E+00	1.966E+01	1.965E+01	1.964E+01	1.899E+01	1.599E+01	8.593E+01	7.175E-01	5.991E-02	1.826E-04	5.568E-07	3.241E-10
MO113	0.000E+00	2.661E+02	2.661E+02	2.661E+02	2.650E+02	2.429E+02	1.372E+02	1.148E+01	9.583E-01	2.921E-03	8.905E-06	5.184E-09
TC113	0.000E+00	1.434E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RH113	0.000E+00	1.610E+02	4.814E-05	1.421E-11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PD113	0.000E+00	2.508E+02	5.317E-05	1.569E-11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AG113	0.000E+00	1.987E+02	1.278E+02	8.052E+01	1.845E-10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AG113M	0.000E+00	9.495E+01	9.491E+01	9.481E+01	8.371E+01	4.353E+01	4.134E+00	3.365E-04	2.738E-08	7.860E-18	2.256E-27	0.000E+00
CD113M	0.000E+00	1.198E+01	1.079E+01	8.521E+00	4.114E-11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
MO114	0.000E+00	9.014E-02	9.014E-02	9.014E-02	9.014E-02	9.014E-02	9.014E-02	9.014E-02	9.014E-02	9.014E-02	9.014E-02	9.014E-02
TC114	0.000E+00	4.426E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RH114	0.000E+00	5.252E+01	1.401E-02	3.731E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RH114M	0.000E+00	3.322E+02	3.481E-02	9.271E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PD114	0.000E+00	8.065E+01	6.150E+01	4.607E+01	2.446E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AG114	0.000E+00	1.429E+02	1.110E+02	8.314E+01	4.414E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

OUTPUT UNIT = 6

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ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

* 1 MTHM, E=3.93%, 33960 MWD/MT (BWRUE)

FISSION PRODUCTS

POWER= 1.00000E+00 MW, BURNUP= 1.00000E+00 MWD, FLUX= 1.00E+00 N/CM**2-SEC

9 SUMMARY TABLE: THERMAL POWER, WATTS

BOC #1 DISCHARGE FUEL 1m FUEL 2m FUEL 1h FUEL 6h FUEL 1D FUEL 4D FUEL 7D FUEL 14D FUEL 21D FUEL 30D

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

* 1 MTHM, E=3.93%, 33960 MWD/MT (BWRUE)

FISSION PRODUCTS

POWER= 1.00000E+00 MW, BURNUP= 1.00000E+00 MWD, FLUX= 1.00E+00 N/CM**2-SEC

9 SUMMARY TABLE: THERMAL POWER, WATTS

	BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1d	FUEL 4d	FUEL 7d	FUEL 14d	FUEL 21d	FUEL 30d
CD120	0.000E+00	5.080E+01	2.313E+01	1.020E+01	2.436E-20	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
IN120	0.000E+00	1.068E+02	8.397E+01	5.148E+01	3.984E-19	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
IN120M	0.000E+00	7.393E+01	3.510E+01	1.548E+01	3.697E-20	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RH121	0.000E+00	1.701E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PD121	0.000E+00	1.914E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AG121	0.000E+00	9.194E+01	9.142E-05	8.715E-11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CD121	0.000E+00	1.480E+02	6.563E+00	2.547E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
IN121	0.000E+00	9.160E+01	3.667E+01	8.921E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
IN121M	0.000E+00	2.445E+01	2.108E+01	1.713E+01	8.771E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SN121	0.000E+00	1.152E+01	1.152E+01	1.151E+01	1.123E+01	9.870E+00	6.196E+00	9.625E-01	1.495E-01	1.939E-03	2.515E-05	9.424E-08
SN121M	0.000E+00	3.889E-04	3.889E-04	3.889E-04	3.889E-04	3.889E-04	3.889E-04	3.889E-04	3.888E-04	3.887E-04	3.886E-04	3.885E-04
RH122	0.000E+00	2.636E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PD122	0.000E+00	4.431E+00	2.660E-14	1.595E-28	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AG122	0.000E+00	8.627E+01	4.506E-14	2.702E-28	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CD122	0.000E+00	7.353E+01	3.872E-02	2.013E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
IN122M	0.000E+00	2.539E+02	8.373E+00	1.331E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SB122	0.000E+00	1.289E+00	1.172E-12	1.065E-24	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SB122M	0.000E+00	8.292E+00	8.291E+00	8.289E+00	8.204E+00	7.777E+00	6.415E+00	2.970E+00	1.375E+00	2.280E-01	3.780E-02	3.751E-03
RH123	0.000E+00	1.062E-02	9.003E-03	7.633E-03	5.316E-07	1.673E-28	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PD123	0.000E+00	1.958E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AG123	0.000E+00	1.523E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CD123	0.000E+00	3.618E+01	4.272E-20	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
IN123	0.000E+00	1.055E+02	2.273E+00	1.756E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
IN123M	0.000E+00	5.149E+01	2.435E+01	1.026E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SN123	0.000E+00	6.943E+00	6.943E+00	6.943E+00	6.942E+00	6.934E+00	6.906E+00	6.796E+00	6.687E+00	6.441E+00	6.203E+00	5.911E+00
SN123M	0.000E+00	3.269E+01	3.234E+01	3.182E+01	1.168E+01	6.524E-02	5.054E-10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TE123M	0.000E+00	1.686E-02	1.686E-02	1.686E-02	1.684E-02	1.684E-02	1.676E-02	1.648E-02	1.619E-02	1.555E-02	1.493E-02	1.417E-02
PD124	0.000E+00	2.263E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AG124	0.000E+00	2.329E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CD124	0.000E+00	1.011E+02	8.982E+00	7.969E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
IN124	0.000E+00	3.243E+02	2.151E+01	1.908E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SB124	0.000E+00	1.178E+01	1.178E+01	1.178E+01	1.178E+01	1.175E+01	1.165E+01	1.125E+01	1.087E+01	1.003E+01	9.250E+00	8.340E+00
SB124M	0.000E+00	1.680E-02	1.074E-02	6.868E-03	3.736E-14	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AG125	0.000E+00	6.002E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CD125	0.000E+00	1.278E+02	9.453E-10	6.915E-21	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
IN125	0.000E+00	1.499E+02	5.583E-06	9.884E-14	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
IN125M	0.000E+00	1.136E+02	3.706E+00	1.158E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SN125	0.000E+00	5.170E+01	5.169E+01	5.169E+01	5.154E+01	5.078E+01	4.811E+01	3.878E+01	3.125E+01	1.889E+01	1.142E+01	5.979E+00
SN125M	0.000E+00	8.544E+01	8.034E+01	7.472E+01	1.095E+00	3.574E-10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SB125	0.000E+00	3.752E+01	3.752E+01	3.752E+01	3.752E+01	3.752E+01	3.751E+01	3.747E+01	3.743E+01	3.731E+01	3.716E+01	3.696E+01
TE125M	0.000E+00	2.225E+00	2.225E+00	2.225E+00	2.225E+00	2.226E+00	2.227E+00	2.230E+00	2.233E+00	2.239E+00	2.244E+00	2.249E+00

ND147	0.000E+00	9.039E+02	9.039E+02	9.023E+02	8.906E+02	8.497E+02	7.041E+02	5.834E+02	3.762E+02	2.426E+02	1.380E+02
PM147	0.000E+00	4.133E+01	4.133E+01	4.134E+01	4.134E+01	4.139E+01	4.155E+01	4.167E+01	4.181E+01	4.183E+01	4.174E+01
CS148	0.000E+00	8.467E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA148	0.000E+00	6.907E+01	6.006E-02	5.220E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
LA148	0.000E+00	1.780E+03	1.353E-01	1.176E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CE148	0.000E+00	1.552E+03	5.962E+02	2.266E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PR148	0.000E+00	4.948E+03	4.391E+03	3.526E+03	9.790E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PM148	0.000E+00	1.211E+03	1.211E+03	1.210E+03	1.204E+03	1.173E+03	1.065E+03	7.265E+02	4.963E+02	2.063E+02	8.181E+01
PM148M	0.000E+00	3.523E+02	3.523E+02	3.523E+02	3.508E+02	3.464E+02	3.294E+02	3.132E+02	2.785E+02	2.476E+02	2.129E+02
BA149	0.000E+00	1.283E+01	2.646E-19	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
LA149	0.000E+00	3.441E+02	1.724E-04	8.510E-11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CE149	0.000E+00	2.196E+03	1.859E-04	9.177E-11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PR149	0.000E+00	1.728E+03	1.287E+03	9.523E+02	2.441E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ND149	0.000E+00	1.155E+03	1.153E+03	1.150E+03	7.902E+02	1.066E+02	7.863E-02	2.329E-14	6.899E-27	0.000E+00	0.000E+00
PM149	0.000E+00	6.980E+02	6.980E+02	6.979E+02	6.943E+02	6.595E+02	5.225E+02	2.041E+02	7.971E+01	8.888E+00	9.910E-01
CS150	0.000E+00	8.783E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA150	0.000E+00	7.592E-01	6.751E-11	5.998E-21	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CE150	0.000E+00	9.667E+01	1.632E-10	1.450E-20	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PR150	0.000E+00	6.127E+02	1.061E-10	9.430E-21	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PM150	0.000E+00	2.631E+03	9.603E+01	3.356E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
LA151	0.000E+00	2.684E+01	2.673E+01	2.661E+01	2.073E+01	5.687E+00	4.423E-10	3.617E-18	4.881E-37	0.000E+00	0.000E+00
CE151	0.000E+00	3.737E+02	4.363E-16	2.904E-34	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PR151	0.000E+00	1.082E+03	3.602E-02	1.099E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ND151	0.000E+00	1.004E+03	9.528E+02	9.010E+02	3.521E+01	1.835E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PM151	0.000E+00	4.216E+02	4.216E+02	4.216E+02	4.143E+02	3.668E+02	2.364E+02	1.0275E+01	7.0255E+00	1.162E-01	1.922E-03
SM151	0.000E+00	5.757E-02	5.757E-02	5.757E-02	5.758E-02	5.763E-02	5.778E-02	5.800E-02	5.804E-02	5.803E-02	5.802E-02
BA152	0.000E+00	2.476E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
LA152	0.000E+00	1.592E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CE152	0.000E+00	5.927E+01	3.059E+00	1.578E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PR152	0.000E+00	8.048E+02	1.707E-01	7.158E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ND152	0.000E+00	2.627E+02	2.489E+02	2.343E+02	7.106E+00	9.970E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PM152	0.000E+00	8.259E+02	8.197E+02	8.076E+02	3.398E+01	4.761E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PM152M	0.000E+00	1.515E+01	1.381E+01	1.259E+01	5.921E-02	5.385E-14	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
EU152	0.000E+00	1.113E-01	1.113E-01	1.113E-01	1.113E-01	1.113E-01	1.113E-01	1.112E-01	1.112E-01	1.111E-01	1.109E-01
EU152M	0.000E+00	5.934E-01	5.927E-01	5.919E-01	5.509E-01	3.798E-01	9.957E-02	4.705E-04	2.233E-06	8.324E-12	3.117E-17
LA153	0.000E+00	1.411E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CE153	0.000E+00	1.771E+01	6.007E-10	2.031E-20	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PR153	0.000E+00	2.019E+02	9.584E-01	4.457E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ND153	0.000E+00	5.768E+02	3.211E+02	1.735E+02	5.354E-14	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PM153	0.000E+00	2.353E+02	2.259E+02	2.090E+02	1.317E-01	2.488E-18	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SM153	0.000E+00	5.237E+02	5.236E+02	5.235E+02	5.162E+02	4.793E+02	3.669E+02	1.260E+02	4.327E+01	3.574E+00	2.952E-01
GD153	0.000E+00	1.388E-02	1.388E-02	1.388E-02	1.387E-02	1.387E-02	1.384E-02	1.372E-02	1.361E-02	1.334E-02	1.307E-02
LA154	0.000E+00	8.568E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CE154	0.000E+00	1.585E+01	1.480E-05	1.382E-10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PR154	0.000E+00	7.263E+01	3.724E-05	3.477E-10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ND154	0.000E+00	1.551E+02	5.506E+01	1.947E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PM154	0.000E+00	4.675E+02	4.174E+02	3.449E+02	2.129E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PM154M	0.000E+00	7.668E+01	5.217E+01	3.550E+01	7.084E-09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

1 MTIHM, E=3.93%, 33960 MWD/MT (BWRUE)
 (ALPHA,N) NEUTRON SOURCE, NEUTRONS/SEC

BASIS=

BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
U234	1.059E+03	6.394E+02	6.394E+02	6.394E+02	6.394E+02	6.394E+02	6.395E+02	6.395E+02	6.396E+02	6.397E+02	6.398E+02
U235	3.107E+01	9.833E+00	9.833E+00	9.833E+00	9.833E+00	9.833E+00	9.833E+00	9.833E+00	9.833E+00	9.833E+00	9.833E+00
U238	1.016E+02	9.915E+01	9.915E+01	9.915E+01	9.915E+01	9.915E+01	9.915E+01	9.915E+01	9.915E+01	9.915E+01	9.915E+01
Pu238	0.000E+00	3.053E+06	3.053E+06	3.055E+06	3.055E+06	3.059E+06	3.075E+06	3.075E+06	3.082E+06	3.088E+06	3.095E+06
Pu239	0.000E+00	2.515E+05	2.515E+05	2.515E+05	2.516E+05	2.521E+05	2.531E+05	2.535E+05	2.537E+05	2.538E+05	2.538E+05
Pu240	0.000E+00	3.438E+05	3.438E+05	3.438E+05	3.438E+05	3.438E+05	3.438E+05	3.438E+05	3.438E+05	3.438E+05	3.438E+05
AM241	0.000E+00	2.137E+05	2.137E+05	2.138E+05	2.139E+05	2.143E+05	2.143E+05	2.143E+05	2.143E+05	2.143E+05	2.143E+05
CM242	0.000E+00	6.076E+07	6.076E+07	6.076E+07	6.077E+07	6.077E+07	6.005E+07	6.005E+07	6.005E+07	6.005E+07	6.005E+07
CM244	0.000E+00	2.672E+06	2.672E+06	2.672E+06	2.672E+06	2.672E+06	2.671E+06	2.671E+06	2.669E+06	2.667E+06	2.664E+06

TOTALS

TABLE	1.192E+03	6.734E+07	6.734E+07	6.735E+07	6.736E+07	6.730E+07	6.666E+07	6.591E+07	6.418E+07	6.251E+07	6.042E+07
ACTUAL	1.192E+03	6.734E+07	6.734E+07	6.735E+07	6.736E+07	6.730E+07	6.666E+07	6.591E+07	6.418E+07	6.251E+07	6.042E+07

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

1 MTIHM, E=3.93%, 33960 MWD/MT (BWRUE)
 SPONTANEOUS FISSION NEUTRON SOURCE, NEUTRONS/SEC

BASIS=

BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
U235	1.385E+01	4.384E+00	4.384E+00	4.384E+00	4.384E+00	4.384E+00	4.384E+00	4.384E+00	4.384E+00	4.384E+00	4.384E+00
U238	1.219E+04	1.189E+04	1.189E+04	1.189E+04	1.189E+04	1.189E+04	1.189E+04	1.189E+04	1.189E+04	1.189E+04	1.189E+04
Pu240	0.000E+00	1.812E+06	1.812E+06	1.812E+06	1.812E+06	1.812E+06	1.812E+06	1.812E+06	1.812E+06	1.812E+06	1.812E+06
Pu242	0.000E+00	6.961E+05	6.961E+05	6.961E+05	6.961E+05	6.961E+05	6.962E+05	6.962E+05	6.962E+05	6.962E+05	6.962E+05
CM242	0.000E+00	2.948E+08	2.948E+08	2.948E+08	2.949E+08	2.949E+08	2.949E+08	2.949E+08	2.949E+08	2.949E+08	2.949E+08
CM244	0.000E+00	3.217E+08	3.217E+08	3.217E+08	3.217E+08	3.217E+08	3.215E+08	3.215E+08	3.215E+08	3.215E+08	3.215E+08
CM246	0.000E+00	9.571E+05	9.571E+05	9.571E+05	9.571E+05	9.571E+05	9.571E+05	9.571E+05	9.571E+05	9.571E+05	9.571E+05

TOTALS

TABLE	1.220E+04	6.206E+08	6.206E+08	6.206E+08	6.206E+08	6.204E+08	6.171E+08	6.133E+08	6.046E+08	5.962E+08	5.858E+08
ACTUAL	1.220E+04	6.206E+08	6.206E+08	6.206E+08	6.206E+08	6.204E+08	6.171E+08	6.133E+08	6.046E+08	5.962E+08	5.858E+08

OVERALL

TOTALS	1.339E+04	6.879E+08	6.879E+08	6.879E+08	6.880E+08	6.877E+08	6.837E+08	6.792E+08	6.688E+08	6.587E+08	6.462E+08
TABLE	1.339E+04	6.879E+08	6.879E+08	6.879E+08	6.880E+08	6.877E+08	6.837E+08	6.792E+08	6.688E+08	6.587E+08	6.462E+08
ACTUAL	1.339E+04	6.879E+08	6.879E+08	6.879E+08	6.880E+08	6.877E+08	6.837E+08	6.792E+08	6.688E+08	6.587E+08	6.462E+08

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

PHOTON SPECTRUM FOR ACTIVATION PRODUCTS

1 MTIHM, E=3.93%, 33960 MWD/MT (BWRUE)
 POWER= 1.00 MW, BURNUP= 1. MWD, FLUX= 1.00E+00 N/CM**2-SEC

8.500E-01	4.746E-02	6.275E+09	6.179E+09	6.085E+09	3.471E+09	2.636E+09	2.059E+09	7.709E+08	2.887E+08	2.918E+07	2.951E+06	1.576E+05
1.250E+00	1.479E-02	2.725E+09	2.722E+09	2.719E+09	2.626E+09	2.430E+09	1.900E+09	7.115E+08	2.664E+08	2.693E+07	2.723E+06	1.450E+05
1.750E+00	1.013E-02	1.039E+06	9.470E+05	8.628E+05	9.070E+03	4.249E+03	1.994E+03	4.558E+02	4.089E+02	4.022E+02	3.970E+02	3.905E+02
2.250E+00	7.537E-03	2.855E+02	2.855E+02	2.855E+02	2.855E+02	2.855E+02	2.855E+02	2.838E+02	2.820E+02	2.779E+02	2.738E+02	2.688E+02
2.750E+00	5.346E-03	3.473E+02	3.473E+02	3.473E+02	3.514E+02	3.476E+02	3.519E+02	3.465E+02	3.458E+02	3.451E+02	3.448E+02	3.446E+02
3.500E+00	6.076E-03	2.310E+02	2.310E+02	2.310E+02	2.310E+02	2.310E+02	2.309E+02	2.297E+02	2.282E+02	2.249E+02	2.216E+02	2.176E+02
5.000E+00	3.723E-03	1.412E+02	1.412E+02	1.412E+02	1.412E+02	1.412E+02	1.411E+02	1.404E+02	1.395E+02	1.374E+02	1.354E+02	1.330E+02
7.000E+00	5.989E-04	2.274E+01	2.274E+01	2.274E+01	2.274E+01	2.275E+01	2.273E+01	2.261E+01	2.247E+01	2.214E+01	2.182E+01	2.142E+01
9.500E+00	9.336E-05	3.554E+00	3.554E+00	3.554E+00	3.554E+00	3.554E+00	3.553E+00	3.533E+00	3.511E+00	3.460E+00	3.410E+00	3.348E+00
TOTAL	6.054E+02	1.146E+11	1.137E+11	1.128E+11	8.843E+10	7.816E+10	6.293E+10	2.692E+10	1.185E+10	2.140E+09	5.867E+08	1.825E+08
GAM POW	9.704E-05	1.837E+04	1.823E+04	1.809E+04	1.418E+04	1.253E+04	1.009E+04	4.315E+03	1.900E+03	3.430E+02	9.404E+01	2.925E+01

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OUTPUT UNIT = 6

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

PRINCIPAL PHOTON SOURCES IN GROUP 1, PHOTONS/SEC

MEAN ENERGY= 0.010MEV

NUCLIDE	BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
U234	9.591E+09	5.791E+09	5.791E+09	5.791E+09	5.791E+09	5.791E+09	5.791E+09	5.792E+09	5.792E+09	5.793E+09	5.794E+09	5.795E+09
U235	1.880E+09	5.950E+08	5.950E+08	5.950E+08	5.950E+08	5.950E+08	5.950E+08	5.950E+08	5.950E+08	5.950E+08	5.950E+08	5.950E+08
U237	0.000E+00	2.091E+16	2.091E+16	2.091E+16	2.038E+16	1.887E+16	1.887E+16	1.887E+16	1.887E+16	1.887E+16	1.887E+16	1.887E+16
U238	1.362E+09	1.329E+09	1.329E+09	1.329E+09	1.329E+09	1.329E+09	1.329E+09	1.329E+09	1.329E+09	1.329E+09	1.329E+09	1.329E+09
U239	0.000E+00	1.950E+17	1.893E+17	1.838E+17	3.330E+16	4.841E+12	7.412E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
NP238	0.000E+00	6.751E+15	6.750E+15	6.748E+15	6.660E+15	6.221E+15	4.866E+15	1.822E+15	6.823E+14	6.895E+13	6.972E+12	3.695E+11
NP239	0.000E+00	4.008E+17	4.008E+17	4.008E+17	3.982E+17	3.750E+17	3.007E+17	1.244E+17	5.144E+16	6.557E+15	8.362E+14	5.974E+13
P238	0.000E+00	1.864E+13	1.864E+13	1.864E+13	1.864E+13	1.865E+13	1.867E+13	1.873E+13	1.877E+13	1.881E+13	1.885E+13	1.889E+13
CM242	0.000E+00	2.729E+14	2.729E+14	2.729E+14	2.729E+14	2.729E+14	2.727E+14	2.697E+14	2.663E+14	2.585E+14	2.510E+14	2.416E+14

PRINCIPAL PHOTON SOURCES IN GROUP 2, PHOTONS/SEC

MEAN ENERGY= 0.025MEV

NUCLIDE	BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
U237	0.000E+00	7.763E+14	7.763E+14	7.762E+14	7.730E+14	7.567E+14	7.006E+14	5.148E+14	3.783E+14	1.844E+14	8.985E+13	3.566E+13
U239	0.000E+00	2.105E+16	2.044E+16	1.985E+16	3.596E+15	5.228E+11	8.005E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
NP238	0.000E+00	2.634E+14	2.633E+14	2.633E+14	2.598E+14	2.427E+14	1.898E+14	7.109E+13	2.662E+13	2.690E+12	2.720E+11	1.441E+10
NP239	0.000E+00	5.238E+15	5.238E+15	5.238E+15	5.204E+15	4.900E+15	3.930E+15	1.625E+15	6.722E+14	8.568E+13	1.093E+13	7.806E+11
P243	0.000E+00	1.333E+14	1.330E+14	1.327E+14	1.159E+14	5.759E+13	4.644E+12	1.964E+08	8.376E+03	6.763E+01	6.763E+01	6.763E+01

PRINCIPAL PHOTON SOURCES IN GROUP 3, PHOTONS/SEC

MEAN ENERGY= 0.038MEV

NUCLIDE	BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
U235	2.870E+06	9.084E+05	9.084E+05	9.084E+05	9.084E+05	9.084E+05	9.084E+05	9.084E+05	9.084E+05	9.084E+05	9.084E+05	9.084E+05
U237	0.000E+00	1.102E+14	1.102E+14	1.102E+14	1.097E+14	1.074E+14	9.944E+13	7.307E+13	5.370E+13	2.617E+13	1.275E+13	5.061E+12
U239	0.000E+00	3.591E+16	3.487E+16	3.386E+16	6.134E+15	8.918E+11	1.366E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
NP238	0.000E+00	1.776E+14	1.776E+14	1.775E+14	1.752E+14	1.637E+14	1.280E+14	4.794E+13	1.795E+13	1.814E+12	1.834E+11	9.720E+09

NP239 0.000E+00 3.558E+15 3.558E+15 3.535E+15 3.329E+15 2.670E+15 1.104E+15 4.567E+14 5.821E+13 7.423E+12 5.303E+11
 PU243 0.000E+00 1.515E+14 1.511E+14 1.508E+14 1.317E+14 6.544E+13 5.278E+12 2.232E+08 9.518E+03 7.685E+01 7.685E+01
 CM242 0.000E+00 6.395E+11 6.395E+11 6.396E+11 6.396E+11 6.391E+11 6.321E+11 6.242E+11 6.059E+11 5.882E+11 5.661E+11

PRINCIPAL PHOTON SOURCES IN GROUP 4, PHOTONS/SEC
 MEAN ENERGY= 0.058MEV

NUCLIDE	BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
U234	7.687E+07	4.642E+07	4.642E+07	4.642E+07	4.642E+07	4.642E+07	4.642E+07	4.642E+07	4.642E+07	4.643E+07	4.644E+07	4.645E+07
U237	0.000E+00	9.817E+15	9.816E+15	9.815E+15	9.775E+15	9.568E+15	8.859E+15	6.510E+15	4.784E+15	2.331E+15	1.136E+15	4.509E+14
U238	7.205E+06	7.032E+06	7.032E+06	7.032E+06	7.032E+06	7.032E+06	7.032E+06	7.032E+06	7.032E+06	7.032E+06	7.032E+06	7.032E+06
U239	0.000E+00	1.880E+16	1.826E+16	1.773E+16	3.211E+15	4.669E+11	7.149E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
NP238	0.000E+00	2.250E+14	2.250E+14	2.249E+14	2.220E+14	2.074E+14	1.622E+14	6.074E+13	2.274E+13	2.298E+12	2.324E+11	1.232E+10
NP239	0.000E+00	9.609E+15	9.609E+15	9.609E+15	9.547E+15	8.990E+15	7.210E+15	2.982E+15	1.233E+15	1.572E+14	2.005E+13	1.432E+12

OUTPUT UNIT = 6

OUTPUT UNIT = 6

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PRINCIPAL PHOTON SOURCES IN GROUP 5, PHOTONS/SEC
 MEAN ENERGY= 0.085MEV

NUCLIDE	BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
U235	2.452E+08	7.761E+07	7.761E+07	7.761E+07	7.761E+07	7.761E+07	7.761E+07	7.761E+07	7.761E+07	7.761E+07	7.761E+07	7.761E+07
U237	0.000E+00	4.558E+15	4.557E+15	4.538E+15	4.442E+15	4.113E+15	3.023E+15	2.221E+15	1.082E+15	5.275E+14	2.094E+14	0.000E+00
U239	0.000E+00	2.014E+17	1.956E+17	1.899E+17	3.441E+16	5.002E+12	7.660E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
NP239	0.000E+00	7.142E+16	7.142E+16	7.142E+16	7.096E+16	6.682E+16	5.359E+16	2.216E+16	9.166E+15	1.168E+15	1.490E+14	1.064E+13
PU243	0.000E+00	1.772E+15	1.768E+15	1.764E+15	1.541E+15	7.657E+14	6.175E+13	2.612E+09	1.114E+05	8.991E+02	8.991E+02	8.991E+02

PRINCIPAL PHOTON SOURCES IN GROUP 6, PHOTONS/SEC
 MEAN ENERGY= 0.125MEV

NUCLIDE	BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
U234	2.729E+07	1.648E+07	1.648E+07	1.648E+07	1.648E+07	1.648E+07	1.648E+07	1.648E+07	1.648E+07	1.648E+07	1.649E+07	1.649E+07
U235	4.841E+08	1.532E+08	1.532E+08	1.532E+08	1.532E+08	1.532E+08	1.532E+08	1.532E+08	1.532E+08	1.532E+08	1.532E+08	1.532E+08
U237	0.000E+00	7.939E+15	7.938E+15	7.938E+15	7.905E+15	7.737E+15	7.164E+15	5.265E+15	3.869E+15	1.885E+15	9.188E+14	3.647E+14
U239	0.000E+00	7.322E+15	7.109E+15	6.903E+15	1.251E+15	1.818E+11	2.784E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
NP239	0.000E+00	2.060E+17	2.060E+17	2.060E+17	2.047E+17	1.928E+17	1.546E+17	6.394E+16	2.644E+16	3.371E+15	4.299E+14	3.071E+13

PRINCIPAL PHOTON SOURCES IN GROUP 7, PHOTONS/SEC
 MEAN ENERGY= 0.225MEV

NUCLIDE	BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
U235	1.713E+09	5.423E+08	5.423E+08	5.423E+08	5.423E+08	5.423E+08	5.423E+08	5.423E+08	5.423E+08	5.423E+08	5.423E+08	5.423E+08
U237	0.000E+00	5.985E+15	5.985E+15	5.984E+15	5.960E+15	5.401E+15	5.401E+15	3.969E+15	2.917E+15	1.421E+15	6.927E+14	2.749E+14
U239	0.000E+00	8.015E+15	7.782E+15	7.556E+15	1.369E+15	1.990E+11	3.047E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
NP239	0.000E+00	1.428E+17	1.428E+17	1.428E+17	1.419E+17	1.336E+17	1.072E+17	4.433E+16	1.833E+16	2.337E+15	2.980E+14	2.129E+13

PRINCIPAL PHOTON SOURCES IN GROUP 8, PHOTONS/SEC

MEAN ENERGY= 0.375MEV

NUCLIDE	BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
U237	4.275E+06	1.353E+06	1.353E+06	1.353E+06	1.353E+06	1.353E+06	1.353E+06	1.353E+06	1.353E+06	1.353E+06	1.353E+06	1.353E+06
U237	0.000E+00	3.531E+14	3.531E+14	3.516E+14	3.442E+14	3.186E+14	2.342E+14	1.721E+14	8.386E+13	4.087E+13	1.622E+13	0.000E+00
U239	0.000E+00	2.716E+15	2.637E+15	2.561E+15	4.640E+14	6.745E+10	1.033E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
NP239	0.000E+00	1.376E+16	1.376E+16	1.368E+16	1.288E+16	1.033E+16	4.271E+15	1.767E+15	2.252E+14	2.872E+13	2.052E+12	

PRINCIPAL PHOTON SOURCES IN GROUP 9, PHOTONS/SEC

MEAN ENERGY= 0.575MEV

NUCLIDE	BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
PA234M	0.000E+00	1.548E+08	1.539E+08	1.534E+08	1.528E+08	1.528E+08	1.528E+08	1.528E+08	1.528E+08	1.528E+08	1.528E+08	1.528E+08
U234	3.209E+04	1.938E+04	1.938E+04	1.938E+04	1.938E+04	1.938E+04	1.938E+04	1.938E+04	1.938E+04	1.938E+04	1.938E+04	1.938E+04
U235	2.103E+05	6.656E+04	6.656E+04	6.656E+04	6.656E+04	6.656E+04	6.656E+04	6.656E+04	6.656E+04	6.656E+04	6.656E+04	6.656E+04
U239	0.000E+00	2.556E+15	2.482E+15	2.410E+15	4.366E+14	6.347E+10	9.719E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
NP238	0.000E+00	3.633E+13	3.632E+13	3.631E+13	3.584E+13	3.477E+13	2.619E+13	9.805E+12	3.671E+12	3.711E+11	3.752E+10	1.988E+09
NP239	0.000E+00	5.930E+13	5.930E+13	5.930E+13	5.892E+13	5.548E+13	4.449E+13	1.840E+13	7.611E+12	9.701E+11	1.237E+11	8.838E+09
NP240	0.000E+00	1.888E+14	1.868E+14	1.849E+14	9.959E+13	4.063E+12	4.047E+07	3.983E-13	0.000E+00	0.000E+00	0.000E+00	0.000E+00

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OUTPUT UNIT = 6

CM242 0.000E+00 4.386E+09 4.386E+09 4.387E+09 4.387E+09 4.387E+09 4.383E+09 4.335E+09 4.281E+09 4.156E+09 4.034E+09 3.883E+09

PRINCIPAL PHOTON SOURCES IN GROUP 10, PHOTONS/SEC

MEAN ENERGY= 0.850MEV

NUCLIDE	BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
U234	2.080E+03	1.256E+03	1.256E+03	1.256E+03	1.256E+03	1.256E+03	1.256E+03	1.256E+03	1.256E+03	1.257E+03	1.257E+03	1.257E+03
U235	2.867E+04	9.074E+03	9.074E+03	9.074E+03	9.074E+03	9.074E+03	9.074E+03	9.074E+03	9.074E+03	9.074E+03	9.074E+03	9.074E+03
U238	2.509E+04	2.449E+04	2.449E+04	2.449E+04	2.449E+04	2.449E+04	2.449E+04	2.449E+04	2.449E+04	2.449E+04	2.449E+04	2.449E+04
U239	0.000E+00	3.786E+15	3.676E+15	3.570E+15	6.467E+14	9.402E+10	1.440E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
NP238	0.000E+00	3.360E+15	3.360E+15	3.359E+15	3.315E+15	3.096E+15	2.422E+15	9.070E+14	3.396E+14	3.432E+13	3.470E+12	1.839E+11
NP240	0.000E+00	2.306E+14	2.282E+14	2.258E+14	1.216E+14	4.962E+12	4.942E+07	4.864E-13	0.000E+00	0.000E+00	0.000E+00	0.000E+00

PRINCIPAL PHOTON SOURCES IN GROUP 11, PHOTONS/SEC

MEAN ENERGY= 1.250MEV

NUCLIDE	BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
U234	1.354E+02	8.176E+01	8.176E+01	8.176E+01	8.176E+01	8.176E+01	8.176E+01	8.176E+01	8.176E+01	8.178E+01	8.180E+01	8.181E+01
U238	1.167E+04	1.139E+04	1.139E+04	1.139E+04	1.139E+04	1.139E+04	1.139E+04	1.139E+04	1.139E+04	1.139E+04	1.139E+04	1.139E+04
U239	0.000E+00	4.462E+13	4.333E+13	4.207E+13	7.622E+12	1.108E+09	1.697E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
NP238	0.000E+00	2.109E+15	2.109E+15	2.108E+15	2.081E+15	1.943E+15	1.520E+15	5.692E+14	2.131E+14	2.154E+13	2.178E+12	1.154E+11
NP240	0.000E+00	2.430E+13	2.404E+13	2.379E+13	1.282E+13	5.229E+11	5.208E+06	5.125E-14	0.000E+00	0.000E+00	0.000E+00	0.000E+00

PRINCIPAL PHOTON SOURCES IN GROUP 12, PHOTONS/SEC

MEAN ENERGY= 1.750MEV

NUCLIDE

BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
BI212	0.000E+00	5.245E+06	5.245E+06	5.246E+06	5.246E+06	5.413E+06	5.256E+06	5.277E+06	5.358E+06	5.448E+06	5.569E+06
PA234M	0.000E+00	1.049E+07	1.040E+07	1.036E+07	1.036E+07	1.036E+07	1.036E+07	1.036E+07	1.036E+07	1.036E+07	1.036E+07
U234	6.777E+01	4.092E+01	4.092E+01	4.092E+01	4.092E+01	4.092E+01	4.093E+01	4.093E+01	4.094E+01	4.095E+01	4.095E+01
U238	5.711E+03	5.574E+03	5.574E+03	5.574E+03	5.574E+03	5.574E+03	5.574E+03	5.574E+03	5.574E+03	5.574E+03	5.574E+03
NP240M	0.000E+00	5.937E+11	5.409E+11	4.928E+11	4.938E+11	9.027E+08	2.620E+07	7.608E+05	3.386E+02	1.416E+02	1.415E+02
CM242	0.000E+00	1.080E+08	1.080E+08	1.080E+08	1.080E+08	1.079E+08	1.067E+08	1.054E+08	1.023E+08	9.931E+07	9.559E+07
CM244	0.000E+00	1.091E+08	1.091E+08	1.091E+08	1.091E+08	1.091E+08	1.091E+08	1.091E+08	1.090E+08	1.089E+08	1.088E+08

PRINCIPAL PHOTON SOURCES IN GROUP 13,PHOTONS/SEC
 MEAN ENERGY= 2.250MEV

NUCLIDE

BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
U234	3.406E+01	2.057E+01	2.057E+01	2.057E+01	2.057E+01	2.057E+01	2.057E+01	2.057E+01	2.057E+01	2.058E+01	2.058E+01
U238	3.310E+03	3.230E+03	3.230E+03	3.230E+03	3.230E+03	3.230E+03	3.230E+03	3.230E+03	3.230E+03	3.230E+03	3.230E+03
CM242	0.000E+00	6.261E+07	6.261E+07	6.262E+07	6.263E+07	6.257E+07	6.189E+07	6.111E+07	5.932E+07	5.758E+07	5.543E+07
CM244	0.000E+00	6.323E+07	6.323E+07	6.323E+07	6.323E+07	6.323E+07	6.321E+07	6.319E+07	6.315E+07	6.310E+07	6.304E+07

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PRINCIPAL PHOTON SOURCES IN GROUP 14,PHOTONS/SEC
 MEAN ENERGY= 2.750MEV

NUCLIDE

BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
TL208	0.000E+00	5.291E+07	5.291E+07	5.438E+07	5.301E+07	5.460E+07	5.302E+07	5.324E+07	5.405E+07	5.496E+07	5.618E+07
U238	1.924E+03	1.877E+03	1.877E+03	1.877E+03	1.877E+03	1.877E+03	1.877E+03	1.877E+03	1.877E+03	1.877E+03	1.877E+03
CM242	0.000E+00	3.616E+07	3.616E+07	3.616E+07	3.617E+07	3.613E+07	3.574E+07	3.529E+07	3.426E+07	3.326E+07	3.201E+07
CM244	0.000E+00	3.664E+07	3.664E+07	3.664E+07	3.664E+07	3.664E+07	3.663E+07	3.662E+07	3.659E+07	3.656E+07	3.653E+07

PRINCIPAL PHOTON SOURCES IN GROUP 15,PHOTONS/SEC
 MEAN ENERGY= 3.500MEV

NUCLIDE

BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
U238	1.720E+03	1.679E+03	1.679E+03	1.679E+03	1.679E+03	1.679E+03	1.679E+03	1.679E+03	1.679E+03	1.679E+03	1.679E+03
CM242	0.000E+00	3.248E+07	3.248E+07	3.248E+07	3.248E+07	3.245E+07	3.210E+07	3.170E+07	3.077E+07	2.987E+07	2.875E+07
CM244	0.000E+00	3.300E+07	3.300E+07	3.300E+07	3.300E+07	3.300E+07	3.299E+07	3.298E+07	3.296E+07	3.293E+07	3.290E+07

PRINCIPAL PHOTON SOURCES IN GROUP 16,PHOTONS/SEC
 MEAN ENERGY= 5.000MEV

NUCLIDE

BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
U238	7.396E+02	7.218E+02	7.218E+02	7.218E+02	7.218E+02	7.218E+02	7.218E+02	7.218E+02	7.218E+02	7.218E+02	7.218E+02
CM242	0.000E+00	1.390E+07	1.390E+07	1.390E+07	1.390E+07	1.389E+07	1.373E+07	1.356E+07	1.316E+07	1.278E+07	1.230E+07
CM244	0.000E+00	1.412E+07	1.412E+07	1.412E+07	1.412E+07	1.412E+07	1.411E+07	1.411E+07	1.410E+07	1.409E+07	1.408E+07

PRINCIPAL PHOTON SOURCES IN GROUP 17,PHOTONS/SEC

MEAN ENERGY= 7.000MEV

NUCLIDE	BOC #1	DISCHARGE FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
U238	8.519E+01	8.314E+01	8.314E+01	8.314E+01	8.314E+01	8.314E+01	8.314E+01	8.314E+01	8.314E+01	8.314E+01	8.314E+01
CM242	0.000E+00	1.596E+06	1.596E+06	1.596E+06	1.596E+06	1.596E+06	1.577E+06	1.557E+06	1.512E+06	1.467E+06	1.412E+06
CM244	0.000E+00	1.628E+06	1.628E+06	1.628E+06	1.628E+06	1.628E+06	1.628E+06	1.627E+06	1.626E+06	1.625E+06	1.623E+06

PRINCIPAL PHOTON SOURCES IN GROUP 18, PHOTONS/SEC
 MEAN ENERGY= 9.500MEV

NUCLIDE	BOC #1	DISCHARGE FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
U238	9.797E+00	9.562E+00	9.562E+00	9.562E+00	9.562E+00	9.562E+00	9.562E+00	9.562E+00	9.562E+00	9.562E+00	9.562E+00
CM242	0.000E+00	1.842E+05	1.842E+05	1.842E+05	1.842E+05	1.840E+05	1.820E+05	1.797E+05	1.745E+05	1.694E+05	1.630E+05
CM244	0.000E+00	1.871E+05	1.871E+05	1.871E+05	1.871E+05	1.871E+05	1.870E+05	1.870E+05	1.868E+05	1.867E+05	1.865E+05

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OUTPUT UNIT = 6

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21
 PHOTON SPECTRUM FOR FISSION PRODUCTS

1 MTHM, E=3.93%, 33960 MWD/MT (BWRUE)
 POWER= 1.00 MW, BURNUP= 1. MWD, FLUX= 1.00E+00 N/CM**2-SEC

18 GROUP PHOTON RELEASE RATES, PHOTONS/SECOND
 BASIS=

EMEAN	BOC #1	DISCHARGE FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
1.000E-02	0.000E+00	1.258E+18	9.353E+17	3.908E+17	2.434E+17	1.586E+17	1.081E+17	9.308E+16	7.605E+16	6.686E+16	5.924E+16
2.500E-02	0.000E+00	3.274E+17	2.507E+17	1.228E+17	8.309E+16	5.856E+16	3.816E+16	3.022E+16	2.175E+16	1.798E+16	1.523E+16
3.750E-02	0.000E+00	2.680E+17	2.171E+17	2.025E+17	1.194E+17	9.268E+16	7.225E+16	6.605E+16	2.498E+16	1.984E+16	1.627E+16
5.750E-02	0.000E+00	2.706E+17	1.960E+17	1.772E+17	5.240E+16	3.410E+16	2.174E+16	1.809E+16	1.454E+16	1.286E+16	1.151E+16
8.500E-02	0.000E+00	1.989E+17	1.489E+17	1.366E+17	6.975E+16	4.777E+16	3.658E+16	2.127E+16	1.422E+16	1.086E+16	8.728E+15
1.250E-01	0.000E+00	2.137E+17	1.702E+17	1.603E+17	1.053E+17	6.728E+16	4.460E+16	3.421E+16	2.476E+16	2.110E+16	1.818E+16
2.250E-01	0.000E+00	4.664E+17	3.473E+17	3.183E+17	1.533E+17	6.667E+16	2.866E+16	1.891E+16	1.102E+16	8.559E+15	7.205E+15
3.750E-01	0.000E+00	3.344E+17	2.842E+17	2.664E+17	9.691E+16	5.194E+16	3.937E+16	2.824E+16	1.479E+16	1.031E+16	7.010E+15
5.750E-01	0.000E+00	5.565E+17	4.873E+17	4.684E+17	3.072E+17	2.216E+17	1.559E+17	9.367E+16	5.645E+16	4.737E+16	4.030E+16
8.500E-01	0.000E+00	5.790E+17	5.258E+17	5.067E+17	3.029E+17	1.785E+17	1.022E+17	8.965E+16	7.562E+16	6.836E+16	6.197E+16
1.250E+00	0.000E+00	3.248E+17	2.841E+17	2.662E+17	1.212E+17	4.730E+16	1.787E+16	8.204E+15	5.870E+15	3.539E+15	2.050E+15
1.750E+00	0.000E+00	1.206E+17	1.095E+17	1.053E+17	6.385E+16	4.256E+16	3.433E+16	2.939E+16	2.531E+16	1.743E+16	1.196E+16
2.250E+00	0.000E+00	6.131E+16	5.636E+16	5.369E+16	2.369E+16	5.430E+15	1.740E+15	1.261E+15	1.043E+15	7.493E+14	5.849E+14
2.750E+00	0.000E+00	2.627E+16	2.284E+16	2.137E+16	9.430E+15	1.979E+15	1.236E+15	1.100E+15	9.493E+14	6.543E+14	4.487E+14
3.500E+00	0.000E+00	1.355E+16	1.065E+16	9.388E+15	2.384E+15	2.353E+14	1.086E+13	9.373E+12	8.152E+12	5.740E+12	4.049E+12
5.000E+00	0.000E+00	6.125E+15	3.649E+15	2.856E+15	2.567E+13	5.764E+12	7.102E+10	1.647E+03	9.626E-05	5.810E-05	5.816E-05
7.000E+00	0.000E+00	5.398E+13	1.181E+10	5.140E+08	1.181E-05	3.766E-06	3.766E-06	3.766E-06	3.770E-06	3.772E-06	3.774E-06
9.500E+00	0.000E+00	1.139E+10	2.217E+03	4.280E-04	2.382E-07	2.382E-07	2.382E-07	2.383E-07	2.384E-07	2.385E-07	2.387E-07
TOTAL	0.000E+00	5.025E+18	4.050E+18	3.780E+18	1.971E+18	1.253E+18	8.819E+17	5.785E+17	4.728E+17	3.566E+17	2.997E+17
MEV/SEC	0.000E+00	2.038E+18	1.773E+18	1.679E+18	8.911E+17	4.991E+17	3.452E+17	2.382E+17	1.991E+17	1.506E+17	1.241E+17

18 GROUP SPECIFIC ENERGY RELEASE RATES, MEV/WATT-SEC

BASIS=

EMEAN

BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D	
1.000E-02	0.000E+00	1.258E+10	9.353E+09	8.535E+09	3.908E+09	2.434E+09	1.586E+09	1.081E+09	9.308E+08	7.605E+08	6.686E+08	5.924E+08
2.500E-02	0.000E+00	8.186E+09	6.268E+09	5.774E+09	3.069E+09	2.077E+09	1.464E+09	9.541E+08	7.555E+08	5.437E+08	4.494E+08	3.808E+08
3.750E-02	0.000E+00	1.005E+10	8.139E+09	7.592E+09	4.478E+09	3.476E+09	2.709E+09	1.746E+09	1.352E+09	9.367E+08	7.440E+08	6.101E+08
5.750E-02	0.000E+00	1.556E+10	1.127E+10	1.019E+10	4.733E+09	3.013E+09	1.961E+09	1.250E+09	1.040E+09	8.361E+08	7.392E+08	6.619E+08
8.500E-02	0.000E+00	1.691E+10	1.265E+10	1.161E+10	5.928E+09	4.060E+09	3.109E+09	2.265E+09	1.808E+09	1.208E+09	9.227E+08	7.419E+08
1.250E-01	0.000E+00	2.671E+10	2.128E+10	2.004E+10	1.316E+10	1.014E+10	8.410E+09	5.575E+09	4.276E+09	3.095E+09	2.638E+09	2.273E+09
2.250E-01	0.000E+00	1.049E+11	7.815E+10	7.162E+10	3.449E+10	2.321E+10	1.500E+10	6.449E+09	4.255E+09	2.480E+09	1.926E+09	1.621E+09
3.750E-01	0.000E+00	1.254E+11	1.066E+11	9.991E+10	3.634E+10	1.948E+10	1.476E+10	1.059E+10	8.485E+09	5.548E+09	3.865E+09	2.629E+09
5.750E-01	0.000E+00	3.200E+11	2.802E+11	2.693E+11	1.766E+11	1.274E+11	8.964E+10	5.388E+10	4.340E+10	3.246E+10	2.724E+10	2.317E+10
8.500E-01	0.000E+00	4.921E+11	4.469E+11	4.307E+11	2.575E+11	1.517E+11	1.168E+11	8.686E+10	7.621E+10	6.428E+10	5.811E+10	5.268E+10
1.250E+00	0.000E+00	4.060E+11	3.552E+11	3.328E+11	1.515E+11	5.913E+10	2.234E+10	1.025E+10	7.337E+09	4.424E+09	3.277E+09	2.562E+09
1.750E+00	0.000E+00	2.110E+11	1.917E+11	1.842E+11	1.117E+11	7.447E+10	6.007E+10	5.144E+10	4.429E+10	3.050E+10	2.093E+10	1.294E+10
2.250E+00	0.000E+00	1.379E+11	1.268E+11	1.208E+11	5.329E+10	1.222E+10	3.914E+09	2.836E+09	2.346E+09	1.686E+09	1.316E+09	1.020E+09
2.750E+00	0.000E+00	7.224E+10	6.280E+10	5.878E+10	2.593E+10	5.442E+09	3.399E+09	3.025E+09	2.611E+09	1.799E+09	1.234E+09	7.606E+08
3.500E+00	0.000E+00	4.744E+10	3.728E+10	3.286E+10	8.345E+09	8.235E+08	3.800E+07	3.281E+07	2.853E+07	2.009E+07	1.417E+07	9.201E+06
5.000E+00	0.000E+00	3.063E+10	1.824E+10	1.428E+10	1.284E+09	2.882E+07	3.551E+05	8.234E-03	4.813E-10	2.905E-10	2.906E-10	2.908E-10
7.000E+00	0.000E+00	3.779E+08	8.268E+04	3.598E+03	8.265E-11	2.636E-11	2.637E-11	2.637E-11	2.638E-11	2.639E-11	2.640E-11	2.642E-11
9.500E+00	0.000E+00	1.082E+05	2.106E-02	4.066E-09	2.262E-12	2.263E-12	2.263E-12	2.263E-12	2.264E-12	2.265E-12	2.266E-12	2.267E-12
TOTAL	0.000E+00	2.038E+12	1.773E+12	1.679E+12	8.911E+11	4.991E+11	3.452E+11	2.382E+11	1.991E+11	1.506E+11	1.241E+11	1.026E+11
GAM POW	0.000E+00	3.267E+05	2.842E+05	2.691E+05	1.429E+05	8.001E+04	5.533E+04	3.819E+04	3.192E+04	2.414E+04	1.989E+04	1.645E+04

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

OUTPUT UNIT = 6

PRINCIPAL PHOTON SOURCES IN GROUP 1, PHOTONS/SEC

MEAN ENERGY = 0.010MEV

NUCLIDE

BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D	
KR 87	0.000E+00	7.990E+15	7.963E+15	7.912E+15	4.683E+15	3.068E+14	1.682E+10	1.521E-07	1.408E-24	0.000E+00	0.000E+00	0.000E+00
BR 88	0.000E+00	1.265E+16	1.002E+15	7.813E+13	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB 88	0.000E+00	1.743E+16	1.742E+16	1.740E+16	1.484E+16	4.427E+15	5.463E+13	1.267E+06	2.937E-02	4.504E-20	0.000E+00	0.000E+00
KR 89	0.000E+00	1.419E+16	1.150E+16	9.239E+15	2.869E+10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB 89	0.000E+00	1.129E+16	1.121E+16	1.105E+16	9.134E+14	1.045E+09	4.269E-13	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SR 89	0.000E+00	6.795E+15	6.795E+15	6.795E+15	6.774E+15	6.774E+15	6.704E+15	6.434E+15	6.174E+15	5.609E+15	5.095E+15	4.503E+15
KR 90	0.000E+00	1.449E+16	4.045E+15	1.117E+15	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB 90	0.000E+00	1.944E+16	1.700E+16	1.358E+16	3.469E+16	3.261E-11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Y 90	0.000E+00	1.623E+15	1.623E+15	1.623E+15	1.623E+15	1.621E+15	1.614E+15	1.596E+15	1.588E+15	1.582E+15	1.580E+15	1.579E+15
SR 91	0.000E+00	9.432E+15	9.429E+15	9.421E+15	8.783E+15	6.099E+15	1.640E+15	8.579E+12	4.487E+10	2.130E+05	1.012E+00	1.447E-07
Y 91	0.000E+00	9.110E+15	9.110E+15	9.110E+15	9.110E+15	9.105E+15	9.054E+15	8.748E+15	8.443E+15	7.771E+15	7.152E+15	6.429E+15
RB 92	0.000E+00	3.867E+16	4.402E+12	4.092E+08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Y 92	0.000E+00	2.279E+16	2.279E+16	2.279E+16	2.229E+16	1.396E+16	7.215E+14	6.602E+08	4.968E+02	2.544E-12	0.000E+00	0.000E+00
Y 93	0.000E+00	2.170E+16	2.170E+16	2.169E+16	2.051E+16	1.455E+16	4.231E+16	3.023E+13	2.160E+11	2.124E+06	2.089E+01	7.623E-06
RB 94	0.000E+00	1.716E+16	3.341E+09	6.446E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Y 94	0.000E+00	3.115E+16	3.082E+16	3.018E+16	3.759E+15	7.029E+10	6.688E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ZR 95	0.000E+00	2.282E+15	2.282E+15	2.282E+15	2.282E+15	2.277E+15	2.259E+15	2.186E+15	2.116E+15	1.962E+15	1.818E+15	1.649E+15
NB 95	0.000E+00	7.524E+14	7.524E+14	7.524E+14	7.524E+14	7.523E+14	7.520E+14	7.499E+14	7.466E+14	7.349E+14	7.186E+14	6.924E+14

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PRINCIPAL PHOTON SOURCES IN GROUP 2, PHOTONS/SEC
MEAN ENERGY = 0.025MEV

NUCLIDE	BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
RB 88	0.000E+00	3.907E+15	3.905E+15	3.901E+15	3.327E+15	9.925E+14	1.225E+13	2.840E+05	6.585E-03	1.010E-20	0.000E+00	0.000E+00
RB 89	0.000E+00	2.455E+15	2.438E+15	2.404E+15	1.986E+14	2.273E+08	9.283E-14	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SR 89	0.000E+00	1.419E+15	1.419E+15	1.419E+15	1.418E+15	1.414E+15	1.400E+15	1.343E+15	1.289E+15	1.171E+15	1.064E+15	9.402E+14
RB 90	0.000E+00	4.338E+15	3.792E+15	3.030E+15	7.742E+09	7.277E-12	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Y 90	0.000E+00	3.489E+14	3.489E+14	3.489E+14	3.483E+14	3.483E+14	3.468E+14	3.431E+14	3.413E+14	3.400E+14	3.396E+14	3.394E+14
SR 91	0.000E+00	1.995E+15	1.995E+15	1.993E+15	1.858E+15	1.290E+15	3.469E+14	1.815E+12	9.491E+09	4.507E+04	2.140E-01	3.061E-08
Y 91	0.000E+00	1.910E+15	1.910E+15	1.910E+15	1.910E+15	1.909E+15	1.898E+15	1.834E+15	1.770E+15	1.629E+15	1.499E+15	1.348E+15
RB 92	0.000E+00	8.800E+15	1.002E+12	9.311E+07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Y 92	0.000E+00	5.024E+15	5.024E+15	5.024E+15	4.913E+15	3.076E+15	1.590E+14	1.455E+08	1.095E+02	5.608E-13	0.000E+00	0.000E+00
Y 93	0.000E+00	4.709E+15	4.709E+15	4.708E+15	4.451E+15	3.158E+15	9.182E+14	6.561E+12	4.688E+10	4.611E+05	4.534E+00	1.654E-06
RB 94	0.000E+00	3.930E+15	7.651E+08	1.476E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Y 94	0.000E+00	6.915E+15	6.842E+15	6.699E+15	8.346E+14	1.560E+14	1.485E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ZR 95	0.000E+00	4.061E+14	4.061E+14	4.061E+14	4.059E+14	4.050E+14	4.018E+14	3.889E+14	3.765E+14	3.490E+14	3.235E+14	2.934E+14
Y 96	0.000E+00	1.150E+16	8.656E+15	6.404E+15	1.641E+08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ZR 97	0.000E+00	3.046E+15	3.044E+15	3.042E+15	2.924E+15	2.382E+15	1.138E+15	5.940E+13	3.099E+12	3.160E+09	3.208E+06	4.558E+02
NB 97	0.000E+00	2.002E+15	2.002E+15	2.002E+15	1.971E+15	1.661E+15	7.453E+14	3.889E+13	2.029E+12	2.069E+09	2.105E+06	3.199E+02
NB 98	0.000E+00	9.194E+15	2.620E+15	6.850E+14	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
NB 99	0.000E+00	7.364E+15	4.887E+14	2.667E+13	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
MO 99	0.000E+00	2.050E+15	2.050E+15	2.049E+15	2.029E+15	1.925E+15	1.593E+15	7.481E+14	3.512E+14	6.016E+13	1.030E+13	1.066E+12
ZR101	0.000E+00	7.431E+15	2.583E+10	8.685E+04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
MO101	0.000E+00	2.511E+15	2.422E+15	2.310E+15	1.477E+14	9.825E+07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TC102	0.000E+00	6.949E+15	6.673E+15	6.289E+15	1.682E+14	1.230E+06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RU103	0.000E+00	4.547E+14	4.547E+14	4.547E+14	4.543E+14	4.527E+14	4.467E+14	4.237E+14	4.018E+14	3.552E+14	3.139E+14	2.678E+14
RH103M	0.000E+00	1.889E+15	1.889E+15	1.889E+15	1.889E+15	1.883E+15	1.858E+15	1.762E+15	1.671E+15	1.477E+15	1.305E+15	1.114E+15
ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21												
TC104	0.000E+00	6.096E+15	6.042E+15	5.929E+15	6.766E+14	7.384E+09	1.012E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RH105M	0.000E+00	2.183E+15	2.183E+15	2.183E+15	1.934E+15	8.863E+14	5.332E+13	6.984E+08	9.148E+03	3.700E-08	1.496E-19	0.000E+00
RH106	0.000E+00	2.766E+15	2.667E+15	2.642E+15	2.634E+15	2.633E+15	2.629E+15	2.614E+15	2.599E+15	2.565E+15	2.532E+15	2.489E+15
PD109	0.000E+00	2.555E+15	2.555E+15	2.554E+15	2.440E+15	1.886E+15	7.465E+14	1.832E+13	4.495E+11	7.866E+07	1.377E+04	2.034E-01
AG109M	0.000E+00	2.239E+15	2.239E+15	2.239E+15	2.140E+15	1.654E+15	6.547E+14	1.607E+13	3.943E+11	7.953E+07	1.044E+07	1.029E+07
SB125	0.000E+00	1.878E+14	1.878E+14	1.878E+14	1.878E+14	1.878E+14	1.877E+14	1.875E+14	1.873E+14	1.867E+14	1.860E+14	1.850E+14
TE129	0.000E+00	1.601E+15	1.600E+15	1.600E+15	1.541E+15	8.896E+14	1.956E+14	1.447E+14	1.360E+14	1.177E+14	1.019E+14	8.464E+13
SN130	0.000E+00	4.053E+15	3.365E+15	2.793E+15	5.656E+10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TE131	0.000E+00	3.869E+15	3.859E+15	3.846E+15	1.858E+15	1.260E+14	8.232E+13	1.560E+13	2.955E+12	6.093E+10	1.256E+09	8.544E+06
I131	0.000E+00	1.397E+15	1.397E+15	1.397E+15	1.396E+15	1.376E+15	1.299E+15	1.016E+15	7.866E+14	4.306E+14	2.555E+14	1.084E+14
SB132M	0.000E+00	3.345E+15	2.836E+15	2.405E+15	1.675E+11	5.270E-11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TE132	0.000E+00	1.946E+16	1.946E+16	1.946E+16	1.929E+16	1.846E+16	1.574E+16	8.312E+15	4.391E+15	9.903E+14	2.234E+14	3.292E+13
I132	0.000E+00	2.080E+15	2.080E+15	2.080E+15	2.069E+15	1.996E+15	1.705E+15	9.009E+14	4.759E+14	1.073E+14	2.421E+13	3.568E+12
TE133	0.000E+00	3.072E+15	2.986E+15	2.889E+15	2.595E+14	3.508E+12	4.749E+06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
I133	0.000E+00	2.091E+15	2.091E+15	2.091E+15	2.052E+15	1.752E+15	9.618E+14	8.731E+13	7.926E+12	2.936E+10	1.088E+08	8.137E+04
XE133M	0.000E+00	7.269E+14	7.269E+14	7.269E+14	7.260E+14	7.185E+14	6.547E+14	3.130E+14	1.265E+14	1.397E+13	1.525E+12	8.830E+10
TE134	0.000E+00	1.079E+16	1.062E+16	1.045E+16	3.993E+15	2.759E+13	4.603E+05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
I134	0.000E+00	4.126E+15	4.117E+15	4.106E+15	2.885E+15	1.096E+14	9.184E+07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
I134M	0.000E+00	3.177E+15	2.634E+15	2.184E+15	4.173E+10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TE135	0.000E+00	5.791E+15	6.674E+14	7.650E+13	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

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I135	0.000E+00	1.719E+15	1.717E+15	1.714E+15	1.549E+15	9.169E+14	1.389E+14	7.316E+10	3.853E+07	8.632E-01	1.934E-08	2.825E-18
I136	0.000E+00	5.121E+15	3.517E+15	2.188E+15	5.270E+15	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
I136M	0.000E+00	4.107E+15	1.663E+15	6.733E+14	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
XE137	0.000E+00	8.602E+15	7.501E+15	6.319E+15	1.750E+11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
I138	0.000E+00	3.795E+15	5.835E+12	8.802E+09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
XE138	0.000E+00	2.880E+15	2.748E+15	2.617E+15	1.533E+14	6.493E+07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CS138	0.000E+00	5.993E+15	5.982E+15	5.964E+15	2.595E+15	4.418E+12	3.536E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
XE139	0.000E+00	6.198E+15	2.182E+15	7.614E+14	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CS139	0.000E+00	8.092E+15	7.782E+15	7.321E+15	1.024E+14	2.530E+04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA139	0.000E+00	4.272E+15	4.271E+15	4.267E+15	2.915E+15	2.364E+14	2.770E+10	5.218E-06	9.831E-22	0.000E+00	0.000E+00	0.000E+00
BA140	0.000E+00	7.458E+15	7.458E+15	7.458E+15	7.442E+15	7.358E+15	7.065E+15	6.005E+15	5.104E+15	3.492E+15	2.390E+15	1.467E+15
LA140	0.000E+00	2.534E+15	2.534E+15	2.534E+15	2.533E+15	2.533E+15	2.485E+15	2.222E+15	1.920E+15	1.324E+15	9.068E+14	5.568E+14
BA141	0.000E+00	3.841E+15	3.748E+15	3.618E+15	4.008E+14	4.561E+09	7.259E-09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
LA141	0.000E+00	4.169E+15	4.169E+15	4.168E+15	3.756E+15	1.570E+15	6.567E+13	2.009E+08	6.149E+02	8.359E-11	1.137E-23	0.000E+00
CE141	0.000E+00	5.307E+14	5.307E+14	5.307E+14	5.306E+14	5.297E+14	5.223E+14	4.899E+14	4.596E+14	3.959E+14	3.410E+14	2.814E+14
LA142	0.000E+00	3.589E+15	3.587E+15	3.584E+15	2.574E+15	2.742E+14	8.529E+10	7.986E-04	7.477E-18	0.000E+00	0.000E+00	0.000E+00
CE143	0.000E+00	1.547E+15	1.547E+15	1.547E+15	1.525E+15	1.374E+15	9.411E+14	2.074E+14	4.571E+13	1.341E+12	3.936E+10	4.214E+08
PR143	0.000E+00	1.180E+15	1.180E+15	1.180E+15	1.180E+15	1.179E+15	1.167E+15	1.053E+15	9.149E+14	6.425E+14	4.493E+14	2.837E+14
CE144	0.000E+00	2.202E+14	2.202E+14	2.202E+14	2.202E+14	2.201E+14	2.197E+14	2.181E+14	2.165E+14	2.128E+14	2.092E+14	2.047E+14
PR144	0.000E+00	4.662E+15	4.661E+15	4.661E+15	4.644E+15	4.640E+15	4.632E+15	4.598E+15	4.564E+15	4.487E+15	4.411E+15	4.316E+15
PR145	0.000E+00	1.850E+15	1.850E+15	1.849E+15	1.664E+15	9.319E+14	1.157E+14	2.750E+10	6.534E+06	2.285E-02	7.992E-11	1.072E-21

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

PRINCIPAL PHOTON SOURCES IN GROUP 3, PHOTONS/SEC
 MEAN ENERGY= 0.038MEV

NUCLIDE	BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1d	FUEL 4d	FUEL 7d	FUEL 14d	FUEL 21d	FUEL 30d
RB 88	0.000E+00	2.658E+15	2.656E+15	2.654E+15	2.263E+15	6.752E+14	8.331E+12	1.932E+05	4.480E-03	6.869E-21	0.000E+00	0.000E+00
SR 89	0.000E+00	9.247E+14	9.247E+14	9.247E+14	9.244E+14	9.218E+14	9.123E+14	8.755E+14	8.402E+14	7.632E+14	6.933E+14	6.127E+14
RB 90	0.000E+00	2.952E+15	2.581E+15	2.062E+15	5.268E+09	4.952E-12	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Y 90	0.000E+00	2.312E+14	2.312E+14	2.312E+14	2.312E+14	2.309E+14	2.299E+14	2.274E+14	2.262E+14	2.254E+14	2.251E+14	2.250E+14
SR 91	0.000E+00	1.311E+15	1.310E+15	1.309E+15	1.221E+15	8.475E+14	2.279E+14	1.192E+12	6.236E+09	2.961E+04	1.406E-01	2.011E-08
Y 91	0.000E+00	1.247E+15	1.247E+15	1.247E+15	1.247E+15	1.247E+15	1.240E+15	1.198E+15	1.156E+15	1.064E+15	9.793E+14	8.802E+14
RB 92	0.000E+00	6.038E+15	6.872E+11	6.388E+07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Y 92	0.000E+00	3.358E+15	3.358E+15	3.358E+15	3.284E+15	2.056E+15	1.063E+14	9.727E+07	7.319E+01	3.748E-13	0.000E+00	0.000E+00
Y 93	0.000E+00	3.139E+15	3.139E+15	3.139E+15	2.967E+15	2.105E+15	6.121E+14	4.374E+12	3.125E+10	3.074E+05	3.023E+00	1.103E-06
RB 94	0.000E+00	2.705E+15	5.265E+08	1.016E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Y 94	0.000E+00	4.672E+15	4.623E+15	4.526E+15	5.639E+14	1.054E+10	1.035E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ZR 95	0.000E+00	2.384E+14	2.384E+14	2.384E+14	2.383E+14	2.378E+14	2.359E+14	2.283E+14	2.210E+14	2.049E+14	1.899E+14	1.723E+14
0.000E+00	7.860E+15	5.915E+15	4.376E+15	1.122E+08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ZR 97	0.000E+00	1.998E+15	1.997E+15	1.996E+15	1.918E+15	1.562E+15	7.467E+14	3.896E+13	2.033E+12	2.073E+09	2.105E+06	2.990E+02
NB 97	0.000E+00	1.293E+15	1.293E+15	1.292E+15	1.273E+15	1.072E+15	4.812E+14	2.511E+13	1.310E+12	1.336E+09	1.359E+06	2.066E+02
NB 98	0.000E+00	6.225E+15	1.774E+15	4.637E+14	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
NB 99	0.000E+00	4.969E+15	3.298E+14	1.800E+13	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
MO 99	0.000E+00	1.668E+15	1.668E+15	1.668E+15	1.651E+15	1.567E+15	1.297E+15	6.088E+14	2.858E+14	4.896E+13	8.386E+12	8.677E+11
ZR101	0.000E+00	5.084E+15	1.767E+10	5.942E+04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TC102	0.000E+00	4.678E+15	4.492E+15	4.234E+15	1.113E+14	8.282E+05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TC104	0.000E+00	4.082E+15	4.046E+15	3.970E+15	4.531E+14	4.945E+09	6.774E-09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RH106	0.000E+00	1.849E+15	1.783E+15	1.766E+15	1.760E+15	1.760E+15	1.757E+15	1.747E+15	1.738E+15	1.715E+15	1.692E+15	1.664E+15

Calc. No. 2004-07600
Project No. 11163-013
Attachment B1

NUCLIDE	BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1d	FUEL 4d	FUEL 7d	FUEL 14d	FUEL 21d	FUEL 30d
TE132	0.000E+00	3.387E+15	3.386E+15	3.386E+15	3.358E+15	3.213E+15	2.739E+15	1.447E+15	7.642E+14	1.724E+14	3.887E+13	5.730E+12
I132	0.000E+00	1.220E+15	1.220E+15	1.220E+15	1.213E+15	1.170E+15	1.000E+15	5.282E+14	2.790E+14	6.293E+13	1.419E+13	2.092E+12
I133	0.000E+00	1.343E+15	1.343E+15	1.343E+15	1.318E+15	1.125E+15	6.177E+14	5.608E+13	5.900E+12	1.886E+10	6.987E+07	5.226E+04
XE133	0.000E+00	1.705E+16	1.705E+16	1.705E+16	1.705E+16	1.701E+16	1.643E+16	1.204E+16	8.227E+15	3.286E+15	1.305E+15	3.975E+14
TE134	0.000E+00	2.336E+15	2.299E+15	2.261E+15	8.643E+14	5.973E+12	9.963E+04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
I134	0.000E+00	2.452E+15	2.447E+15	2.441E+15	1.715E+15	6.511E+13	5.458E+07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TE135	0.000E+00	3.940E+15	4.541E+14	5.205E+13	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
XE135	0.000E+00	1.145E+15	1.147E+15	1.149E+15	1.245E+15	1.418E+15	7.359E+14	5.055E+12	2.191E+10	6.018E+04	1.641E-01	1.151E-08
I136	0.000E+00	3.483E+15	2.392E+15	1.488E+15	3.584E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
XE137	0.000E+00	5.933E+15	5.173E+15	4.358E+15	1.207E+11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA137M	0.000E+00	2.389E+14	2.389E+14	2.388E+14	2.386E+14	2.386E+14	2.386E+14	2.386E+14	2.385E+14	2.384E+14	2.383E+14	2.382E+14
XE138	0.000E+00	2.953E+15	2.818E+15	2.684E+15	1.572E+14	6.657E+07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CS138	0.000E+00	4.021E+15	4.013E+15	4.002E+15	1.741E+15	2.964E+12	2.373E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
XE139	0.000E+00	4.186E+15	1.474E+15	5.142E+14	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CS139	0.000E+00	5.456E+15	5.247E+15	4.936E+15	6.906E+13	1.706E+04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA139	0.000E+00	4.310E+15	4.308E+15	4.305E+15	2.941E+15	2.385E+14	2.794E+10	5.264E-06	9.918E-22	0.000E+00	0.000E+00	0.000E+00
I140	0.000E+00	1.291E+15	1.291E+15	1.291E+15	1.289E+15	1.274E+15	1.223E+15	1.040E+15	8.838E+14	6.048E+14	4.138E+14	2.541E+14
LA140	0.000E+00	2.200E+15	2.200E+15	2.200E+15	2.199E+15	2.193E+15	2.158E+15	1.929E+15	1.668E+15	1.150E+15	7.874E+14	4.835E+14
BA141	0.000E+00	4.561E+15	4.451E+15	4.297E+15	4.760E+14	5.416E+09	8.620E-09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
LA141	0.000E+00	2.774E+15	2.773E+15	2.773E+15	2.499E+15	1.045E+15	4.369E+13	1.337E+08	4.091E+02	5.561E-11	7.562E-24	0.000E+00
CE141	0.000E+00	6.099E+15	6.099E+15	6.099E+15	6.099E+15	6.088E+15	6.003E+15	5.631E+15	5.282E+15	4.550E+15	3.919E+15	3.235E+15
BA142	0.000E+00	6.847E+15	6.426E+15	6.023E+15	1.406E+14	5.104E+05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
LA142	0.000E+00	2.452E+15	2.451E+15	2.449E+15	1.759E+15	1.874E+14	5.828E+10	5.457E-04	5.110E-18	0.000E+00	0.000E+00	0.000E+00
ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21												
CE143	0.000E+00	2.031E+16	2.031E+16	2.031E+16	2.002E+16	1.803E+16	1.235E+16	2.723E+15	6.001E+14	1.761E+13	5.167E+11	5.531E+09
PR143	0.000E+00	7.483E+14	7.483E+14	7.483E+14	7.483E+14	7.478E+14	7.406E+14	6.682E+14	5.804E+14	4.076E+14	2.851E+14	1.800E+14
CE144	0.000E+00	3.214E+15	3.214E+15	3.214E+15	3.214E+15	3.212E+15	3.206E+15	3.183E+15	3.160E+15	3.106E+15	3.054E+15	2.988E+15
PR144	0.000E+00	3.108E+15	3.108E+15	3.107E+15	3.096E+15	3.094E+15	3.088E+15	3.065E+15	3.043E+15	2.991E+15	2.941E+15	2.877E+15
CE145	0.000E+00	1.228E+16	1.110E+16	9.145E+15	1.406E+10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PR145	0.000E+00	1.357E+15	1.357E+15	1.356E+15	1.220E+15	6.836E+14	8.488E+13	2.017E+10	4.793E+06	1.676E-02	5.863E-11	7.867E-22
CE146	0.000E+00	2.241E+15	2.151E+15	2.049E+15	1.208E+14	5.275E+07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ND147	0.000E+00	6.805E+15	6.805E+15	6.805E+15	6.792E+15	6.704E+15	6.397E+15	5.300E+15	4.392E+15	2.832E+15	1.826E+15	1.039E+15
ND149	0.000E+00	3.036E+15	3.033E+15	3.025E+15	2.078E+15	2.803E+14	2.068E+11	6.124E-02	1.814E-14	0.000E+00	0.000E+00	0.000E+00
SM153	0.000E+00	5.440E+15	5.439E+15	5.438E+15	5.362E+15	4.979E+15	3.811E+15	1.309E+15	4.495E+14	3.713E+13	3.066E+12	1.242E+11
EU156	0.000E+00	5.406E+14	5.406E+14	5.406E+14	5.397E+14	5.352E+14	5.181E+14	4.521E+14	3.943E+14	2.864E+14	2.081E+14	1.380E+14

PRINCIPAL PHOTON SOURCES IN GROUP 4, PHOTONS/SEC
MEAN ENERGY= 0.058MEV

NUCLIDE

NUCLIDE	BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1d	FUEL 4d	FUEL 7d	FUEL 14d	FUEL 21d	FUEL 30d
KR 87	0.000E+00	1.756E+15	1.750E+15	1.739E+15	1.029E+15	6.745E+13	3.698E+09	3.343E-08	3.095E-25	0.000E+00	0.000E+00	0.000E+00
BR 88	0.000E+00	2.985E+15	2.365E+14	1.844E+13	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB 88	0.000E+00	4.038E+15	4.035E+15	4.032E+15	3.438E+15	1.026E+15	1.266E+13	2.935E+05	6.805E-03	1.043E-20	0.000E+00	0.000E+00
KR 89	0.000E+00	3.108E+15	2.519E+15	2.024E+15	6.286E+09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB 89	0.000E+00	2.418E+15	2.401E+15	2.367E+15	1.956E+14	2.239E+08	9.142E-14	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SR 89	0.000E+00	1.322E+15	1.322E+15	1.322E+15	1.322E+15	1.318E+15	1.305E+15	1.252E+15	1.202E+15	1.091E+15	9.915E+14	8.762E+14
KR 90	0.000E+00	2.863E+15	7.993E+14	2.207E+14	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB 90	0.000E+00	4.482E+15	3.918E+15	3.131E+15	7.999E+09	7.519E-12	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Y 90	0.000E+00	3.402E+14	3.402E+14	3.402E+14	3.401E+14	3.397E+14	3.382E+14	3.346E+14	3.329E+14	3.316E+14	3.312E+14	3.310E+14

CE143	0.000E+00	5.093E+15	5.093E+15	5.093E+15	5.021E+15	4.522E+15	3.098E+15	6.828E+14	1.505E+14	4.416E+12	1.296E+11	1.387E+09
PR143	0.000E+00	1.021E+15	1.021E+15	1.021E+15	1.021E+15	1.020E+15	1.010E+15	9.117E+14	7.920E+14	5.561E+14	3.889E+14	2.456E+14
CE144	0.000E+00	1.851E+14	1.851E+14	1.851E+14	1.851E+14	1.850E+14	1.847E+14	1.833E+14	1.820E+14	1.789E+14	1.759E+14	1.721E+14
PR144	0.000E+00	4.632E+15	4.631E+15	4.631E+15	4.615E+15	4.611E+15	4.602E+15	4.569E+15	4.535E+15	4.458E+15	4.383E+15	4.288E+15
CE145	0.000E+00	4.775E+15	4.315E+15	3.555E+15	5.465E+09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PR145	0.000E+00	1.757E+15	1.756E+15	1.756E+15	1.580E+15	8.849E+14	1.099E+14	2.611E+10	6.204E+06	2.170E-02	7.589E-11	1.018E-21
ND147	0.000E+00	3.077E+14	3.077E+14	3.077E+14	3.031E+14	2.892E+14	2.892E+14	2.892E+14	2.892E+14	1.281E+14	8.258E+13	4.698E+13
PR148	0.000E+00	2.375E+15	2.108E+15	1.693E+15	4.699E+07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PM148	0.000E+00	5.106E+14	5.106E+14	5.105E+14	5.079E+14	4.945E+14	4.493E+14	3.064E+14	2.093E+14	8.700E+13	3.719E+13	1.359E+13
SM153	0.000E+00	1.827E+15	1.826E+15	1.826E+15	1.800E+15	1.672E+15	1.280E+15	4.395E+14	1.509E+14	1.247E+13	1.030E+12	4.170E+10

PRINCIPAL PHOTON SOURCES IN GROUP 5, PHOTONS/SEC
MEAN ENERGY= 0.085MEV

NUCLIDE	BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
RB 88	0.000E+00	2.644E+15	2.642E+15	2.640E+15	2.251E+15	6.715E+14	8.286E+12	1.921E+05	4.455E-03	6.831E-21	0.000E+00	0.000E+00
KR 89	0.000E+00	1.997E+15	1.618E+15	1.300E+15	4.039E+09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB 89	0.000E+00	1.529E+15	1.518E+15	1.497E+15	1.237E+14	1.416E+08	5.781E-14	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SR 89	0.000E+00	7.915E+14	7.915E+14	7.915E+14	7.912E+14	7.890E+14	7.809E+14	7.494E+14	7.192E+14	6.533E+14	5.934E+14	5.245E+14
RB 90	0.000E+00	2.934E+15	2.565E+15	2.050E+15	5.236E+09	4.922E-12	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Y 90	0.000E+00	2.113E+14	2.113E+14	2.113E+14	2.113E+14	2.110E+14	2.101E+14	2.078E+14	2.068E+14	2.066E+14	2.058E+14	2.056E+14
SR 91	0.000E+00	1.158E+15	1.158E+15	1.157E+15	1.079E+15	7.490E+14	2.014E+14	1.054E+12	5.511E+09	2.617E+04	1.242E-01	1.777E-08
Y 91	0.000E+00	1.072E+15	1.072E+15	1.072E+15	1.072E+15	1.071E+15	1.065E+15	1.029E+15	9.931E+14	9.141E+14	8.414E+14	7.563E+14
RB 92	0.000E+00	6.255E+15	7.120E+11	6.618E+07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Y 92	0.000E+00	3.252E+15	3.252E+15	3.252E+15	3.180E+15	1.992E+15	1.030E+15	4.421E+07	7.089E+01	3.630E-13	0.000E+00	0.000E+00
Y 93	0.000E+00	2.958E+15	2.958E+15	2.957E+15	2.795E+15	1.984E+15	5.767E+14	4.121E+12	2.945E+10	2.896E+05	2.848E+00	1.039E-06

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21
RB 94 0.000E+00 2.831E+15 5.511E+08 1.063E+02 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
Y 94 0.000E+00 4.547E+15 4.500E+15 4.406E+15 5.489E+14 1.026E+10 9.765E-08 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
ZR 95 0.000E+00 1.222E+14 1.222E+14 1.222E+14 1.221E+14 1.219E+14 1.209E+14 1.170E+14 1.133E+14 1.105E+14 9.733E+13 8.829E+13
Y 96 0.000E+00 7.988E+15 6.011E+15 4.447E+15 1.140E+08 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
ZR 97 0.000E+00 1.762E+15 1.760E+15 1.759E+15 1.691E+15 1.377E+15 6.583E+14 3.435E+13 1.792E+12 1.075E+12 1.096E+09 1.855E+06 2.636E+02
NB 97 0.000E+00 1.061E+15 1.061E+15 1.061E+15 1.044E+15 8.800E+14 3.949E+14 2.060E+13 1.075E+12 1.075E+12 1.096E+09 1.115E+06 1.695E+02
NB 98 0.000E+00 6.153E+15 1.754E+15 4.584E+14 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
NB 99 0.000E+00 4.788E+15 3.178E+14 1.734E+13 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
MO 99 0.000E+00 9.483E+14 9.482E+14 9.480E+14 9.384E+14 8.904E+14 7.371E+14 3.460E+14 1.624E+14 1.624E+14 2.783E+13 4.766E+12 4.932E+11
ZR101 0.000E+00 5.167E+15 1.796E+10 6.038E+04 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
TC101 0.000E+00 2.593E+15 2.502E+15 2.386E+15 1.525E+14 1.015E+08 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
TC102 0.000E+00 4.508E+15 4.329E+15 4.080E+15 1.091E+14 7.982E+05 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
TC104 0.000E+00 3.972E+15 3.937E+15 3.863E+15 4.408E+14 4.811E+09 6.591E-09 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
RH106 0.000E+00 1.774E+15 1.710E+15 1.694E+15 1.689E+15 1.688E+15 1.688E+15 1.676E+15 1.676E+15 1.667E+15 1.645E+15 1.624E+15 1.596E+15
I131 0.000E+00 6.871E+14 6.871E+14 6.871E+14 6.865E+14 6.767E+14 6.388E+14 4.994E+14 3.868E+14 2.251E+14 2.117E+14 1.558E+14 5.331E+13
I132 0.000E+00 9.842E+14 9.842E+14 9.841E+14 9.791E+14 9.442E+14 8.069E+14 4.262E+14 2.51E+14 5.078E+13 1.145E+13 1.688E+12
TE133 0.000E+00 1.526E+15 1.483E+15 1.435E+15 1.289E+14 1.743E+12 2.359E+06 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
TE133M 0.000E+00 2.151E+15 2.124E+15 2.098E+15 1.016E+15 2.381E+13 3.224E+07 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
I133 0.000E+00 1.084E+15 1.084E+15 1.084E+15 1.064E+15 9.080E+14 4.985E+14 4.525E+13 4.108E+12 1.522E+10 5.638E+07 4.217E+04
XE133 0.000E+00 1.526E+16 1.526E+16 1.526E+16 1.526E+16 1.523E+16 1.471E+16 1.078E+16 7.363E+15 2.941E+15 1.168E+15 3.558E+14
TE134 0.000E+00 7.347E+15 7.230E+15 7.111E+15 2.718E+15 1.878E+13 3.133E+05 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
I134 0.000E+00 2.047E+15 2.042E+15 2.037E+15 1.431E+15 5.434E+13 4.555E+07 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00

Calc. No. 2004-07600
Project No. 11163-013
Attachment B1

Table with columns for nuclide and 25 output units (BOC #1 to FC101). Values range from 0.000E+00 to 6.822E-08.

OUTPUT UNIT = 6

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ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21
PRINCIPAL PHOTON SOURCES IN GROUP 6, PHOTONS/SEC
MEAN ENERGY= 0.125MEV

Table with columns for nuclide, BOC #1, and 25 output units (FUEL 1m to FUEL 30D). Values range from 0.000E+00 to 5.887E+14.

MEAN ENERGY= 0.575MEV

NUCLIDE	BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1d	FUEL 4d	FUEL 7d	FUEL 14d	FUEL 21d	FUEL 30d
CR 89	0.000E+00	6.668E+15	5.404E+15	4.342E+15	1.349E+10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CR 90	0.000E+00	7.166E+15	2.001E+15	5.525E+14	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SR 91	0.000E+00	3.918E+15	3.917E+15	3.913E+15	3.649E+15	2.533E+15	6.812E+14	3.563E+12	1.864E+10	8.849E+04	4.202E-01	6.011E-08
Y 91M	0.000E+00	1.294E+16	1.294E+16	1.294E+16	1.265E+16	9.153E+15	2.464E+15	1.289E+13	6.740E+10	3.200E+05	1.520E+00	2.174E-07
NB 97	0.000E+00	3.969E+16	3.969E+16	3.969E+16	3.908E+16	3.293E+16	1.478E+16	7.709E+14	4.023E+13	4.110E+10	4.172E+07	6.343E+03
MO101	0.000E+00	1.630E+16	1.573E+16	1.500E+16	9.589E+14	6.378E+08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TC102	0.000E+00	2.471E+16	2.373E+16	2.237E+16	5.983E+14	4.375E+06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RU103	0.000E+00	2.811E+16	2.811E+16	2.811E+16	2.809E+16	2.799E+16	2.762E+16	2.619E+16	2.484E+16	2.119E+16	1.941E+16	1.656E+16
TC104	0.000E+00	2.125E+16	1.214E+16	1.191E+16	1.359E+15	1.483E+10	2.032E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RU105	0.000E+00	1.004E+16	1.004E+16	1.004E+16	8.876E+15	4.066E+15	2.446E+14	3.204E+09	4.197E+04	1.697E-07	6.864E-19	0.000E+00
RH106	0.000E+00	5.050E+15	4.869E+15	4.824E+15	4.809E+15	4.807E+15	4.800E+15	4.773E+15	4.747E+15	4.684E+15	4.623E+15	4.545E+15
SB127	0.000E+00	1.853E+15	1.853E+15	1.853E+15	1.847E+15	1.794E+15	1.571E+15	9.151E+14	5.332E+14	1.512E+14	4.286E+13	8.478E+12
SB131	0.000E+00	7.482E+15	7.321E+15	7.135E+15	1.249E+15	1.479E+11	1.083E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TE131	0.000E+00	4.929E+15	4.916E+15	4.901E+15	2.367E+15	1.606E+14	1.049E+14	1.987E+13	3.765E+12	7.762E+10	1.600E+09	1.089E+07
II131	0.000E+00	1.809E+15	1.809E+15	1.809E+15	1.808E+15	1.782E+15	1.682E+15	1.315E+15	1.018E+15	5.575E+14	3.049E+14	1.404E+14
SB132	0.000E+00	1.263E+16	1.043E+16	8.346E+15	4.948E+09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SB132M	0.000E+00	9.265E+15	7.855E+15	6.660E+15	4.638E+11	1.460E-10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
II132	0.000E+00	5.072E+16	5.072E+16	5.071E+16	5.046E+16	4.866E+16	4.158E+16	2.1197E+16	1.160E+16	2.167E+15	5.903E+14	8.699E+13
TE133M	0.000E+00	7.067E+15	6.980E+15	6.895E+15	3.338E+15	7.824E+13	1.059E+08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
II133	0.000E+00	3.524E+16	3.523E+16	3.523E+16	3.458E+16	2.952E+16	1.621E+16	1.471E+15	1.335E+14	4.947E+11	1.833E+09	1.371E+06
TE134	0.000E+00	1.243E+16	1.223E+16	1.203E+16	4.598E+15	3.178E+13	5.301E+05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
II134	0.000E+00	2.308E+16	2.303E+16	2.297E+16	1.614E+16	6.127E+14	5.137E+08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CS134	0.000E+00	7.297E+15	7.297E+15	7.297E+15	7.297E+15	7.295E+15	7.290E+15	7.270E+15	7.250E+15	7.204E+15	7.158E+15	7.098E+15
TE135	0.000E+00	1.743E+16	2.009E+15	2.302E+14	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
XE135M	0.000E+00	6.251E+15	6.176E+15	6.104E+15	4.372E+15	2.529E+15	3.832E+14	2.018E+11	1.063E+08	2.381E+00	5.334E-08	7.794E-18
XE137	0.000E+00	1.105E+16	9.635E+15	8.116E+15	2.248E+11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA137M	0.000E+00	3.781E+15	3.779E+15	3.779E+15	3.776E+15	3.776E+15	3.776E+15	3.775E+15	3.774E+15	3.772E+15	3.771E+15	3.769E+15

OUTPUT UNIT = 6

at 11:32:21

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1d	FUEL 4d	FUEL 7d	FUEL 14d	FUEL 21d	FUEL 30d
II138	0.000E+00	1.374E+16	2.113E+13	3.187E+10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CS138	0.000E+00	1.485E+16	1.482E+16	1.478E+16	6.430E+15	1.094E+13	8.761E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA140	0.000E+00	6.803E+15	6.803E+15	6.803E+15	6.788E+15	6.712E+15	6.445E+15	5.478E+15	4.656E+15	3.186E+15	2.180E+15
LA140	0.000E+00	1.383E+16	1.383E+16	1.383E+16	1.383E+16	1.378E+16	1.357E+16	1.213E+16	1.048E+16	7.229E+15	4.950E+15
BA141	0.000E+00	9.533E+15	9.303E+15	8.981E+15	9.949E+14	1.132E+10	1.802E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00
LA142	0.000E+00	2.060E+16	2.059E+16	2.058E+16	1.478E+16	1.574E+15	4.896E+11	4.585E-03	4.293E-17	0.000E+00	0.000E+00
CE143	0.000E+00	2.877E+15	2.877E+15	2.877E+15	2.837E+15	2.555E+15	1.751E+15	3.858E+14	8.503E+13	2.495E+12	7.321E+10
PR144	0.000E+00	1.393E+15	1.392E+15	1.392E+15	1.387E+15	1.386E+15	1.384E+15	1.374E+15	1.363E+15	1.340E+15	1.318E+15
ND147	0.000E+00	1.885E+15	1.885E+15	1.885E+15	1.881E+15	1.857E+15	1.772E+15	1.468E+15	1.216E+15	7.845E+14	5.059E+14
PM148M	0.000E+00	2.168E+15	2.168E+15	2.168E+15	2.167E+15	2.159E+15	2.132E+15	2.028E+15	1.928E+15	1.714E+15	1.524E+15

PRINCIPAL PHOTON SOURCES IN GROUP 10, PHOTONS/SEC

MEAN ENERGY= 0.850MEV

NUCLIDE	BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1d	FUEL 4d	FUEL 7d	FUEL 14d	FUEL 21d	FUEL 30d
BR 88	0.000E+00	8.762E+15	6.943E+14	5.413E+13	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB 90	0.000E+00	6.642E+15	5.807E+15	4.640E+15	1.185E+10	1.114E-11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

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SR 91	0.000E+00	6.288E+15	6.286E+15	6.281E+15	5.856E+15	4.066E+15	1.093E+15	5.719E+12	2.991E+10	1.420E+05	6.744E-01	9.648E-08
Y 92	0.000E+00	5.024E+15	5.024E+15	5.024E+15	4.913E+15	3.076E+15	1.590E+14	1.455E+08	1.095E+02	5.608E-13	0.000E+00	0.000E+00
RB 94	0.000E+00	8.620E+15	1.678E+09	0.238E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Y 94	0.000E+00	2.626E+16	2.598E+16	2.544E+16	3.169E+15	5.926E+10	5.638E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ZR 95	0.000E+00	3.042E+16	3.042E+16	3.042E+16	3.041E+16	3.034E+16	3.010E+16	2.913E+16	2.820E+16	2.614E+16	2.423E+16	2.198E+16
NB 95	0.000E+00	3.228E+16	3.228E+16	3.228E+16	3.228E+16	3.228E+16	3.228E+16	3.228E+16	3.203E+16	3.153E+16	3.083E+16	2.971E+16
NB 97M	0.000E+00	2.829E+16	2.829E+16	2.829E+16	2.713E+16	2.210E+16	1.056E+16	5.511E+14	2.875E+13	2.931E+10	2.982E+07	4.229E+03
MO 99	0.000E+00	5.823E+15	5.823E+15	5.822E+15	5.763E+15	5.468E+15	4.526E+15	2.125E+15	9.976E+14	1.709E+14	2.927E+13	3.029E+12
MO101	0.000E+00	5.843E+15	5.843E+15	5.832E+15	3.441E+14	2.289E+08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TC104	0.000E+00	7.972E+15	7.901E+15	7.753E+15	8.847E+14	9.656E+09	1.323E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RU105	0.000E+00	1.140E+16	1.140E+16	1.139E+16	1.007E+16	4.614E+15	2.776E+14	3.636E+09	4.762E+04	1.926E-07	7.789E-19	0.000E+00
SB128M	0.000E+00	7.088E+15	7.049E+15	7.008E+15	3.897E+15	1.153E+14	3.559E+08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SB129	0.000E+00	5.717E+15	5.712E+15	5.705E+15	4.937E+15	2.213E+15	1.232E+14	1.182E+09	1.135E+04	2.222E-08	4.350E-20	0.000E+00
SB130	0.000E+00	5.350E+15	5.258E+15	5.168E+15	1.892E+15	1.045E+13	7.787E+04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SB130M	0.000E+00	2.035E+16	1.969E+16	1.885E+16	5.747E+13	2.673E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SB131	0.000E+00	1.542E+16	1.509E+16	1.470E+16	2.573E+15	3.048E+11	2.232E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TE131M	0.000E+00	2.823E+15	2.822E+15	2.822E+15	2.770E+15	2.470E+15	1.630E+15	3.088E+14	5.850E+13	1.206E+12	2.487E+10	1.691E+08
SB132	0.000E+00	1.553E+16	1.282E+16	1.026E+16	6.084E+09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SB132M	0.000E+00	8.311E+15	7.047E+15	5.975E+15	4.161E+11	1.309E-10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
I132	0.000E+00	3.291E+16	3.291E+16	3.290E+16	3.274E+16	3.157E+16	2.698E+16	1.425E+16	7.528E+15	1.698E+15	3.830E+14	5.644E+13
TE133M	0.000E+00	2.612E+16	2.580E+16	2.548E+16	1.234E+16	2.891E+14	3.914E+08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
I133	0.000E+00	3.396E+15	3.396E+15	3.396E+15	3.333E+15	2.845E+15	1.562E+15	1.418E+14	1.287E+13	4.768E+10	1.767E+08	1.321E+05
TE134	0.000E+00	1.657E+16	1.631E+16	1.604E+16	6.131E+15	4.237E+13	7.067E+05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
I134	0.000E+00	8.765E+16	8.746E+16	8.723E+16	6.129E+16	2.327E+15	1.951E+09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CS134	0.000E+00	5.068E+15	5.068E+15	5.068E+15	5.067E+15	5.067E+15	5.063E+15	5.049E+15	5.035E+15	5.003E+15	4.971E+15	4.930E+15
I135	0.000E+00	4.099E+15	4.093E+15	4.086E+15	3.693E+15	2.186E+15	3.312E+14	1.744E+11	9.187E+07	2.058E+00	4.611E-08	6.736E-18
CS136	0.000E+00	1.683E+15	1.683E+15	1.683E+15	1.680E+15	1.661E+15	1.597E+15	1.362E+15	1.162E+15	8.027E+14	5.542E+14	3.443E+14
LA140	0.000E+00	1.559E+16	1.559E+16	1.559E+16	1.559E+16	1.554E+16	1.529E+16	1.367E+16	1.182E+16	8.150E+15	5.580E+15	3.427E+15
BA142	0.000E+00	9.702E+15	9.106E+15	8.534E+15	1.993E+14	7.233E+05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
LA142	0.000E+00	4.453E+15	4.451E+15	4.447E+15	3.194E+15	3.402E+14	1.058E+11	9.909E-04	9.277E-18	0.000E+00	0.000E+00	0.000E+00
CE145	0.000E+00	1.391E+16	1.257E+16	1.036E+16	1.592E+10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

ORIGEN2 V2.1 (8-1-91), Run on 10/14/04 at 11:32:21

OUTPUT UNIT = 6

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PRINCIPAL PHOTON SOURCES IN GROUP 11, PHOTONS/SEC
MEAN ENERGY= 1.250MEV

NUCLIDE	BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1d	FUEL 4d	FUEL 7d	FUEL 14d	FUEL 21d	FUEL 30d
KR 89	0.000E+00	4.307E+15	3.490E+15	2.804E+15	8.710E+09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB 89	0.000E+00	1.713E+16	1.701E+16	1.677E+16	1.386E+15	1.586E+09	6.477E-13	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
KR 90	0.000E+00	6.994E+15	1.953E+15	5.393E+14	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SR 91	0.000E+00	7.280E+15	7.277E+15	7.271E+15	6.779E+15	4.707E+15	1.266E+15	6.621E+12	3.463E+10	1.644E+05	7.807E-01	1.117E-07
Y 91	0.000E+00	7.504E+13	7.504E+13	7.504E+13	7.504E+13	7.500E+13	7.458E+13	7.206E+13	6.954E+13	6.401E+13	5.891E+13	5.296E+13
SR 92	0.000E+00	2.685E+16	2.675E+16	2.663E+16	2.080E+16	5.790E+15	5.797E+15	5.826E+05	5.855E-03	1.276E-21	0.000E+00	0.000E+00
Y 92	0.000E+00	1.735E+15	1.735E+15	1.735E+15	1.696E+15	1.062E+15	5.491E+13	5.024E+07	3.781E+01	1.936E-13	0.000E+00	0.000E+00
Y 94	0.000E+00	4.672E+15	4.623E+15	4.526E+15	5.639E+14	1.054E+10	1.003E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ZR 97	0.000E+00	2.134E+15	2.133E+15	2.131E+15	2.048E+15	1.669E+15	7.975E+14	4.161E+13	2.171E+12	2.213E+09	2.248E+06	3.193E+02
MO101	0.000E+00	1.298E+16	1.253E+16	1.195E+16	7.638E+14	5.980E+08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TC102	0.000E+00	3.898E+15	3.744E+15	3.528E+15	9.438E+13	6.901E+05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TC104	0.000E+00	5.572E+15	5.522E+15	5.419E+15	6.184E+14	6.749E+09	9.245E-09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

CS138 0.000E+00 5.529E+12 5.518E+12 5.503E+12 2.394E+12 4.076E+09 3.263E-01 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
 CE142 0.000E+00 5.416E-05 5.416E-05 5.416E-05 5.416E-05 5.416E-05 5.416E-05 5.416E-05 5.416E-05 5.416E-05 5.416E-05 5.416E-05 5.416E-05
 SM147 0.000E+00 3.878E-06 3.878E-06 3.878E-06 3.878E-06 3.879E-06 3.882E-06 3.894E-06 3.906E-06 3.934E-06 3.962E-06 3.998E-06

PRINCIPAL PHOTON SOURCES IN GROUP 17, PHOTONS/SEC
 MEAN ENERGY= 7.000MEV

NUCLIDE	BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
AS 82	0.000E+00	1.922E+09	3.090E+08	4.265E+07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR 88	0.000E+00	7.079E+10	5.609E+09	4.373E+08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB 92	0.000E+00	5.071E+13	5.772E+09	5.365E+05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB 94	0.000E+00	3.155E+12	6.143E+05	1.185E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
I136	0.000E+00	7.814E+07	5.366E+07	3.338E+07	8.04E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CE142	0.000E+00	3.514E-06	3.514E-06	3.514E-06	3.514E-06	3.514E-06	3.514E-06	3.514E-06	3.514E-06	3.514E-06	3.514E-06	3.514E-06
SM147	0.000E+00	2.516E-07	2.516E-07	2.516E-07	2.517E-07	2.519E-07	2.519E-07	2.527E-07	2.534E-07	2.553E-07	2.571E-07	2.594E-07

PRINCIPAL PHOTON SOURCES IN GROUP 18, PHOTONS/SEC
 MEAN ENERGY= 9.500MEV

NUCLIDE	BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
RB 94	0.000E+00	1.139E+10	2.217E+03	4.277E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CE142	0.000E+00	2.222E-07	2.222E-07	2.222E-07	2.222E-07	2.222E-07	2.222E-07	2.222E-07	2.222E-07	2.222E-07	2.222E-07	2.222E-07
SM147	0.000E+00	1.591E-08	1.591E-08	1.591E-08	1.592E-08	1.592E-08	1.593E-08	1.598E-08	1.603E-08	1.614E-08	1.626E-08	1.640E-08

```
*****  
*  
* OOOO RRRR IIII GGGG EEEE N N 2222  
* O O R R I G E NN N 22 22  
* O O RRRR I G GG EEEE N NN N 22  
* O O R R I G E N NN 22  
* OOOO R R IIII GGGGG EEEEE N N 222222  
*  
* Version 2.1 (8-1-91)  
*  
* OOOO AA K K  
* O O A A K K  
* O O AAAA KKK  
* O O A A K K  
* OOOO A A K K  
*  
* RRRR III DDDDD GGGG EEEEE  
* R R I D D G E  
* RRRR I D D G GG EEEE  
* R R I D D G G E  
* R R III DDDDD GGGGG EEEEE  
*  
* N N AA TTTT III OOOO N N AA L  
* N N A A T I O O NN N A A L  
* N NN N AAAA T I O O N NN AAAA L  
* N N A A T I O O N NN A A L  
* N N A A T III OOOO N N A LLLL  
*  
* L AA BBBB OOOO RRRR AA TTTT OOOO RRRR Y Y  
* L A B B O O R R A A T O O R R Y Y  
* L AAAA BBBB O O RRRR AAAA T O O RRRR Y  
* L A B B O O R R A A T O O R R Y  
* LLLL A A BBBB OOOO R R A A T OOOO R R Y  
*  
* RSIC CODE PACKAGE NUMBER (CCC-371)  
*  
* ORIGEN2 VERSION 2.1 (8-1-91) UPDATES THE FOLLOWING:  
*  
* CCC-371(A) - MAINFRAMES  
* CCC-371(E) - IBM PC (80386 W/80387 OR 80486)  
*  
* ORIGEN2 RUN DATE: 10/19/04 TIME 15:12:15  
*  
*****
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ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

***** ORIGEN2: A REVISED AND UPDATED VERSION OF THE ORIGEN COMPUTER CODE *****

INTRODUCTION

THIS TEXT IS INTENDED TO BE A BRIEF OUTLINE OF THE ORIGEN2 COMPUTER CODE, WHICH IS A REVISED AND UPDATED VERSION OF THE ORIGEN DOCUMENTED IN REPORT ORNL-4628 (MAY 1973). INCLUDED HERE ARE A BRIEF DESCRIPTION OF THE FUNCTIONS OF ORIGEN2, A LISTING OF THE MAJOR DATA SOURCES, A LISTING OF THE PUBLISHED DOCUMENTATION CONCERNING ORIGEN2, AND AN OUTLINE OF THE ORIGEN2 OUTPUT ORGANIZATION. ORIGEN2 IS AVAILABLE FROM THE ORNL RADIATION SHIELDING INFORMATION CENTER (RSIC) AT THE FOLLOWING ADDRESS:

CODES COORDINATOR
RADIATION SHIELDING INFORMATION CENTER
BLDG. 6025
OAK RIDGE NATIONAL LABORATORY
OAK RIDGE, TENNESSEE 37830
PHONE: (615) 574-6176

QUESTIONS CONCERNING ORIGEN2 SHOULD BE ADDRESSED TO RSIC.

DESCRIPTION

ORIGEN2 IS A REVISION AND UPDATE OF THE ORIGEN COMPUTER CODE. SPECIFICALLY, THE INPUT, OUTPUT, CONTROL, AND DATA BASE ASPECTS OF ORIGEN HAVE BEEN SIGNIFICANTLY REVISED AND UPDATED TO REFLECT CURRENT INFORMATION AND NEEDS. IT SHOULD BE NOTED THAT THE MATHEMATICAL METHODS USED TO SOLVE THE NUCLEIDE BUILDUP, DEPLETION, AND DECAY EQUATIONS ARE ESSENTIALLY UNCHANGED FROM THAT IN ORIGEN. ORIGEN2 IS A COMPUTER CODE DESIGNED TO CALCULATE THE COMPOSITION AND CHARACTERISTICS OF NUCLEAR MATERIALS AS A FUNCTION OF DECAY TIME AND THE CHANGES THE MATERIALS UNDERGO DURING VARIOUS FUEL CYCLE OPERATIONS. INPUT AND OUTPUT FEATURES HAVE BEEN DESIGNED TO FACILITATE FLEXIBILITY IN THE TYPE OF CASES THAT CAN BE CONSIDERED AND IN CONTROLLING THE DETAIL OF THE OUTPUT. FOR FURTHER INFORMATION, THE USER IS REFERRED TO THE DOCUMENTATION LISTED BELOW.

MAJOR DATA SOURCES

VIRTUALLY ALL ASPECTS OF THE DATA INPUT TO ORIGEN2 HAVE BEEN UPDATED OR REVISED TO REFLECT CURRENT INFORMATION. THE PRINCIPAL SOURCES OF CROSS SECTION DATA WERE THE ENDF/B-IV, ENDF/B-V, AND LENDL COMPILATIONS. DECAY AND PHOTON INFORMATION WERE PRIMARILY BASED ON THE EVALUATED NUCLEAR STRUCTURE DATA FILE (ENSDF) AT ORNL AND ENDF/B-IV. DATA CONCERNING REACTOR AND FUEL CHARACTERISTICS WERE OBTAINED FROM REFERENCE SAFETY ANALYSIS REPORTS AND, WHERE POSSIBLE, THE COMMERCIAL REACTOR VENDORS.

DOCUMENTATION

THE FOLLOWING ITEMS CONSTITUTE THE ORIGEN2 DOCUMENTATION PUBLISHED AS OF THE DATE OF THIS CODE PACKAGE:

- A.G. CROFF, "ORIGEN2 - A REVISED AND UPDATED VERSION OF THE OAK RIDGE ISOTOPE GENERATION AND DEPLETION CODE", ORNL-5621 (JULY 1980).
- A.G. CROFF, "A USER'S MANUAL FOR THE ORIGEN2 COMPUTER CODE", ORNL/TM-7175 (JULY 1980).
- A.G. CROFF, M.A. BJERKE, G.W. MORRISON, AND L.M. PETRIE, "REVISED URANIUM-PLUTONIUM CYCLE PWR AND BWR MODELS FOR THE ORIGEN COMPUTER CODE", ORNL/TM-6051 (SEPTEMBER 1978).
- A.G. CROFF AND M.A. BJERKE, "ALTERNATIVE FUEL CYCLE PWR MODELS FOR THE ORIGEN COMPUTER CODE", ORNL/TM-7005 (FEB 1980).
- A.G. CROFF, R.L. HAESE, AND N.B. GOVE, "UPDATED DECAY AND PHOTON LIBRARIES FOR THE ORIGEN CODE", ORNL/TM-6055 (FEB 1979).
- A.G. CROFF, "ORIGEN2: A REVISED AND UPDATED VERSION OF ORIGEN", TRANS. AM. NUCL. SOC., VOL. 34, P. 349-50 (JUNE 1980).

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

***** ORIGEN2: A REVISED AND UPDATED VERSION OF THE ORIGEN COMPUTER CODE *****

ORGANIZATION OF ORIGEN2 OUTPUT

PAST EXPERIENCE HAS INDICATED THAT MANY USERS ENCOUNTER CONSIDERABLE DIFFICULTY IN FINDING THE DESIRED INFORMATION IN A ORIGEN2 OUTPUT WHICH IS SOMETIMES RATHER MASSIVE. THIS SECTION IS INTENDED AS A BRIEF OUTLINE OF THE ORGANIZATION OF ORIGEN2 OUTPUT. FOR DETAILS REFER TO THE USER'S MANUAL (ORNL/TM-7175, SECT. 8.2). THE ORIGEN2 OUTPUT IS EXTREMELY HIERARCHICAL, AND IS ORGANIZED AS FOLLOWS:

CARD INPUT ECHO
MISCELLANEOUS INPUT DATA (NEUTRON YIELDS, REPROCESSING LOSSES, ELEMENT CHEMICAL TOXICITIES)

LISTING OF ORIGEN2 COMMANDS CURRENTLY BEING EXECUTED
LISTING OF ORIGEN2 DATA LIBRARIES (IF SPECIFIED)

DECAY LIBRARY

ACTIVATION PRODUCTS

ACTINIDES

FISSION PRODUCTS

CROSS SECTION/FISSION PRODUCT YIELD LIBRARY

ACTIVATION PRODUCTS, ACTINIDES, AND FISSION PRODUCTS

PHOTON LIBRARY

ACTIVATION PRODUCTS, ACTINIDES, AND FISSION PRODUCTS

OUTPUT 1

REACTIVITY AND BURNUP DATA

ACTIVATION PRODUCT TABLES

GRAM TABLES (NUCLIDE, ELEMENT, NUCLIDE SUMMARY, ELEMENT SUMMARY)

CURIE TABLES (NUCLIDE, ELEMENT, NUCLIDE SUMMARY, ELEMENT SUMMARY)

ETC. (DEPENDING ON THE OUTPUT OPTIONS SPECIFIED, MANY OF THESE TABLES MAY BE OMITTED)

ACTINIDE TABLES

SAME SUBHEADINGS POSSIBLE AS UNDER ACTIVATION PRODUCT TABLES

FISSION PRODUCT TABLES

SAME SUBHEADINGS POSSIBLE AS UNDER ACTIVATION PRODUCT TABLES

NEUTRON PRODUCTION RATE TABLES: (ALPHA,N) AND SPONTANEOUS FISSION

PHOTON TABLES

ACTIVATION PRODUCTS (SUMMATION AND PRINCIPAL CONTRIBUTORS)

ACTINIDES (SUMMATION AND PRINCIPAL CONTRIBUTORS)

FISSION PRODUCTS (SUMMATION AND PRINCIPAL CONTRIBUTORS)

OUTPUT 2

SAME GENERAL CONTENT AND ORDER AS OUTPUT 1

OUTPUT N

SAME GENERAL CONTENT AND ORDER AS OUTPUT 1

TABLE OF CONTENTS (UNIT 12) FOR THE ABOVE (UNIT 6) OUTPUT
VARIABLE CROSS SECTION INFORMATION OUTPUT (UNIT 16)
DEBUGGING AND OTHER INTERNAL INFORMATION OUTPUT (UNIT 15)

THE SCENARIO LISTED ABOVE CONSTITUTES A TYPICAL ORIGENZ OUTPUT FOR MANY CASES. ONE POSSIBLE MODIFICATION IS THE USE OF AN
STP COMMAND TO EXECUTE AN ADDITIONAL SET OF INSTRUCTIONS AFTER THE FIRST SET HAS BEEN EXECUTED. IF THIS IS DONE, THE OUTPUT
WILL BEGIN WITH "MISCELLANEOUS INPUT DATA" IF NSTP=1, "ORIGENZCOMMANDS CURRENTLY BEING EXECUTED" IF NSTP=2, OR "OUTPUT 1"
FOR NSTP=3. ANOTHER OFTEN-USED OPTION IS TO EMPLOY BOTH THE PRIMARY (UNIT 6) AND ALTERNATE (UNIT 11) OUTPUT UNITS. IF BOTH
ARE ROUTED TO PAPER, THE TABLE OF CONTENTS FOR UNIT 11, WHICH IS ON UNIT 13, WILL IMMEDIATELY FOLLOW THE DEBUGGING AND
INTERNAL INFORMATION (UNIT 15) OUTPUT. THE "OUTPUT N" TABLES FOR UNIT 11 WILL BE PRINTED FOLLOWING THE TABLE OF CONTENTS.

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15
 LISTING OF INPUT DATA ON UNIT = 5

INPUT UNIT	WRITE UNIT	CARD NUMBER	CARD IMAGE
5	50	1	-1
5	50	2	-1
5	50	3	-1
5	50	4	RDA
5	50	5	RDA
5	50	6	RDA
5	50	7	RDA
5	50	8	RDA
5	50	9	RDA
5	50	10	CUT
5	50	11	LIP
5	50	12	RDA
5	50	13	LIB
5	50	14	RDA
5	50	15	PHO
5	50	16	TIT
5	50	17	RDA
5	50	18	INP
5	50	19	RDA
5	50	20	TIT
5	50	21	RDA
5	50	22	OPTL
5	50	23	OPTA
5	50	24	OPTF
5	50	25	MOV
5	50	26	RDA
5	50	27	BUP
5	50	28	IRP
5	50	29	IRP
5	50	30	IRP
5	50	31	IRP
5	50	32	IRP
5	50	33	IRP
5	50	34	IRP
5	50	35	BUP
5	50	36	HED
5	50	37	HED
5	50	38	OUT
5	50	39	RDA
5	50	40	RDA
5	50	41	RDA
5	50	42	TIT
5	50	43	TIT
5	50	44	RDA
5	50	45	RDA

Monticello Calc 2004-07600 Max Burnup 1918 MWt
 1 MTIHM, E=3.93%, 54000 MWD/MT (BWRUE), ONLY FUEL
 ** CROSS SECTION LIBRARY = BWRUE, 4 CYCLE
 -1 = FRESH BWR FUEL WITH IMPURITIES (1 MT = 1000 KG)
 WARNING: VECTORS ARE CHANGED WITH RESPECT TO CONTENT.
 THESE CHANGES WILL BE NOTED ON RDA CARDS.

5 1.0E-11 7 1.0E-10 9 1.0E-10 -1
 0 0 0
 0 DECAY LIB XSECT LIB VAR. XSECT
 0 1 2 3 657 658 659 9 50 0 1 42
 PHOTON LIB
 101 102 103 10
 INITIAL COMP. OF UNIT AMOUNTS OF FUEL AND STRUCTURAL MAT'Ls
 READ FUEL COMPOSITION INCLUDING IMPURITIES (1000 KG)
 -1 1 -1 -1 1 1
 IRRADIATION OF ONE METRIC TON OF BWRU FUEL
 IRRADIATION OF ONE METRIC TON OF BWRU FUEL
 *****PRINT OUT CONTROL*****
 4*8 7 8 7 8 7 15*8
 4*8 7 8 7 8 7 15*8
 4*8 7 8 7 8 7 15*8
 -1 1 0 1.0
 200.0 21.655 1 2 4 2 BURNUP= 4,331 MWD/MTIHM
 600.0 21.655 2 3 4 0 BURNUP=12,993 MWD/MTIHM
 1000.0 21.655 3 4 4 0 BURNUP=21,655 MWD/MTIHM
 1400.0 21.655 4 5 4 0 BURNUP=30,317 MWD/MTIHM
 1800.0 21.655 5 6 4 0 BURNUP=38,979 MWD/MTIHM
 2200.0 21.655 6 7 4 0 BURNUP=47,641 MWD/MTIHM
 2493.68 21.655 7 8 4 0 BURNUP=54,000 MWD/MTIHM
 1 *BOC #1
 8 *EOC #1
 8 1 0 0
 8 = IRRADIATED U FUEL AT DISCHARGE
 ***** OUTPUT MODULE *****
 Monticello Calc 2004-07600 Max Burnup 1918 MWt
 1 MTIHM, E=3.93%, 54000 MWD/MT (BWRUE)
 ONLY FUEL
 MOVE FUEL AT CHARGE TO 1, MOVE FUEL AT DISCHARGE TO 2

5	50	MOV	8	2	0	1.0
5	50	RDA	*****DECAY MODULE *****			
5	50	RDA	DISCHARGED FUEL IN 2, DECAYED FUEL IN 3, 4, 5, ETC.			
5	50	RDA				

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15
 LISTING OF INPUT DATA ON UNIT = 5

INPUT UNIT	WRITE UNIT	CARD NUMBER		CARD IMAGE
5	50	50	DEC	
5	50	51	DEC	6.9444E-4 2 3 4 2
5	50	52	DEC	1.3889E-3 3 4 4 0
5	50	53	DEC	4.1667E-2 4 5 4 0
5	50	54	DEC	2.5000E-1 5 6 4 0
5	50	55	DEC	1.0 6 7 4 0
5	50	56	DEC	4.0 7 8 4 0
5	50	57	DEC	7.0 8 9 4 0
5	50	58	DEC	14.0 9 10 4 0
5	50	59	DEC	21.0 10 11 4 0
5	50	60	RDA	30.0 11 12 4 0
5	50	61	HED	
5	50	62	HED	2 DISCHARGE
5	50	63	HED	FUEL 1m
5	50	64	HED	FUEL 2m
5	50	65	HED	FUEL 1h
5	50	66	HED	FUEL 6h
5	50	67	HED	FUEL 1D
5	50	68	HED	FUEL 4D
5	50	69	HED	FUEL 7D
5	50	70	HED	FUEL 14D
5	50	71	HED	FUEL 21D
5	50	72	RDA	FUEL 30D
5	50	73	OUT	12 1 -1 0
5	50	74	END	
5	50	75	2 922340	305.0 922350 39300.0 922380 960395. 0 0.0 FUEL 3.93%
5	50	76	0	

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15
 NEUTRON YIELD PER NEUTRON-INDUCED FISSION

OUTPUT UNIT = 6

NUCLIDE	YIELD	NUCLIDE	YIELD	NUCLIDE	YIELD	NUCLIDE	YIELD	NUCLIDE	YIELD	NUCLIDE	YIELD	NUCLIDE	YIELD	PAGE
832090	0.0000	882230	0.0000	882260	0.0000	882280	0.0000	892270	0.0000	902270	0.0000	902270	0.0000	5
902280	0.0000	902290	2.0490	902300	0.0000	902320	2.4180	902330	0.0000	902340	0.0000	902340	0.0000	
912310	0.0000	912320	0.0000	912330	2.6630	912341	0.0000	912340	0.0000	922300	0.0000	922300	0.0000	
922310	0.0000	922320	0.0000	922330	2.4990	922340	2.6310	922350	2.4210	922360	2.7340	922360	2.7340	
922370	0.0000	922380	2.8010	922390	0.0000	922400	0.0000	932360	0.0000	932370	3.0050	932370	3.0050	
932380	0.0000	932390	0.0000	942360	2.8700	942370	0.0000	942380	2.8330	942390	2.8750	942390	2.8750	
942400	3.1350	942410	2.9340	942420	3.2800	942430	0.0000	952410	3.2770	952421	3.1620	952421	3.1620	
952420	3.3600	952430	3.7320	952441	0.0000	952440	0.0000	962420	3.7460	962430	3.4340	962430	3.4340	
962440	3.7250	962450	3.8320	962460	3.8580	962470	3.5920	962480	3.7960	962490	0.0000	962490	0.0000	
972490	3.7600	982490	4.0620	982500	3.9700	982510	4.1400	982520	4.1260	982530	4.1500	982530	4.1500	
982540	0.0000	992530	0.0000	992541	0.0000	992540	0.0000	0	0.0000	0	0.0000	0	0.0000	

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15
 SPONTANEOUS FISSION NEUTRON YIELD, NEUT/FISSION

NUCLIDE	NUCLIDE	NUCLIDE	NUCLIDE	NUCLIDE	NUCLIDE	NUCLIDE	NUCLIDE	NUCLIDE
922350	1.6950	922360	1.6500	922370	1.8720	922380	2.0000	922390
932360	1.7830	932370	1.8730	932380	1.9630	932390	2.0530	942360
942380	2.2800	942390	2.2400	942400	2.1600	942410	2.2500	942420
942440	2.3000	952400	2.2900	952410	2.3830	952420	2.4750	952421
952440	2.6570	952441	2.6650	962410	2.5000	962420	2.5900	962430
962450	2.8720	962460	3.0000	962480	3.3200	962500	3.5600	972490
982500	3.5600	982520	3.7250	982540	3.9000	992530	3.9200	992540

THE REMAINING NEUTRON YIELDS ARE CALCULATED FROM THE EQUATION: NEUT/FISSION= (2.84+0.1225*(AT WT-244)

46	0.00000000	1.00000000	0.00050000	0.00000000	1.00000000	1.00000000	1.00000000	0.00000000	0.00000000	1.00000000	1.00000000
47	0.00000000	1.00000000	0.00050000	0.00000000	1.00000000	1.00000000	1.00000000	0.00000000	0.00000000	1.00000000	1.00000000
48	0.00000000	1.00000000	0.00050000	0.00000000	1.00000000	1.00000000	1.00000000	0.00000000	0.00000000	1.00000000	1.00000000
49	0.00000000	1.00000000	0.00050000	0.00000000	1.00000000	1.00000000	1.00000000	0.00000000	0.00000000	1.00000000	1.00000000

95	0.0000000	1.0000000	0.0005000	0.0000000	0.0010000	0.0010000	0.0010000	0.0000000	0.0000000	1.0000000
96	0.0000000	1.0000000	0.0005000	0.0000000	0.0010000	0.0010000	0.0010000	0.0000000	0.0000000	1.0000000
97	0.0000000	1.0000000	0.0005000	0.0000000	0.0010000	0.0010000	0.0010000	0.0000000	0.0000000	1.0000000
98	0.0000000	1.0000000	0.0005000	0.0000000	0.0010000	0.0010000	0.0010000	0.0000000	0.0000000	1.0000000
99	0.0000000	1.0000000	0.0005000	0.0000000	0.0010000	0.0010000	0.0010000	0.0000000	0.0000000	1.0000000

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15
 ELEMENT ASSIGNMENTS TO FRACTIONAL RECOVERY GROUPS

ELEM GROUP	ELEM GROUP	ELEM GROUP	ELEM GROUP	ELEM GROUP	ELEM GROUP	ELEM GROUP	ELEM GROUP	ELEM GROUP	ELEM GROUP	ELEM GROUP	ELEM GROUP						
1	14	2	13	3	1	4	1	5	1	6	13	7	13	8	1	9	12
10	13	11	1	12	1	13	1	14	1	15	1	16	1	17	12	18	13
19	1	20	1	21	1	22	1	23	1	24	1	25	1	26	1	27	1
28	1	29	1	30	1	31	1	32	1	33	1	34	1	35	12	36	13
37	1	38	1	39	1	40	1	41	1	42	1	43	1	44	1	45	1
46	1	47	1	48	1	49	1	50	1	51	1	52	1	53	12	54	13
55	1	56	1	57	1	58	1	59	1	60	1	61	1	62	1	63	1
64	1	65	1	66	1	67	1	68	1	69	1	70	1	71	1	72	1
73	1	74	1	75	1	76	1	77	1	78	1	79	1	80	1	81	1
82	1	83	1	84	1	85	1	86	13	87	1	88	1	89	1	90	2
91	3	92	4	93	5	94	6	95	7	96	8	97	9	98	10	99	11

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15
 CHEMICAL TOXICITIES, GRAMS PER M**3 WATER

NUCLIDE	TOXICITY	NUCLIDE	TOXICITY	NUCLIDE	TOXICITY	NUCLIDE	TOXICITY	NUCLIDE	TOXICITY	NUCLIDE	TOXICITY	NUCLIDE	TOXICITY	NUCLIDE	TOXICITY
1	3.50E+03	2	2.00E-01	3	5.00E+00	4	1.00E+00	5	1.00E+00	6	4.00E+02				
7	1.00E-02	8	9.45E+05	9	1.00E+00	10	1.00E+00	11	1.00E+03	12	1.00E+01				
13	1.00E-02	14	5.00E+00	15	1.00E-02	16	5.00E+01	17	1.50E-01	18	1.00E+01				
19	1.00E+03	20	3.00E+01	21	5.00E-01	22	1.00E-01	23	1.00E-01	24	2.00E-02				
25	1.00E-02	26	5.00E-02	27	5.00E-02	28	5.00E-02	29	1.00E-02	30	5.00E-02				
31	2.00E-01	32	5.00E-01	33	1.00E-02	34	1.00E-02	35	3.00E+00	36	4.00E+01				
37	5.00E+01	38	1.00E+01	39	1.00E-03	40	1.00E+00	41	2.00E-02	42	5.00E-01				
43	1.00E+02	44	1.00E+00	45	5.00E-02	46	5.00E-02	47	1.00E-03	48	1.00E-02				
49	2.00E-02	50	5.00E-02	51	5.00E-02	52	2.00E-01	53	1.00E+01	54	1.50E+02				
55	5.00E+00	56	5.00E-01	57	1.00E+00	58	2.00E+00	59	1.00E+00	60	2.00E-01				
61	1.00E+00	62	2.00E-01	63	2.00E-01	64	2.00E-01	65	5.00E-01	66	1.00E+00				
67	1.00E+00	68	1.00E-01	69	2.00E-01	70	1.00E-01	71	1.00E-01	72	5.00E-02				
73	1.00E+00	74	1.00E+02	75	1.00E+01	76	1.00E+00	77	8.00E-01	78	3.00E-01				
79	2.00E-02	80	2.00E-03	81	5.00E-03	82	1.00E-02	83	1.00E-01	84	2.00E-01				
85	1.00E+01	86	5.00E+02	87	5.00E+00	88	1.00E-03	89	2.00E-02	90	5.00E-04				
91	5.00E-03	92	5.00E-01	93	8.00E-03	94	8.00E-04	95	4.00E-02	96	5.00E-01				
97	5.00E-03	98	1.00E-02	99	1.00E-02										

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ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15
1 0 RDA * RDA Monticello Calc 2004-07600 Max Burnup 1918 MWt
2 0 RDA * RDA 1 MTIHM, E=3.93%, 54000 MWD/MT (BWRUE), ONLY FUEL
3 0 RDA * RDA ** CROSS SECTION LIBRARY = BWRUE, 4 CYCLE
4 0 RDA * RDA -1 = FRESH BWR FUEL WITH IMPURITIES (1 MT = 1000 KG)
5 0 RDA * RDA WARNING: VECTORS ARE CHANGED WITH RESPECT TO CONTENT.
6 0 RDA * RDA THESE CHANGES WILL BE NOTED ON RDA CARDS.
7 0 CUT * CUT 5 1.0E-11 7 1.0E-10 9 1.0E-10 -1
8 0 LIP * LIP 0 0
9 0 RDA * RDA DECAT LIB XSECT LIB 9 50 0 1 VAR. XSECT
10 0 LIB * LIB 0 1 2 3 657 658 659
11 0 RDA * RDA PHOTON LIB
12 0 PHO * PHO 101 102 103 10
13 0 TIT * TIT INITIAL COMP. OF UNIT AMOUNTS OF FUEL AND STRUCTURAL MAT'IS
14 0 RDA * RDA READ FUEL COMPOSITION INCLUDING IMPURITIES (1000 KG)
15 0 INP * INP -1 1 -1 -1 1 1
16 0 RDA * RDA IRRADIATION OF ONE METRIC TON OF BWRU FUEL
17 0 TIT * TIT IRRADIATION OF ONE METRIC TON OF BWRU FUEL
18 0 RDA * RDA *****PRINT OUT CONTROL*****
19 0 OPTL * OPTL 4*8 7 8 7 8 7 15*8
20 0 OPTA * OPTA 4*8 7 8 7 8 7 15*8
21 0 OPTF * OPTF 4*8 7 8 7 8 7 15*8
22 0 MOV * MOV -1 1 0 1.0
23 0 RDA * RDA
24 0 BUP * BUP
25 0 IRP * IRP 200.0 21.655 1 2 4 2 BURNUP= 4,331 MWD/MTIHM
26 0 IRP * IRP 600.0 21.655 2 3 4 0 BURNUP=12,993 MWD/MTIHM
27 0 IRP * IRP 1000.0 21.655 3 4 4 0 BURNUP=21,655 MWD/MTIHM
28 0 IRP * IRP 1400.0 21.655 4 5 4 0 BURNUP=30,317 MWD/MTIHM
29 0 IRP * IRP 1800.0 21.655 5 6 4 0 BURNUP=38,979 MWD/MTIHM
30 0 IRP * IRP 2200.0 21.655 6 7 4 0 BURNUP=47,641 MWD/MTIHM
31 0 IRP * IRP 2493.68 21.655 7 8 4 0 BURNUP=54,000 MWD/MTIHM
32 0 BUP * BUP
33 0 HED * HED 1 *BOC #1
34 0 HED * HED 8 *EOC #1
35 0 OUT * OUT 8 1 0 0
36 0 RDA * RDA 8 = IRRADIATED U FUEL AT DISCHARGE
37 0 RDA * RDA
38 0 RDA * RDA ***** OUTPUT MODULE *****
39 0 TIT * TIT Monticello Calc 2004-07600 Max Burnup 1918 MWt
40 0 TIT * TIT 1 MTIHM, E=3.93%, 54000 MWD/MT (BWRUE)
41 0 RDA * RDA ONLY FUEL
42 0 RDA * RDA MOVE FUEL AT CHARGE TO 1, MOVE FUEL AT DISCHARGE TO 2
43 0 MOV * MOV 8 2 0 1.0
44 0 RDA * RDA *****DECAY MODULE *****
45 0 RDA * RDA DISCHARGED FUEL IN 2, DECAYED FUEL IN 3, 4, 5, ETC.
46 0 RDA * RDA
47 0 DEC * DEC 6.9444E-4 2 3 4 2
48 0 DEC * DEC 1.3889E-3 3 4 4 0
49 0 DEC * DEC 4.1667E-2 4 5 4 0
  
```

OUTPUT UNIT = 6

```

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15
50 0 DEC * DEC 2.5000E-1 5 6 4 0
51 0 DEC * DEC 1.0 6 7 4 0
52 0 DEC * DEC 4.0 7 8 4 0
53 0 DEC * DEC 7.0 8 9 4 0
54 0 DEC * DEC 14.0 9 10 4 0
55 0 DEC * DEC 21.0 10 11 4 0
56 0 DEC * DEC 30.0 11 12 4 0
57 0 RDA * RDA
58 0 HED * HED 2 DISCHARGE
59 0 HED * HED 3 FUEL 1m
60 0 HED * HED 4 FUEL 2m
61 0 HED * HED 5 FUEL 1h
62 0 HED * HED 6 FUEL 6h
63 0 HED * HED 7 FUEL 1D
64 0 HED * HED 8 FUEL 4D
65 0 HED * HED 9 FUEL 7D
66 0 HED * HED 10 FUEL 14D
67 0 HED * HED 11 FUEL 21D
68 0 HED * HED 12 FUEL 30D
69 0 RDA * RDA
70 0 OUT * OUT 12 1 -1 0
71 0 END * END
  
```

SUM OF YIELDS FOR EACH FISSILE ISOTOPE:

0.0000E+00 0.0000E+00 2.0003E+00 1.9997E+00 2.0006E+00 2.0001E+00

ISOTOPES FOR WHICH YIELDS ARE EXPLICITLY ACCOUNTED FOR: 922350 922380 942390 942410

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
 POWER= 2.16550E+01 MW, BURNUP= 5.40006E+04 MWD, FLUX= 2.35E+14 N/CM**2-SEC

REACTIVITY AND BURNUP DATA

BASIS=

TIME, SEC	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
NEUT. FLUX	0.00E+00	1.73E+07	5.18E+07	8.64E+07	1.21E+08	1.56E+08	1.90E+08	2.15E+08
SP POW/MW	0.00E+00	1.87E+14	1.90E+14	2.03E+14	2.25E+14	2.51E+14	2.80E+14	3.06E+14
BURNUP/MWD	0.00E+00	2.17E+01	2.17E+01	2.17E+01	2.17E+01	2.17E+01	2.17E+01	2.17E+01
K INFINITY	0.00000	1.31088	1.22339	1.17256	1.13750	1.11431	1.10456	1.11608
NEUT PROD	0.00E+00	8.99E+03	8.94E+03	8.58E+03	8.15E+03	7.78E+03	7.53E+03	7.44E+03
NEUT DEST	0.00E+00	6.86E+03	7.31E+03	7.32E+03	7.17E+03	6.98E+03	6.81E+03	6.66E+03
TOT BURNUP	0.00E+00	5.40E+04	5.40E+04	5.40E+04	5.40E+04	5.40E+04	5.40E+04	5.40E+04
AVG N FLUX	0.00E+00	2.35E+14	2.35E+14	2.35E+14	2.35E+14	2.35E+14	2.35E+14	2.35E+14
AVG SP POW	0.00E+00	2.17E+01	2.17E+01	2.17E+01	2.17E+01	2.17E+01	2.17E+01	2.17E+01

SIZE OF MMAX (I): MMAX= 1 #= 876 MMAX= 2 #= 431 MMAX= 3 #= 143 MMAX= 4 #= 51 MMAX= 5 #= 86 MMAX= 6 #= 58
 MMAX= 7 #= 44 MMAX= 8 #= 0 MMAX= 9 #= 0 MMAX= 10 #= 0 MMAX= 11 #= 0 MMAX= 12 #= 0

THE NUMBER OF NON-ZERO TERMS IN A=6473
 THE NUMBER OF NON-ZERO FISSION PRODUCT YIELDS=3254
 ILITE= 688 IACT= 129 IFP= 879 ITOT=1696
 THE NUMBER OF NON-ZERO NATURAL ABUNDANCES= 437
 THE NUMBER OF NON-ZERO PHOTON YIELDS= 7903
 THE MAXIMUM NUMBER OF TERMS IN AP= 3207
 SUMTOT 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
 TOTAL 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
ACTINIDES+DAUGHTERS
POWER= 2.16550E+01 MW, BURNUP= 5.40006E+04 MWD, FLUX= 2.35E+14 N/CM**2-SEC

5 SUMMARY TABLE: CONCENTRATIONS, GRAMS

HE	4	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
HE	4	0.000E+00	3.754E-04	1.133E-02	9.109E-02	3.323E-01	8.003E-01	1.514E+00	2.189E+00
PB208		0.000E+00	1.511E-09	5.143E-08	3.191E-07	1.163E-06	3.158E-06	7.032E-06	1.152E-05
TH228		0.000E+00	2.623E-08	3.251E-07	1.325E-06	3.624E-06	7.771E-06	1.403E-05	1.987E-05
TH230		0.000E+00	4.351E-04	1.139E-03	1.639E-03	1.951E-03	2.094E-03	2.095E-03	2.026E-03
TH232		0.000E+00	7.810E-06	6.333E-05	1.593E-04	2.835E-04	4.249E-04	5.734E-04	6.817E-04
TH234		0.000E+00	1.387E-05	1.383E-05	1.375E-05	1.366E-05	1.356E-05	1.344E-05	1.336E-05
PA231		0.000E+00	3.325E-05	1.534E-04	3.102E-04	4.719E-04	6.109E-04	7.067E-04	7.439E-04
PA233		0.000E+00	6.108E-07	4.420E-06	9.951E-06	1.677E-05	2.421E-05	3.149E-05	3.643E-05
U232		0.000E+00	1.210E-05	7.195E-05	2.258E-04	5.237E-04	9.965E-04	1.642E-03	2.203E-03
U233		0.000E+00	3.777E-04	9.173E-04	1.272E-03	1.506E-03	1.656E-03	1.751E-03	1.800E-03
U234		3.050E+02	2.876E+02	2.552E+02	2.248E+02	1.958E+02	1.687E+02	1.441E+02	1.280E+02
U235		3.930E+04	3.442E+04	2.631E+04	1.973E+04	1.436E+04	1.008E+04	6.798E+03	4.957E+03
U236		0.000E+00	9.575E+02	2.477E+03	3.608E+03	4.419E+03	4.937E+03	5.188E+03	5.222E+03
U237		0.000E+00	1.856E+00	3.842E+00	5.674E+00	7.501E+00	9.249E+00	1.077E+01	1.184E+01
U238		9.604E+05	9.577E+05	9.523E+05	9.465E+05	9.402E+05	9.332E+05	9.254E+05	9.192E+05
U239		0.000E+00	2.834E-01	2.859E-01	3.043E-01	3.339E-01	3.701E-01	4.090E-01	4.445E-01
U240		0.000E+00	5.089E-06	5.208E-06	5.936E-06	7.197E-06	8.907E-06	1.097E-05	1.304E-05
NP235		0.000E+00	5.643E-08	6.404E-07	1.915E-06	3.852E-06	6.332E-06	9.110E-06	1.118E-05
NP236M		0.000E+00	2.977E-07	1.633E-06	3.904E-06	7.222E-06	1.156E-05	1.665E-05	2.088E-05
NP236		0.000E+00	5.665E-06	6.953E-05	2.162E-04	4.391E-04	7.145E-04	1.007E-03	1.211E-03
NP237		0.000E+00	2.372E+01	1.282E+02	2.860E+02	4.788E+02	6.863E+02	8.863E+02	1.016E+03
NP238		0.000E+00	3.498E-02	1.918E-01	4.584E-01	8.473E-01	1.355E+00	1.949E+00	2.443E+00
NP239		0.000E+00	4.081E+01	4.117E+01	4.382E+01	4.809E+01	5.329E+01	5.889E+01	6.399E+01
NP240M		0.000E+00	9.079E-06	9.291E-06	1.059E-05	1.284E-05	1.589E-05	1.957E-05	2.326E-05
NP240		0.000E+00	4.449E-04	4.553E-04	5.189E-04	6.291E-04	7.785E-04	9.588E-04	1.140E-03
Pu236		0.000E+00	8.317E-06	1.147E-04	3.969E-04	8.981E-04	1.631E-03	2.563E-03	3.332E-03
Pu237		0.000E+00	1.205E-06	1.430E-05	5.250E-05	1.357E-04	2.816E-04	4.979E-04	6.678E-04
Pu238		0.000E+00	9.388E-01	1.441E+01	5.579E+01	1.385E+02	2.692E+02	4.440E+02	5.928E+02
Pu239		0.000E+00	1.866E+03	3.810E+03	4.750E+03	5.337E+03	5.807E+03	6.254E+03	6.617E+03
Pu240		0.000E+00	1.500E+02	7.052E+02	1.241E+03	1.754E+03	2.295E+03	2.909E+03	3.443E+03
Pu241		0.000E+00	3.441E+01	4.106E+02	8.945E+02	1.279E+03	1.529E+03	1.672E+03	1.708E+03
Pu242		0.000E+00	9.271E-01	3.656E+01	1.498E+02	3.288E+02	5.393E+02	7.468E+02	8.825E+02
Pu243		0.000E+00	1.508E-04	5.954E-03	2.547E-02	6.024E-02	1.075E-01	1.617E-01	2.041E-01
Pu244		0.000E+00	1.385E-06	2.510E-04	2.672E-03	1.223E-02	3.696E-02	8.644E-02	1.437E-01
AM241		0.000E+00	2.300E-01	8.247E+00	2.960E+01	5.551E+01	7.707E+01	9.075E+01	9.604E+01
AM242M		0.000E+00	2.716E-03	2.286E-01	1.133E+00	2.489E+00	3.757E+00	4.626E+00	5.001E+00
AM242		0.000E+00	2.998E-04	1.058E-02	3.829E-02	7.465E-02	1.088E-01	1.342E-01	1.466E-01
AM243		0.000E+00	2.100E-02	2.633E+00	1.948E+01	6.330E+01	1.386E+02	2.386E+02	3.194E+02
AM244M		0.000E+00	4.167E-07	5.302E-05	4.200E-04	1.508E-03	3.686E-03	7.073E-03	1.036E-02
AM244		0.000E+00	5.105E-07	6.494E-05	5.144E-04	1.847E-03	4.514E-03	8.661E-03	1.268E-02
CM242		0.000E+00	9.515E-03	8.663E-01	4.566E+00	1.083E+01	1.777E+01	2.362E+01	2.676E+01

CM243	0.000E+00	2.934E-05	8.624E-03	8.453E-02	3.062E-01	6.867E-01	1.154E+00	1.491E+00
CM244	0.000E+00	5.827E-04	2.387E-01	3.319E+00	1.707E+01	5.432E+01	1.290E+02	2.136E+02
CM245	0.000E+00	3.352E-06	4.030E-03	9.282E-02	6.626E-01	2.667E+00	7.547E+00	1.382E+01
CM246	0.000E+00	2.557E-08	1.001E-04	4.250E-03	4.793E-02	2.821E-01	1.114E+00	2.552E+00
CM247	0.000E+00	2.788E-11	3.412E-07	2.547E-05	4.306E-04	3.495E-03	1.803E-02	4.900E-02
CM248	0.000E+00	1.462E-13	5.687E-09	7.597E-07	1.973E-05	2.277E-04	1.594E-03	5.304E-03
BK249	0.000E+00	2.454E-16	2.540E-11	5.150E-09	1.751E-07	2.461E-06	2.004E-05	7.318E-05
CF249	0.000E+00	8.752E-18	2.627E-12	8.205E-10	3.535E-08	5.719E-07	5.081E-06	1.912E-05
CF250	0.000E+00	1.075E-17	2.691E-12	7.648E-10	3.155E-08	5.023E-07	4.435E-06	1.702E-05
CF251	0.000E+00	1.006E-18	6.391E-13	2.628E-10	1.344E-08	2.464E-07	2.409E-06	9.704E-06

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
ACTINIDES+DAUGHTERS
POWER= 2.16550E+01 MW, BURNUP= 5.40006E+04 MWD, FLUX= 2.35E+14 N/CM**2-SEC

5 SUMMARY TABLE: CONCENTRATIONS, GRAMS

BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
SF250	0.000E+00	3.188E-10	3.842E-08	4.173E-07	1.860E-06	5.550E-06	1.325E-05
SUMTOT	1.000E+06	9.955E+05	9.865E+05	9.776E+05	9.687E+05	9.598E+05	9.510E+05
TOTAL	1.000E+06	9.955E+05	9.865E+05	9.776E+05	9.687E+05	9.598E+05	9.510E+05

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
 ACTINIDES+DAUGHTERS
 POWER= 2.16550E+01 MW, BURNUP= 5.40006E+04 MWD, FLUX= 2.35E+14 N/CM**2-SEC

5 SUMMARY TABLE: CONCENTRATIONS, GRAMS

BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
HE	0.000E+00	3.754E-04	1.133E-02	9.109E-02	3.323E-01	8.003E-01	1.514E+00
SF	0.000E+00	3.188E-10	3.842E-08	4.173E-07	1.860E-06	5.550E-06	1.325E-05
PB	0.000E+00	1.528E-09	5.166E-08	3.201E-07	1.166E-06	3.163E-06	7.043E-06
TH	0.000E+00	4.572E-04	1.217E-03	1.815E-03	2.254E-03	2.544E-03	2.702E-03
PA	0.000E+00	3.393E-05	1.581E-04	3.208E-04	4.897E-04	6.366E-04	7.401E-04
U	1.000E+06	9.934E+05	9.813E+05	9.701E+05	9.592E+05	9.484E+05	9.375E+05
NP	0.000E+00	6.457E+01	1.695E+02	3.303E+02	5.277E+02	7.410E+02	9.471E+02
PU	0.000E+00	2.052E+03	4.977E+03	7.091E+03	8.837E+03	1.044E+04	1.203E+04
AM	0.000E+00	2.540E-01	1.112E+01	5.025E+01	1.214E+02	2.195E+02	3.341E+02
CM	0.000E+00	1.013E-02	1.118E+00	8.066E+00	2.892E+01	7.573E+01	1.625E+02
BK	0.000E+00	2.455E-16	2.541E-11	5.153E-09	1.752E-07	2.463E-06	2.006E-05
CF	0.000E+00	2.055E-17	6.042E-12	1.910E-09	8.512E-08	1.444E-06	1.355E-05
SUMTOT	1.000E+06	9.955E+05	9.865E+05	9.776E+05	9.687E+05	9.598E+05	9.510E+05
TOTAL	1.000E+06	9.955E+05	9.865E+05	9.776E+05	9.687E+05	9.598E+05	9.510E+05

CUMULATIVE TABLE TOTALS

AP+FP	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ACT+FP	1.000E+06	9.955E+05	9.865E+05	9.776E+05	9.687E+05	9.598E+05	9.510E+05
AP+ACT+FP	1.000E+06	9.955E+05	9.865E+05	9.776E+05	9.687E+05	9.598E+05	9.510E+05

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
 ACTINIDES+DAUGHTERS
 POWER= 2.16550E+01 MW, BURNUP= 5.40006E+04 MWD, FLUX= 2.35E+14 N/CM**2-SEC

7 SUMMARY TABLE: RADIOACTIVITY, CURIES

	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
TL208	0.000E+00	7.726E-06	9.582E-05	3.909E-04	1.069E-03	2.294E-03	4.145E-03	5.876E-03
PB212	0.000E+00	2.150E-05	2.667E-04	1.088E-03	2.976E-03	6.385E-03	1.154E-02	1.636E-02
BI212	0.000E+00	2.150E-05	2.667E-04	1.088E-03	2.976E-03	6.385E-03	1.154E-02	1.636E-02
PO212	0.000E+00	1.378E-05	1.709E-04	6.970E-04	1.907E-03	4.091E-03	7.391E-03	1.048E-02
PO216	0.000E+00	2.150E-05	2.667E-04	1.088E-03	2.976E-03	6.385E-03	1.154E-02	1.636E-02
RN220	0.000E+00	2.150E-05	2.667E-04	1.088E-03	2.976E-03	6.385E-03	1.154E-02	1.636E-02
RA224	0.000E+00	2.150E-05	2.667E-04	1.088E-03	2.976E-03	6.385E-03	1.154E-02	1.636E-02
TH228	0.000E+00	2.150E-05	2.666E-04	1.087E-03	2.971E-03	6.372E-03	1.151E-02	1.629E-02
TH231	0.000E+00	2.092E-01	4.145E-01	5.940E-01	7.563E-01	8.908E-01	9.839E-01	1.036E+00
TH233	0.000E+00	2.857E-04	2.351E-03	6.333E-03	1.245E-02	2.084E-02	3.134E-02	4.076E-02
TH234	0.000E+00	3.212E-01	3.204E-01	3.185E-01	3.164E-01	3.140E-01	3.114E-01	3.094E-01
PA232	0.000E+00	2.636E-02	1.234E-01	2.673E-01	4.492E-01	6.492E-01	8.368E-01	9.638E-01
PA233	0.000E+00	1.268E-02	9.178E-02	2.066E-01	3.482E-01	5.026E-01	6.537E-01	7.565E-01
PA234M	0.000E+00	3.213E-01	3.211E-01	3.202E-01	3.195E-01	3.191E-01	3.188E-01	3.188E-01
PA234	0.000E+00	5.126E-04	1.120E-03	2.110E-03	3.569E-03	5.496E-03	7.778E-03	9.735E-03
U232	0.000E+00	2.590E-04	1.541E-03	4.836E-03	1.121E-02	2.134E-02	3.516E-02	4.717E-02
U234	1.907E+00	1.798E+00	1.596E+00	1.405E+00	1.224E+00	1.054E+00	9.008E-01	8.002E-01
U235	8.498E-02	7.444E-02	5.689E-02	4.267E-02	3.106E-02	2.180E-02	1.470E-02	1.072E-02
U236	0.000E+00	6.197E-02	1.603E-01	2.335E-01	2.860E-01	3.195E-01	3.358E-01	3.380E-01
U237	0.000E+00	1.515E+05	3.137E+05	4.633E+05	6.125E+05	7.552E+05	8.795E+05	9.672E+05
U238	3.230E-01	3.221E-01	3.203E-01	3.183E-01	3.162E-01	3.138E-01	3.112E-01	3.092E-01
U239	0.000E+00	9.478E+06	9.560E+06	1.018E+07	1.117E+07	1.238E+07	1.368E+07	1.487E+07
U240	0.000E+00	4.715E+00	4.825E+00	5.499E+00	6.668E+00	8.252E+00	1.016E+01	1.208E+01
NP235	0.000E+00	7.920E-05	8.988E-04	2.688E-03	5.407E-03	8.887E-03	1.279E-02	1.570E-02
NP236M	0.000E+00	1.758E-01	9.641E-01	2.305E+00	4.264E+00	6.828E+00	9.829E+00	1.233E+01
NP237	0.000E+00	1.673E-02	9.038E-02	2.017E-01	3.376E-01	4.840E-01	6.250E-01	7.163E-01
NP238	0.000E+00	9.070E+03	4.973E+04	1.188E+05	2.197E+05	3.514E+05	5.054E+05	6.335E+05
NP239	0.000E+00	9.471E+06	9.554E+06	1.017E+07	1.116E+07	1.237E+07	1.367E+07	1.485E+07
NP240M	0.000E+00	9.615E+02	9.840E+02	1.122E+03	1.360E+03	1.683E+03	2.072E+03	2.464E+03
NP240	0.000E+00	5.365E+03	5.490E+03	6.257E+03	7.586E+03	9.388E+03	1.156E+04	1.374E+04
PB236	0.000E+00	4.421E-03	6.099E-02	2.110E-01	4.774E-01	8.670E-01	1.362E+00	1.771E+00
PB237	0.000E+00	1.456E-02	1.729E-01	6.346E-01	1.640E+00	3.404E+00	6.018E+00	8.072E+00
PB238	0.000E+00	1.608E+01	2.468E+02	9.555E+02	2.372E+03	4.610E+03	7.604E+03	1.015E+04
PB239	0.000E+00	1.160E+02	2.369E+02	2.954E+02	3.319E+02	3.611E+02	3.889E+02	4.115E+02
PB240	0.000E+00	3.420E+01	1.608E+02	2.828E+02	3.998E+02	5.233E+02	6.632E+02	7.849E+02
PB241	0.000E+00	3.547E+03	4.232E+04	9.219E+04	1.318E+05	1.576E+05	1.724E+05	1.760E+05
PB242	0.000E+00	3.541E-03	1.396E-01	5.721E-01	1.256E+00	2.060E+00	2.853E+00	3.371E+00
PB243	0.000E+00	3.925E+02	1.550E+04	6.632E+04	1.568E+05	2.799E+05	4.210E+05	5.313E+05
PB245	0.000E+00	1.870E-05	3.437E-03	3.918E-02	1.981E-01	6.686E-01	1.743E+00	3.170E+00
AM240	0.000E+00	8.046E-04	2.935E-02	1.131E-01	2.347E-01	3.642E-01	4.783E-01	5.544E-01
AM241	0.000E+00	7.895E-01	2.832E+01	1.016E+02	1.906E+02	2.646E+02	3.116E+02	3.297E+02

AM242M	0.000E+00	2.640E-02	2.223E+00	1.102E+01	2.420E+01	3.653E+01	4.498E+01	4.863E+01
AM242	0.000E+00	2.425E+02	8.558E+03	3.097E+04	6.037E+04	8.800E+04	1.085E+05	1.186E+05
AM243	0.000E+00	4.187E-03	5.251E-01	3.884E+00	1.262E+01	2.763E+01	4.758E+01	6.370E+01
AM244M	0.000E+00	1.236E+01	1.572E+03	1.245E+04	4.472E+04	1.093E+05	2.097E+05	3.072E+05
AM244	0.000E+00	6.494E-01	8.261E+01	6.544E+02	2.350E+03	5.742E+03	1.102E+04	1.614E+04
AM245	0.000E+00	1.870E-05	3.437E-03	3.918E-02	1.981E-01	6.686E-01	1.743E+00	3.170E+00
CM241	0.000E+00	2.334E-06	5.062E-04	2.889E-03	7.682E-03	1.424E-02	2.130E-02	2.503E-02
CM242	0.000E+00	3.147E+01	2.866E+03	1.510E+04	3.583E+04	5.878E+04	7.813E+04	8.851E+04
CM243	0.000E+00	1.515E-03	4.453E-01	4.365E+00	1.581E+01	3.546E+01	5.961E+01	7.700E+01
CM244	0.000E+00	4.717E-02	1.932E+01	2.687E+02	1.381E+03	4.397E+03	1.044E+04	1.729E+04

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
 ACTINIDES+DAUGHTERS
 POWER= 2.16550E+01 MW, BURNUP= 5.40006E+04 MWD, FLUX= 2.35E+14 N/CM**2-SEC

7 SUMMARY TABLE: RADIOACTIVITY, CURIES

	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
CM245	0.000E+00	5.758E-07	6.922E-04	1.594E-02	1.138E-01	4.581E-01	1.296E+00
CM246	0.000E+00	7.858E-09	3.075E-05	1.306E-03	1.473E-02	8.668E-02	3.423E-01
CM249	0.000E+00	1.096E-11	4.324E-07	6.185E-05	1.774E-03	2.287E-02	1.784E-01
BK249	0.000E+00	4.023E-13	4.163E-08	8.442E-06	2.871E-04	4.035E-03	3.286E-02
BK250	0.000E+00	5.539E-13	5.815E-08	1.263E-05	4.744E-04	7.444E-03	6.756E-02
CF252	0.000E+00	2.253E-17	4.527E-11	3.312E-08	2.568E-06	6.607E-05	8.636E-04
SUMTOT	2.315E+00	1.912E+07	1.956E+07	2.115E+07	2.360E+07	2.657E+07	2.976E+07
TOTAL	2.315E+00	1.912E+07	1.956E+07	2.115E+07	2.360E+07	2.657E+07	2.976E+07

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

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 ACTINIDES+DAUGHTERS
 POWER= 2.16550E+01 MW, BURNUP= 5.40006E+04 MWD, FLUX= 2.35E+14 N/CM**2-SEC

7 SUMMARY TABLE: RADIOACTIVITY, CURIES

	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
TL	0.000E+00	7.738E-06	9.596E-05	3.913E-04	1.070E-03	2.296E-03	4.147E-03	5.879E-03
PB	0.000E+00	2.152E-05	2.669E-04	1.088E-03	2.977E-03	6.387E-03	1.154E-02	1.636E-02
BI	0.000E+00	2.152E-05	2.669E-04	1.088E-03	2.977E-03	6.387E-03	1.154E-02	1.636E-02
PO	0.000E+00	3.530E-05	4.377E-04	1.785E-03	4.884E-03	1.048E-02	1.893E-02	2.684E-02
RN	0.000E+00	2.152E-05	2.668E-04	1.088E-03	2.977E-03	6.386E-03	1.154E-02	1.636E-02
RA	0.000E+00	2.152E-05	2.669E-04	1.088E-03	2.977E-03	6.387E-03	1.154E-02	1.636E-02
TH	0.000E+00	5.307E-01	7.376E-01	9.200E-01	1.088E+00	1.232E+00	1.338E+00	1.403E+00
PA	0.000E+00	3.609E-01	5.374E-01	7.962E-01	1.121E+00	1.476E+00	1.817E+00	2.049E+00
U	2.315E+00	9.629E+06	9.874E+06	1.064E+07	1.178E+07	1.313E+07	1.456E+07	1.583E+07
NP	0.000E+00	9.487E+06	9.610E+06	1.029E+07	1.139E+07	1.273E+07	1.418E+07	1.550E+07
PU	0.000E+00	4.106E+03	5.846E+04	1.600E+05	2.918E+05	4.430E+05	6.020E+05	7.186E+05
AM	0.000E+00	2.563E+02	1.024E+04	4.419E+04	1.077E+05	2.034E+05	3.297E+05	4.423E+05
CM	0.000E+00	3.152E+01	2.885E+03	1.537E+04	3.723E+04	6.321E+04	8.864E+04	1.059E+05
BK	0.000E+00	9.563E-13	9.980E-08	2.107E-05	7.616E-04	1.148E-02	1.004E-01	3.899E-01
CF	0.000E+00	1.237E-15	3.537E-10	1.224E-07	6.341E-06	1.282E-04	1.440E-03	6.507E-03
SUMTOT	2.315E+00	1.912E+07	1.956E+07	2.115E+07	2.360E+07	2.657E+07	2.976E+07	3.260E+07
TOTAL	2.315E+00	1.912E+07	1.956E+07	2.115E+07	2.360E+07	2.657E+07	2.976E+07	3.260E+07

CUMULATIVE TABLE TOTALS

AP+FP	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ACT+FP	2.315E+00	1.912E+07	1.956E+07	2.115E+07	2.360E+07	2.657E+07	2.976E+07	3.260E+07
AP+ACT+FP	2.315E+00	1.912E+07	1.956E+07	2.115E+07	2.360E+07	2.657E+07	2.976E+07	3.260E+07

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
 ACTINIDES+DAUGHTERS
 POWER= 2.16550E+01 MW, BURNUP= 5.40006E+04 MWD, FLUX= 2.35E+14 N/CM**2-SEC

9 SUMMARY TABLE: THERMAL POWER, WATTS

	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
TL208	0.000E+00	1.818E-07	2.255E-06	9.198E-06	2.516E-05	5.399E-05	9.754E-05	1.383E-04
PB212	0.000E+00	4.094E-08	5.078E-07	2.071E-06	5.666E-06	1.216E-05	2.196E-05	3.114E-05
BI212	0.000E+00	3.657E-07	4.535E-06	1.850E-05	5.061E-05	1.086E-04	1.962E-04	2.781E-04
PO212	0.000E+00	7.301E-07	9.055E-06	3.694E-05	1.010E-04	2.168E-04	3.917E-04	5.553E-04
PO216	0.000E+00	8.803E-07	1.092E-05	4.453E-05	1.218E-04	2.614E-04	4.722E-04	6.695E-04
RN220	0.000E+00	8.164E-07	1.013E-05	4.130E-05	1.130E-04	2.424E-04	4.380E-04	6.210E-04
RA224	0.000E+00	7.380E-07	9.153E-06	3.734E-05	1.021E-04	2.191E-04	3.959E-04	5.613E-04
TH228	0.000E+00	7.032E-07	8.719E-06	3.554E-05	9.717E-05	2.084E-04	3.763E-04	5.328E-04
TH231	0.000E+00	1.174E-04	2.326E-04	3.333E-04	4.243E-04	4.999E-04	5.521E-04	5.813E-04
TH233	0.000E+00	7.233E-07	5.950E-06	1.603E-05	3.151E-05	5.274E-05	7.932E-05	1.032E-04
TH234	0.000E+00	1.302E-04	1.299E-04	1.291E-04	1.283E-04	1.273E-04	1.263E-04	1.255E-04
PA232	0.000E+00	1.724E-04	8.067E-04	1.748E-03	2.937E-03	4.245E-03	5.471E-03	6.302E-03
PA233	0.000E+00	2.878E-05	2.083E-04	4.690E-04	7.903E-04	1.141E-03	1.484E-03	1.717E-03
PA234M	0.000E+00	1.588E-03	1.587E-03	1.582E-03	1.579E-03	1.577E-03	1.576E-03	1.575E-03
PA234	0.000E+00	7.363E-06	1.608E-05	3.030E-05	5.126E-05	7.894E-05	1.117E-04	1.398E-04
U232	0.000E+00	8.315E-06	4.946E-05	1.553E-04	3.600E-04	6.850E-04	1.129E-03	1.514E-03
U234	5.491E-02	5.178E-02	4.596E-02	4.047E-02	3.526E-02	3.037E-02	2.594E-02	2.305E-02
U235	2.226E-03	1.949E-03	1.490E-03	1.117E-03	8.135E-04	5.709E-04	3.850E-04	2.807E-04
U236	0.000E+00	1.679E-03	4.343E-03	6.326E-03	7.748E-03	8.656E-03	9.096E-03	9.156E-03
U237	0.000E+00	2.867E+02	5.935E+02	8.766E+02	1.159E+03	1.429E+03	1.664E+03	1.830E+03
U238	8.193E-03	8.170E-03	8.124E-03	8.075E-03	8.020E-03	7.961E-03	7.894E-03	7.841E-03
U239	0.000E+00	2.551E+04	2.573E+04	2.739E+04	3.006E+04	3.332E+04	3.682E+04	4.001E+04
U240	0.000E+00	3.868E-03	3.958E-03	4.511E-03	5.470E-03	6.770E-03	8.339E-03	9.914E-03
NP236M	0.000E+00	1.389E-04	7.618E-04	1.821E-03	3.369E-03	5.395E-03	7.767E-03	9.741E-03
NP237	0.000E+00	5.112E-04	2.762E-03	6.165E-03	1.032E-02	1.479E-02	1.910E-02	2.189E-02
NP238	0.000E+00	4.344E+01	2.382E+02	5.692E+02	1.052E+03	1.683E+03	2.421E+03	3.034E+03
NP239	0.000E+00	2.289E+04	2.309E+04	2.458E+04	2.697E+04	2.989E+04	3.303E+04	3.590E+04
NP240M	0.000E+00	5.572E+00	5.702E+00	6.499E+00	7.880E+00	9.751E+00	1.201E+01	1.428E+01
NP240	0.000E+00	5.686E+01	5.818E+01	6.313E+01	8.040E+01	9.950E+01	1.225E+02	1.457E+02
PB236	0.000E+00	1.538E-04	2.122E-03	7.343E-03	1.661E-02	3.017E-02	4.741E-02	6.163E-02
PB237	0.000E+00	5.368E-06	6.375E-05	2.340E-04	6.047E-04	1.255E-03	2.219E-03	2.976E-03
PB238	0.000E+00	5.328E-01	8.179E+00	3.167E+01	7.861E+01	1.528E+02	2.520E+02	3.365E+02
PB239	0.000E+00	3.575E+00	7.302E+00	9.103E+00	1.023E+01	1.113E+01	1.199E+01	1.268E+01
PB240	0.000E+00	1.065E+00	5.006E+00	8.807E+00	1.245E+01	1.629E+01	2.065E+01	2.444E+01
PB241	0.000E+00	1.100E-01	1.312E+00	2.858E+00	4.087E+00	4.885E+00	5.343E+00	5.457E+00
PB242	0.000E+00	1.046E-04	4.124E-03	1.690E-02	3.709E-02	6.083E-02	8.424E-02	9.955E-02
PB243	0.000E+00	4.530E-01	1.789E+01	7.694E+01	1.810E+02	3.231E+02	4.859E+02	6.131E+02
PB245	0.000E+00	4.434E-08	8.148E-06	9.230E-05	4.697E-04	1.585E-03	4.132E-03	7.516E-03
AM240	0.000E+00	5.266E-06	1.921E-04	7.399E-04	1.536E-03	2.383E-03	3.130E-03	3.628E-03
AM241	0.000E+00	2.623E-02	9.406E-01	3.376E+00	6.331E+00	8.790E+00	1.035E+01	1.095E+01
AM242M	0.000E+00	1.043E-05	8.781E-04	4.353E-03	9.558E-03	1.443E-02	1.777E-02	1.921E-02

AM242	0.000E+00	2.752E-01	9.714E+00	3.515E+01	6.853E+01	9.990E+01	1.232E+02	1.346E+02
AM243	0.000E+00	1.346E-04	1.688E-02	1.249E-01	4.058E-01	8.883E-01	1.529E+00	2.048E+00
AM244M	0.000E+00	3.738E-02	4.755E+00	3.767E+01	1.353E+02	3.306E+02	6.344E+02	9.293E+02
AM244	0.000E+00	3.403E-03	4.329E-01	3.429E+00	1.231E+01	3.009E+01	5.773E+01	8.456E+01
AM245	0.000E+00	3.469E-08	6.376E-06	7.269E-05	3.675E-04	1.241E-03	3.233E-03	5.881E-03
CM241	0.000E+00	9.594E-09	2.081E-06	1.188E-05	3.158E-05	5.854E-05	8.754E-05	1.029E-04
CM242	0.000E+00	1.160E+00	1.056E+02	5.564E+02	1.320E+03	2.166E+03	2.879E+03	3.261E+03
CM243	0.000E+00	5.558E-05	1.634E-02	1.602E-01	5.801E-01	1.301E+00	2.187E+00	2.825E+00
CM244	0.000E+00	1.650E-03	6.757E-01	9.397E+00	4.833E+01	1.538E+02	3.653E+02	6.047E+02
CM245	0.000E+00	1.911E-08	2.297E-05	5.290E-04	3.777E-03	1.520E-02	4.302E-02	7.876E-02

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
 ACTINIDES+DAUGHTERS
 POWER= 2.16550E+01 MW, BURNUP= 5.40006E+04 MWD, FLUX= 2.35E+14 N/CM**2-SEC

9 SUMMARY TABLE: THERMAL POWER, WATTS

	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
CM246	0.000E+00	2.573E-10	1.007E-06	4.276E-05	4.822E-04	2.838E-03	1.121E-02	2.567E-02
CM249	0.000E+00	1.907E-14	7.525E-10	1.076E-07	3.088E-06	3.980E-05	3.105E-04	1.130E-03
BK249	0.000E+00	2.981E-16	3.085E-11	6.255E-09	2.127E-07	2.990E-06	2.435E-05	8.889E-05
BK250	0.000E+00	3.848E-15	4.040E-10	8.772E-08	3.296E-06	5.172E-05	4.693E-04	1.875E-03
CF250	0.000E+00	4.367E-17	1.093E-11	3.107E-09	1.282E-07	2.041E-06	1.810E-05	6.914E-05
CF252	0.000E+00	1.608E-18	3.231E-12	2.364E-09	1.833E-07	4.716E-06	6.164E-05	3.003E-04
SUMTOT	6.533E-02	4.881E+04	4.989E+04	5.426E+04	6.121E+04	6.973E+04	7.892E+04	8.696E+04
TOTAL	6.533E-02	4.881E+04	4.989E+04	5.426E+04	6.121E+04	6.973E+04	7.892E+04	8.696E+04

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
 ACTINIDES+DAUGHTERS
 POWER= 2.16550E+01 MW, BURNUP= 5.40006E+04 MWD, FLUX= 2.35E+14 N/CM**2-SEC

9 SUMMARY TABLE: THERMAL POWER, WATTS

	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
TL	0.000E+00	1.818E-07	2.255E-06	9.200E-06	2.517E-05	5.399E-05	9.755E-05	1.383E-04
PB	0.000E+00	4.098E-08	5.082E-07	2.073E-06	5.670E-06	1.216E-05	2.197E-05	3.115E-05
BI	0.000E+00	3.662E-07	4.541E-06	1.852E-05	5.065E-05	1.086E-04	1.963E-04	2.783E-04
PO	0.000E+00	1.611E-06	1.998E-05	8.150E-05	2.229E-04	4.783E-04	8.641E-04	1.225E-03
RN	0.000E+00	8.169E-07	1.013E-05	4.132E-05	1.130E-04	2.425E-04	4.381E-04	6.211E-04
RA	0.000E+00	7.385E-07	9.158E-06	3.735E-05	1.022E-04	2.192E-04	3.960E-04	5.614E-04
TH	0.000E+00	2.493E-04	3.778E-04	5.150E-04	6.825E-04	8.896E-04	1.135E-03	1.344E-03
PA	0.000E+00	1.796E-03	2.618E-03	3.830E-03	5.359E-03	7.043E-03	8.644E-03	9.735E-03
U	6.533E-02	2.580E+04	2.633E+04	2.827E+04	3.122E+04	3.474E+04	3.848E+04	4.184E+04
NP	0.000E+00	2.300E+04	2.340E+04	2.522E+04	2.811E+04	3.168E+04	3.559E+04	3.909E+04
PU	0.000E+00	5.736E+00	3.969E+01	1.290E+02	2.864E+02	5.083E+02	7.760E+02	9.924E+02
AM	0.000E+00	3.424E-01	1.586E+01	7.975E+01	2.229E+02	4.703E+02	8.273E+02	1.161E+03
CM	0.000E+00	1.161E+00	1.063E+02	5.660E+02	1.369E+03	2.321E+03	3.246E+03	3.869E+03
BK	0.000E+00	4.147E-15	4.349E-10	9.400E-08	3.509E-06	5.472E-05	4.938E-04	1.964E-03
CF	0.000E+00	4.699E-17	1.471E-11	5.655E-09	3.204E-07	6.930E-06	8.171E-05	3.787E-04
SUMTOT	6.533E-02	4.881E+04	4.989E+04	5.426E+04	6.121E+04	6.973E+04	7.892E+04	8.696E+04
TOTAL	6.533E-02	4.881E+04	4.989E+04	5.426E+04	6.121E+04	6.973E+04	7.892E+04	8.696E+04

CUMULATIVE TABLE TOTALS

AP+FP	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ACT+FP	6.533E-02	4.881E+04	4.989E+04	5.426E+04	6.121E+04	6.973E+04	7.892E+04	8.696E+04
AP+ACT+FP	6.533E-02	4.881E+04	4.989E+04	5.426E+04	6.121E+04	6.973E+04	7.892E+04	8.696E+04

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
 FISSION PRODUCTS
 POWER= 2.16550E+01 MW, BURNUP= 5.40006E+04 MWD, FLUX= 2.35E+14 N/CM**2-SEC

5 SUMMARY TABLE: CONCENTRATIONS, GRAMS

	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
H 3	0.000E+00	6.901E-03	2.111E-02	3.528E-02	4.931E-02	6.316E-02	7.677E-02	8.660E-02
LI 6	0.000E+00	5.296E-05	1.346E-04	1.879E-04	2.175E-04	2.279E-04	2.246E-04	2.164E-04
LI 7	0.000E+00	1.343E-06	4.024E-06	6.676E-06	9.311E-06	1.193E-05	1.454E-05	1.644E-05
BE 9	0.000E+00	2.590E-06	7.756E-06	1.286E-05	1.793E-05	2.296E-05	2.796E-05	3.162E-05
BE 10	0.000E+00	1.727E-05	5.172E-05	8.579E-05	1.196E-04	1.533E-04	1.868E-04	2.112E-04
C 14	0.000E+00	3.492E-06	1.046E-05	1.735E-05	2.419E-05	3.099E-05	3.775E-05	4.270E-05
ZN 68	0.000E+00	1.611E-04	4.821E-04	8.179E-04	1.180E-03	1.572E-03	1.998E-03	2.331E-03
GA 69	0.000E+00	3.941E-08	3.243E-07	9.277E-07	1.944E-06	3.500E-06	5.741E-06	7.918E-06
ZN 70	0.000E+00	5.318E-04	1.651E-03	2.856E-03	4.1169E-03	5.602E-03	7.160E-03	8.384E-03
GA 71	0.000E+00	7.883E-08	3.067E-07	6.059E-07	9.816E-07	1.450E-06	2.034E-06	2.549E-06
ZN 72	0.000E+00	3.234E-05	3.476E-05	3.706E-05	3.999E-05	4.332E-05	4.685E-05	5.003E-05
GA 72	0.000E+00	9.822E-06	1.057E-05	1.127E-05	1.217E-05	1.318E-05	1.426E-05	1.522E-05
GE 72	0.000E+00	2.194E-03	7.068E-03	1.237E-02	1.813E-02	2.438E-02	3.112E-02	3.638E-02
GA 73	0.000E+00	8.120E-06	8.156E-06	8.303E-06	8.627E-06	9.048E-06	9.527E-06	1.001E-05
GE 73	0.000E+00	5.442E-03	1.646E-02	2.759E-02	3.890E-02	5.042E-02	6.210E-02	7.075E-02
ZN 74	0.000E+00	9.132E-08	8.820E-08	8.669E-08	8.718E-08	8.881E-08	9.120E-08	9.438E-08
GA 74	0.000E+00	4.863E-07	4.759E-07	4.707E-07	4.755E-07	4.861E-07	5.007E-07	5.192E-07
GE 74	0.000E+00	1.195E-02	3.615E-02	6.066E-02	8.577E-02	1.117E-01	1.387E-01	1.593E-01
GA 75	0.000E+00	2.550E-07	2.445E-07	2.380E-07	2.367E-07	2.384E-07	2.421E-07	2.486E-07
GE 75	0.000E+00	1.117E-05	1.074E-05	1.048E-05	1.043E-05	1.052E-05	1.070E-05	1.100E-05
AS 75	0.000E+00	2.683E-02	7.946E-02	1.306E-01	1.806E-01	2.296E-01	2.777E-01	3.125E-01
GA 76	0.000E+00	1.545E-07	1.409E-07	1.319E-07	1.263E-07	1.225E-07	1.199E-07	1.200E-07
GE 76	0.000E+00	7.110E-02	2.070E-01	3.362E-01	4.606E-01	5.813E-01	6.989E-01	7.838E-01
AS 76	0.000E+00	1.553E-06	4.586E-06	8.011E-06	1.219E-05	1.727E-05	2.324E-05	2.858E-05
SE 76	0.000E+00	9.811E-05	8.627E-04	2.427E-03	4.908E-03	8.439E-03	1.313E-02	1.737E-02
GA 77	0.000E+00	1.443E-07	1.294E-07	1.191E-07	1.120E-07	1.066E-07	1.024E-07	1.013E-07
GE 77	0.000E+00	1.812E-04	1.706E-04	1.616E-04	1.557E-04	1.517E-04	1.494E-04	1.501E-04
GE 77M	0.000E+00	5.689E-07	5.202E-07	4.846E-07	4.606E-07	4.430E-07	4.304E-07	4.287E-07
AS 77	0.000E+00	1.782E-03	1.648E-03	1.545E-03	1.476E-03	1.427E-03	1.394E-03	1.393E-03
SE 77	0.000E+00	1.518E-01	4.429E-01	7.124E-01	9.624E-01	1.194E+00	1.407E+00	1.553E+00
GA 78	0.000E+00	1.066E-07	9.247E-08	8.311E-08	7.633E-08	7.074E-08	6.603E-08	6.386E-08
GE 78	0.000E+00	1.366E-04	1.309E-04	1.256E-04	1.224E-04	1.204E-04	1.195E-04	1.205E-04
AS 78	0.000E+00	1.446E-04	1.394E-04	1.341E-04	1.311E-04	1.293E-04	1.286E-04	1.299E-04
SE 78	0.000E+00	3.169E-01	9.546E-01	1.585E+00	2.209E+00	2.830E+00	3.452E+00	3.910E+00
GA 79	0.000E+00	6.441E-08	5.664E-08	5.218E-08	4.942E-08	4.743E-08	4.593E-08	4.564E-08
GE 79	0.000E+00	2.460E-06	2.317E-06	2.207E-06	2.141E-06	2.098E-06	2.074E-06	2.089E-06
AS 79	0.000E+00	3.689E-05	3.465E-05	3.284E-05	3.168E-05	3.087E-05	3.037E-05	3.048E-05
SE 79	0.000E+00	8.228E-01	2.428E+00	3.969E+00	5.460E+00	6.907E+00	8.317E+00	9.334E+00
SE 79M	0.000E+00	1.596E-05	1.500E-05	1.422E-05	1.373E-05	1.339E-05	1.318E-05	1.324E-05
BR 79	0.000E+00	2.737E-06	2.332E-05	6.196E-05	1.167E-04	1.856E-04	2.668E-04	3.329E-04
GA 80	0.000E+00	4.566E-08	3.836E-08	3.389E-08	3.069E-08	2.806E-08	2.580E-08	2.470E-08

GE 80	0.000E+00	3.211E-06	2.867E-06	2.619E-06	2.439E-06	2.292E-06	2.173E-06	2.125E-06
AS 80	0.000E+00	2.577E-06	2.394E-06	2.243E-06	2.136E-06	2.054E-06	1.994E-06	1.982E-06
SE 80	0.000E+00	1.896E+00	5.580E+00	9.095E+00	1.246E+01	1.571E+01	1.883E+01	2.107E+01
KR 80	0.000E+00	1.387E-05	6.042E-05	1.194E-04	1.871E-04	2.627E-04	3.469E-04	4.143E-04
GE 81	0.000E+00	1.785E-06	1.538E-06	1.375E-06	1.257E-06	1.159E-06	1.076E-06	1.037E-06
AS 81	0.000E+00	8.253E-06	7.535E-06	6.990E-06	6.605E-06	6.305E-06	6.074E-06	6.010E-06
SE 81	0.000E+00	3.005E-04	2.770E-04	2.584E-04	2.454E-04	2.355E-04	2.281E-04	2.266E-04
SE 81M	0.000E+00	2.776E-05	2.506E-05	2.279E-05	2.103E-05	1.958E-05	1.842E-05	1.793E-05
BR 81	0.000E+00	3.265E+00	9.434E+00	1.512E+01	2.037E+01	2.520E+01	2.961E+01	3.259E+01
KR 81	0.000E+00	4.443E-07	3.344E-06	8.535E-06	1.634E-05	2.745E-05	4.279E-05	5.735E-05

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
FISSION PRODUCTS
POWER= 2.16550E+01 MW, BURNUP= 5.40006E+04 MWD, FLUX= 2.35E+14 N/CM**2-SEC

5 SUMMARY TABLE: CONCENTRATIONS, GRAMS

	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
GE 82	0.000E+00	7.635E-07	6.392E-07	5.622E-07	5.065E-07	4.600E-07	4.197E-07	3.991E-07
AS 82	0.000E+00	5.591E-06	4.803E-06	4.289E-06	3.915E-06	3.603E-06	3.338E-06	3.210E-06
AS 82M	0.000E+00	1.297E-06	1.162E-06	1.062E-06	9.886E-07	9.280E-07	8.783E-07	8.575E-07
SE 82	0.000E+00	5.106E+00	1.467E+01	2.355E+01	3.188E+01	3.973E+01	4.716E+01	5.239E+01
BR 82	0.000E+00	4.328E-04	1.161E-03	1.911E-03	2.776E-03	3.775E-03	4.892E-03	5.857E-03
BR 82M	0.000E+00	4.610E-07	1.250E-06	2.086E-06	3.059E-06	4.186E-06	5.449E-06	6.540E-06
KR 82	0.000E+00	2.149E-02	1.704E-01	4.512E-01	8.687E-01	1.429E+00	2.131E+00	2.733E+00
GE 83	0.000E+00	2.353E-07	1.947E-07	1.702E-07	1.526E-07	1.380E-07	1.253E-07	1.188E-07
AS 83	0.000E+00	6.898E-06	5.806E-06	5.100E-06	4.575E-06	4.129E-06	3.741E-06	3.537E-06
SE 83	0.000E+00	3.441E-04	3.116E-04	2.880E-04	2.713E-04	2.579E-04	2.473E-04	2.437E-04
SE 83M	0.000E+00	2.902E-05	2.548E-05	2.305E-05	2.128E-05	1.981E-05	1.858E-05	1.802E-05
BR 83	0.000E+00	5.818E-03	5.193E-03	4.751E-03	4.432E-03	4.173E-03	3.960E-03	3.875E-03
KR 83	0.000E+00	8.090E+00	2.203E+01	3.336E+01	4.230E+01	4.896E+01	5.346E+01	5.554E+01
KR 83M	0.000E+00	4.454E-03	3.976E-03	3.640E-03	3.399E-03	3.205E-03	3.049E-03	2.991E-03
AS 84	0.000E+00	2.331E-06	1.970E-06	1.748E-06	1.590E-06	1.459E-06	1.345E-06	1.288E-06
SE 84	0.000E+00	2.437E-04	2.115E-04	1.895E-04	1.732E-04	1.596E-04	1.480E-04	1.424E-04
BR 84	0.000E+00	2.400E-03	2.094E-03	1.863E-03	1.728E-03	1.598E-03	1.488E-03	1.435E-03
BR 84M	0.000E+00	1.007E-05	1.093E-05	1.112E-05	1.133E-05	1.159E-05	1.193E-05	1.233E-05
KR 84	0.000E+00	1.608E+01	4.671E+01	7.613E+01	1.050E+02	1.335E+02	1.619E+02	1.827E+02
AS 85	0.000E+00	5.266E-07	4.347E-07	3.773E-07	3.350E-07	2.992E-07	2.679E-07	2.511E-07
SE 85	0.000E+00	3.020E-05	2.560E-05	2.252E-05	2.020E-05	1.823E-05	1.652E-05	1.562E-05
SE 85M	0.000E+00	1.067E-05	9.132E-06	8.074E-06	7.270E-06	6.585E-06	5.992E-06	5.683E-06
BR 85	0.000E+00	2.685E-04	2.332E-04	2.084E-04	1.898E-04	1.741E-04	1.607E-04	1.541E-04
KR 85	0.000E+00	4.094E+00	1.119E+01	1.712E+01	2.212E+01	2.633E+01	2.985E+01	3.207E+01
KR 85M	0.000E+00	2.546E-02	2.212E-02	1.979E-02	1.803E-02	1.656E-02	1.530E-02	1.469E-02
RB 85	0.000E+00	1.546E+01	4.405E+01	7.028E+01	9.466E+01	1.174E+02	1.385E+02	1.532E+02
AS 86	0.000E+00	1.300E-07	1.062E-07	9.141E-08	8.047E-08	7.121E-08	6.309E-08	5.867E-08
SE 86	0.000E+00	2.684E-05	2.233E-05	1.938E-05	1.715E-05	1.523E-05	1.354E-05	1.260E-05
BR 86	0.000E+00	6.494E-05	5.548E-05	4.904E-05	4.418E-05	4.002E-05	3.643E-05	3.455E-05
BR 86M	0.000E+00	5.354E-06	4.570E-06	4.037E-06	3.633E-06	3.289E-06	2.990E-06	2.834E-06
KR 86	0.000E+00	3.113E+01	8.736E+01	1.377E+02	1.834E+02	2.251E+02	2.630E+02	2.888E+02
RB 86	0.000E+00	2.232E-03	5.993E-03	9.977E-03	1.464E-02	2.010E-02	2.630E-02	3.171E-02
SR 86	0.000E+00	7.820E-03	6.803E-02	1.880E-01	3.755E-01	6.415E-01	9.962E-01	1.318E+00
SE 87	0.000E+00	6.963E-06	5.900E-06	5.196E-06	4.670E-06	4.225E-06	3.841E-06	3.641E-06
BR 87	0.000E+00	1.518E-04	1.297E-04	1.147E-04	1.033E-04	9.358E-05	8.520E-05	8.084E-05
KR 87	0.000E+00	1.476E-02	1.263E-02	1.117E-02	1.006E-02	9.114E-03	8.299E-03	7.874E-03
RB 87	0.000E+00	4.019E+01	1.126E+02	1.772E+02	2.357E+02	2.887E+02	3.368E+02	3.693E+02
SR 87	0.000E+00	8.589E-05	4.650E-04	1.210E-03	2.568E-03	4.928E-03	8.817E-03	1.303E-02
SR 87M	0.000E+00	4.131E-08	8.871E-08	1.506E-07	2.517E-07	4.126E-07	6.547E-07	9.091E-07
SE 88	0.000E+00	7.199E-07	6.011E-07	5.288E-07	4.770E-07	4.341E-07	3.973E-07	3.788E-07
BR 88	0.000E+00	5.101E-05	4.263E-05	3.702E-05	3.273E-05	2.905E-05	2.583E-05	2.407E-05

KR 88	0.000E+00	4.710E-02	4.027E-02	3.556E-02	3.197E-02	2.892E-02	2.629E-02	2.492E-02
RB 88	0.000E+00	4.972E-03	4.260E-03	3.768E-03	3.395E-03	3.078E-03	2.805E-03	2.665E-03
SR 88	0.000E+00	5.785E+01	1.620E+02	2.548E+02	3.387E+02	4.148E+02	4.836E+02	5.302E+02
SE 89	0.000E+00	5.499E-08	4.610E-08	4.097E-08	3.751E-08	3.477E-08	3.249E-08	3.151E-08
BR 89	0.000E+00	1.069E-05	8.719E-06	7.430E-06	6.441E-06	5.585E-06	4.829E-06	4.398E-06
KR 89	0.000E+00	1.117E-03	9.438E-04	8.254E-04	7.350E-04	6.574E-04	5.900E-04	5.537E-04
RB 89	0.000E+00	5.587E-03	4.765E-03	4.196E-03	3.763E-03	3.392E-03	3.073E-03	2.905E-03
SR 89	0.000E+00	2.562E+01	2.356E+01	2.080E+01	1.868E+01	1.684E+01	1.522E+01	1.433E+01
Y 89	0.000E+00	5.071E+01	1.896E+02	3.136E+02	4.248E+02	5.249E+02	6.147E+02	6.749E+02
BR 90	0.000E+00	2.558E-06	2.057E-06	1.731E-06	1.479E-06	1.261E-06	1.067E-06	9.552E-07

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL

FISSION PRODUCTS

POWER= 2.16550E+01 MW, BURNUP= 5.40006E+04 MWD, FLUX= 2.35E+14 N/CM**2-SEC

5 SUMMARY TABLE: CONCENTRATIONS, GRAMS

	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
KR 90	0.000E+00	1.905E-04	1.605E-04	1.402E-04	1.247E-04	1.115E-04	9.987E-05	9.360E-05
RB 90	0.000E+00	9.337E-04	7.912E-04	6.936E-04	6.191E-04	5.551E-04	4.995E-04	4.698E-04
RB 90M	0.000E+00	3.348E-04	2.952E-04	2.659E-04	2.438E-04	2.251E-04	2.095E-04	2.021E-04
SR 90	0.000E+00	9.138E+00	2.521E+02	3.904E+02	5.109E+02	6.156E+02	7.038E+02	7.641E+02
Y 90	0.000E+00	2.329E-02	6.443E-02	1.000E-01	1.312E-01	1.587E-01	1.826E-01	1.983E-01
Y 90M	0.000E+00	3.821E-07	5.851E-07	6.966E-07	7.994E-07	9.063E-07	1.021E-06	1.117E-06
ZR 90	0.000E+00	7.241E-01	5.537E+00	1.430E+01	2.651E+01	4.175E+01	5.962E+01	7.422E+01
BR 91	0.000E+00	3.168E-07	2.573E-07	2.197E-07	1.917E-07	1.679E-07	1.471E-07	1.358E-07
KR 91	0.000E+00	3.864E-05	3.240E-05	2.831E-05	2.523E-05	2.260E-05	2.030E-05	1.906E-05
RB 91	0.000E+00	4.305E-04	3.696E-04	3.278E-04	2.962E-04	2.694E-04	2.464E-04	2.345E-04
SR 91	0.000E+00	2.648E-01	2.294E-01	2.049E-01	1.864E-01	1.708E-01	1.575E-01	1.509E-01
Y 91	0.000E+00	3.617E+01	3.503E+01	3.139E+01	2.859E+01	2.618E+01	2.407E+01	2.294E+01
Y 91M	0.000E+00	1.340E-02	1.161E-02	1.037E-02	9.435E-03	8.647E-03	7.975E-03	7.641E-03
ZR 91	0.000E+00	5.949E+01	2.347E+02	3.946E+02	5.397E+02	6.718E+02	7.922E+02	8.737E+02
KR 92	0.000E+00	3.779E-06	3.215E-06	2.872E-06	2.628E-06	2.426E-06	2.250E-06	2.163E-06
RB 92	0.000E+00	2.857E-05	2.468E-05	2.066E-05	2.012E-05	1.848E-05	1.706E-05	1.634E-05
SR 92	0.000E+00	7.918E-02	6.973E-02	6.309E-02	5.817E-02	5.406E-02	5.060E-02	4.899E-02
Y 92	0.000E+00	1.036E-01	9.135E-02	8.270E-02	7.629E-02	7.094E-02	6.644E-02	6.435E-02
ZR 92	0.000E+00	1.001E+02	2.849E+02	4.538E+02	6.103E+02	7.559E+02	8.915E+02	9.856E+02
KR 93	0.000E+00	9.308E-05	2.421E-05	2.177E-05	1.999E-05	1.850E-05	1.721E-05	1.657E-05
RB 93	0.000E+00	2.803E-05	2.421E-05	2.177E-05	1.999E-05	1.850E-05	1.721E-05	1.657E-05
SR 93	0.000E+00	3.990E-03	3.577E-03	3.284E-03	3.073E-03	2.899E-03	2.756E-03	2.697E-03
Y 93	0.000E+00	3.281E-01	2.951E-01	2.715E-01	2.545E-01	2.406E-01	2.291E-01	2.246E-01
ZR 93	0.000E+00	1.100E+02	3.158E+02	5.094E+02	6.820E+02	8.466E+02	9.998E+02	1.106E+03
NB 93	0.000E+00	1.257E-06	1.172E-05	3.587E-05	7.748E-05	1.399E-04	2.261E-04	3.059E-04
NB 93M	0.000E+00	1.338E-05	1.137E-04	3.001E-04	5.607E-04	8.858E-04	1.266E-03	1.576E-03
KR 94	0.000E+00	6.516E-08	5.347E-08	4.630E-08	4.101E-08	3.649E-08	3.249E-08	3.027E-08
RB 94	0.000E+00	6.697E-06	5.820E-06	5.284E-06	4.908E-06	4.596E-06	4.327E-06	4.199E-06
SR 94	0.000E+00	6.280E-04	5.670E-04	5.237E-04	4.928E-04	4.674E-04	4.467E-04	4.385E-04
Y 94	0.000E+00	1.017E-02	9.283E-03	8.632E-03	8.171E-03	7.799E-03	7.501E-03	7.399E-03
ZR 94	0.000E+00	1.083E+02	3.150E+02	5.108E+02	6.986E+02	8.797E+02	1.055E+03	1.181E+03
NB 94	0.000E+00	3.499E-05	1.809E-04	3.751E-04	5.980E-04	8.422E-04	1.104E-03	1.305E-03
RB 95	0.000E+00	4.724E-07	4.020E-07	3.670E-07	3.320E-07	3.083E-07	2.878E-07	2.779E-07
SR 95	0.000E+00	2.028E-04	1.823E-04	1.685E-04	1.589E-04	1.510E-04	1.446E-04	1.420E-04
Y 95	0.000E+00	5.872E-03	5.423E-03	5.097E-03	4.876E-03	4.703E-03	4.569E-03	4.537E-03
ZR 95	0.000E+00	4.631E+01	4.907E+01	4.646E+01	4.456E+01	4.299E+01	4.170E+01	4.125E+01
NB 95	0.000E+00	2.217E+01	2.735E+01	2.594E+01	2.488E+01	2.400E+01	2.327E+01	2.283E+01
NB 95M	0.000E+00	1.838E-02	1.951E-02	1.849E-02	1.775E-02	1.714E-02	1.664E-02	1.651E-02
MO 95	0.000E+00	4.502E+01	2.751E+02	4.986E+02	7.045E+02	8.930E+02	1.064E+03	1.164E+03
RB 96	0.000E+00	6.883E-08	6.061E-08	5.660E-08	5.445E-08	5.300E-08	5.192E-08	5.189E-08
SR 96	0.000E+00	2.195E-05	1.961E-05	1.815E-05	1.716E-05	1.635E-05	1.567E-05	1.541E-05

Y 96	0.000E+00	1.224E-03	1.132E-03	1.068E-03	1.025E-03	9.918E-04	9.662E-04	9.607E-04
ZR 96	0.000E+00	1.133E+02	3.326E+02	5.428E+02	7.460E+02	9.428E+02	1.134E+03	1.270E+03
NB 96	0.000E+00	5.709E-04	7.738E-04	8.608E-04	9.653E-04	1.073E-03	1.179E-03	1.265E-03
MO 96	0.000E+00	2.311E-01	4.883E+00	1.626E+01	3.532E+01	6.320E+01	1.009E+02	1.347E+02
SR 97	0.000E+00	5.825E-07	5.174E-07	4.804E-07	4.567E-07	4.380E-07	4.223E-07	4.167E-07
Y 97	0.000E+00	8.450E-06	7.833E-06	7.422E-06	7.164E-06	6.968E-06	6.820E-06	6.799E-06
ZR 97	0.000E+00	5.476E-01	5.228E-01	5.038E-01	4.935E-01	4.870E-01	4.838E-01	4.877E-01
NB 97	0.000E+00	3.915E-02	3.744E-02	3.611E-02	3.539E-02	3.495E-02	3.475E-02	3.504E-02
NB 97M	0.000E+00	5.118E-04	4.888E-04	4.711E-04	4.615E-04	4.555E-04	4.526E-04	4.562E-04
MO 97	0.000E+00	1.078E+02	3.212E+02	5.287E+02	7.316E+02	9.301E+02	1.124E+03	1.265E+03

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
FISSION PRODUCTS
POWER= 2.16550E+01 MW, BURNUP= 5.40006E+04 MWD, FLUX= 2.35E+14 N/CM**2-SEC

5 SUMMARY TABLE: CONCENTRATIONS, GRAMS

	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
SR 98	0.000E+00	9.697E-07	8.582E-07	8.018E-07	7.703E-07	7.477E-07	7.299E-07	7.270E-07
Y 98	0.000E+00	1.661E-06	1.525E-06	1.442E-06	1.392E-06	1.354E-06	1.324E-06	1.319E-06
ZR 98	0.000E+00	2.798E-04	2.689E-04	2.605E-04	2.562E-04	2.537E-04	2.526E-04	2.547E-04
NB 98	0.000E+00	2.553E-05	2.462E-05	2.389E-05	2.353E-05	2.333E-05	2.326E-05	2.348E-05
NB 98M	0.000E+00	1.719E-04	2.141E-04	2.329E-04	2.495E-04	2.661E-04	2.837E-04	2.993E-04
MO 98	0.000E+00	1.095E+02	3.270E+02	5.403E+02	7.503E+02	9.567E+02	1.160E+03	1.306E+03
TC 98	0.000E+00	7.923E-05	7.249E-04	2.074E-03	4.242E-03	7.357E-03	1.153E-02	1.532E-02
SR 99	0.000E+00	1.633E-07	1.467E-07	1.404E-07	1.388E-07	1.388E-07	1.395E-07	1.418E-07
Y 99	0.000E+00	2.556E-06	2.325E-06	2.205E-06	2.114E-06	2.095E-06	2.058E-06	2.056E-06
ZR 99	0.000E+00	2.160E-05	2.072E-05	2.012E-05	1.984E-05	1.968E-05	1.961E-05	1.979E-05
NB 99	0.000E+00	1.324E-04	1.278E-04	1.244E-04	1.229E-04	1.222E-04	1.221E-04	1.234E-04
NB 99M	0.000E+00	4.239E-05	4.840E-05	5.084E-05	5.312E-05	5.500E-05	5.812E-05	6.060E-05
MO 99	0.000E+00	2.275E+00	2.226E+00	2.195E+00	2.201E+00	2.225E+00	2.265E+00	2.323E+00
TC 99	0.000E+00	1.102E+02	3.274E+02	5.309E+02	7.199E+02	8.925E+02	1.047E+03	1.149E+03
TC 99M	0.000E+00	1.816E-01	1.778E-01	1.753E-01	1.758E-01	1.777E-01	1.808E-01	1.855E-01
RU 99	0.000E+00	9.791E-05	8.762E-04	2.371E-03	4.500E-03	7.172E-03	1.028E-02	1.278E-02
SR100	0.000E+00	5.560E-08	5.088E-08	4.986E-08	5.050E-08	5.177E-08	5.325E-08	5.503E-08
Y100	0.000E+00	1.097E-06	9.918E-07	9.417E-07	9.171E-07	9.006E-07	8.883E-07	8.897E-07
ZR100	0.000E+00	6.015E-05	5.740E-05	5.557E-05	5.467E-05	5.413E-05	5.385E-05	5.425E-05
NB100	0.000E+00	1.216E-05	1.189E-05	1.166E-05	1.158E-05	1.157E-05	1.161E-05	1.177E-05
NB100M	0.000E+00	1.221E-05	1.194E-05	1.171E-05	1.163E-05	1.161E-05	1.166E-05	1.182E-05
MO100	0.000E+00	1.211E+02	3.656E+02	6.091E+02	8.520E+02	1.094E+03	1.335E+03	1.512E+03
TC100	0.000E+00	4.089E-06	1.232E-05	2.139E-05	3.204E-05	4.436E-05	5.800E-05	6.962E-05
RU100	0.000E+00	1.551E+00	1.417E+01	4.048E+01	8.264E+01	1.431E+02	2.237E+02	2.967E+02
Y101	0.000E+00	4.646E-07	4.157E-07	3.953E-07	3.870E-07	3.826E-07	3.797E-07	3.821E-07
ZR101	0.000E+00	1.851E-05	1.734E-05	1.673E-05	1.646E-05	1.629E-05	1.618E-05	1.627E-05
NB101	0.000E+00	5.776E-05	5.675E-05	5.606E-05	5.614E-05	5.648E-05	5.704E-05	5.801E-05
MO101	0.000E+00	7.494E-03	7.472E-03	7.442E-03	7.501E-03	7.603E-03	7.732E-03	7.905E-03
TC101	0.000E+00	7.280E-03	7.259E-03	7.230E-03	7.291E-03	7.387E-03	7.512E-03	7.681E-03
RU101	0.000E+00	1.005E+02	3.031E+02	5.038E+02	7.017E+02	8.957E+02	1.084E+03	1.219E+03
ZR102	0.000E+00	8.708E-05	8.225E-05	8.068E-05	8.076E-05	8.123E-05	8.183E-05	8.297E-05
NB102	0.000E+00	1.988E-05	1.994E-05	2.077E-05	2.043E-05	2.086E-05	2.133E-05	2.185E-05
MO102	0.000E+00	5.009E-03	5.175E-03	5.278E-03	5.425E-03	5.585E-03	5.756E-03	5.928E-03
TC102	0.000E+00	3.974E-05	4.107E-05	4.199E-05	4.306E-05	4.433E-05	4.569E-05	4.707E-05
TC102M	0.000E+00	1.174E-06	1.812E-06	2.126E-06	2.392E-06	2.650E-06	2.914E-06	3.131E-06
RU102	0.000E+00	8.827E+01	2.779E+02	4.796E+02	6.935E+02	9.199E+02	1.159E+03	1.344E+03
RH102	0.000E+00	9.767E-06	1.270E-04	3.528E-04	6.705E-04	1.062E-03	1.505E-03	1.829E-03
ZR103	0.000E+00	1.786E-06	1.739E-06	1.739E-06	1.830E-06	1.896E-06	1.958E-06	2.015E-06
NB103	0.000E+00	6.479E-05	6.788E-05	7.053E-05	7.374E-05	7.698E-05	8.018E-05	8.304E-05
MO103	0.000E+00	3.708E-04	4.143E-04	4.407E-04	4.675E-04	4.942E-04	5.209E-04	5.441E-04
TC103	0.000E+00	3.120E-04	3.498E-04	3.726E-04	3.956E-04	4.184E-04	4.414E-04	4.612E-04

RUI03	0.000E+00	1.994E+01	2.377E+01	2.536E+01	2.698E+01	2.861E+01	3.026E+01	3.168E+01
RHI03	0.000E+00	4.781E+01	1.801E+02	2.969E+02	3.910E+02	4.601E+02	5.053E+02	5.214E+02
RHI03M	0.000E+00	1.781E-02	2.124E-02	2.266E-02	2.411E-02	2.556E-02	2.704E-02	2.830E-02
ZRI04	0.000E+00	7.202E-07	7.434E-07	8.155E-07	9.006E-07	9.814E-07	1.053E-06	1.105E-06
NBI04	0.000E+00	1.705E-06	1.868E-06	2.046E-06	2.236E-06	2.414E-06	2.577E-06	2.699E-06
MOI04	0.000E+00	3.963E-04	4.797E-04	5.376E-04	5.929E-04	6.453E-04	6.953E-04	7.343E-04
TCI04	0.000E+00	4.732E-03	5.803E-03	6.524E-03	7.207E-03	7.855E-03	8.476E-03	8.962E-03
RUI04	0.000E+00	4.700E+01	1.651E+02	3.041E+02	4.604E+02	6.318E+02	8.168E+02	9.603E+02
RHI04	0.000E+00	2.034E-05	7.775E-05	1.372E-04	1.996E-04	2.624E-04	3.211E-04	3.625E-04
RHI04M	0.000E+00	8.171E-06	3.124E-05	5.513E-05	8.021E-05	1.054E-04	1.290E-04	1.456E-04

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
 FISSION PRODUCTS
 POWER= 2.16550E+01 MW, BURNUP= 5.40006E+04 MWD, FLUX= 2.35E+14 N/CM**2-SEC

5 SUMMARY TABLE: CONCENTRATIONS, GRAMS

	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
PD104	0.000E+00	2.316E+00	3.273E+01	9.822E+01	2.007E+02	3.409E+02	5.166E+02	6.613E+02
NB105	0.000E+00	9.096E-07	1.045E-06	1.197E-06	1.353E-06	1.496E-06	1.624E-06	1.714E-06
MO105	0.000E+00	1.353E-04	1.776E-04	2.079E-04	2.362E-04	2.625E-04	2.873E-04	3.058E-04
TC105	0.000E+00	1.415E-03	1.926E-03	2.270E-03	2.585E-03	2.880E-03	3.160E-03	3.371E-03
RU105	0.000E+00	4.748E-02	6.492E-02	7.668E-02	8.755E-02	9.782E-02	1.077E-01	1.152E-01
RH105	0.000E+00	3.655E-01	4.989E-01	5.875E-01	6.679E-01	7.424E-01	8.128E-01	8.653E-01
RH105M	0.000E+00	3.744E-05	5.119E-05	6.046E-05	6.903E-05	7.713E-05	8.491E-05	9.086E-05
PD105	0.000E+00	2.882E+01	1.104E+02	2.113E+02	3.266E+02	4.533E+02	5.890E+02	6.928E+02
NB106	0.000E+00	7.872E-08	8.486E-08	9.633E-08	1.086E-07	1.195E-07	1.285E-07	1.345E-07
MO106	0.000E+00	1.006E-05	1.423E-05	1.774E-05	2.103E-05	2.400E-05	2.666E-05	2.850E-05
TC106	0.000E+00	5.986E-05	9.275E-05	1.170E-04	1.390E-04	1.591E-04	1.776E-04	1.908E-04
RU106	0.000E+00	1.408E+01	4.756E+01	7.819E+01	1.052E+02	1.290E+02	1.501E+02	1.642E+02
RH106	0.000E+00	1.548E-05	4.781E-05	7.742E-05	1.038E-04	1.273E-04	1.486E-04	1.630E-04
RH106M	0.000E+00	2.672E-04	3.706E-04	4.673E-04	5.867E-04	7.280E-04	8.878E-04	1.034E-03
PD106	0.000E+00	3.749E+00	3.179E+01	8.788E+01	1.703E+02	2.778E+02	4.093E+02	5.208E+02
MO107	0.000E+00	2.415E-06	3.398E-06	4.61E-06	5.478E-06	6.370E-06	7.126E-06	7.606E-06
TC107	0.000E+00	2.239E-05	3.666E-05	4.891E-05	6.022E-05	7.029E-05	7.915E-05	8.507E-05
RU107	0.000E+00	2.855E-04	5.018E-04	6.581E-04	7.986E-04	9.262E-04	1.043E-03	1.125E-03
RH107	0.000E+00	1.482E-03	2.607E-03	3.418E-03	4.147E-03	4.810E-03	5.416E-03	5.844E-03
PD107	0.000E+00	9.828E+00	4.796E+01	1.032E+02	1.724E+02	2.532E+02	3.435E+02	4.145E+02
AG107	0.000E+00	2.499E-07	3.398E-06	1.185E-05	2.707E-05	5.006E-05	8.136E-05	1.097E-04
MO108	0.000E+00	2.108E-07	2.643E-07	3.189E-07	3.739E-07	4.252E-07	4.718E-07	5.053E-07
TC108	0.000E+00	2.313E-06	3.899E-06	5.163E-06	6.320E-06	7.364E-06	8.302E-06	8.947E-06
RU108	0.000E+00	1.945E-04	3.613E-04	4.839E-04	5.939E-04	6.934E-04	7.838E-04	8.469E-04
RH108	0.000E+00	1.221E-05	2.270E-05	3.040E-05	3.731E-05	4.355E-05	4.923E-05	5.319E-05
RH108M	0.000E+00	2.175E-06	4.615E-06	6.102E-06	7.383E-06	8.566E-06	9.692E-06	1.052E-05
PD108	0.000E+00	6.050E+00	3.146E+01	6.932E+01	1.172E+02	1.732E+02	2.355E+02	2.843E+02
AG108M	0.000E+00	3.060E-08	2.135E-07	4.952E-07	8.680E-07	1.351E-06	1.979E-06	2.558E-06
CD108	0.000E+00	1.775E-06	2.578E-05	4.600E-05	2.284E-04	4.473E-04	7.688E-04	1.079E-03
MO109	0.000E+00	4.979E-08	6.192E-08	7.161E-08	8.165E-08	9.191E-08	1.021E-07	1.104E-07
TC109	0.000E+00	1.164E-05	1.900E-05	2.419E-05	2.892E-05	3.332E-05	3.746E-05	4.049E-05
RU109	0.000E+00	1.588E-05	2.944E-05	3.915E-05	4.785E-05	5.577E-05	6.304E-05	6.819E-05
RH109	0.000E+00	4.205E-05	7.850E-05	1.047E-04	1.281E-04	1.494E-04	1.690E-04	1.828E-04
RH109M	0.000E+00	1.168E-05	2.181E-05	2.908E-05	3.559E-05	4.151E-05	4.694E-05	5.078E-05
PD109	0.000E+00	2.321E-02	4.526E-02	6.341E-02	8.215E-02	1.022E-01	1.239E-01	1.418E-01
MO109M	0.000E+00	6.580E-05	1.230E-04	1.643E-04	2.015E-04	2.356E-04	2.671E-04	2.896E-04
AG109	0.000E+00	3.682E+00	1.837E+01	3.819E+01	6.061E+01	8.376E+01	1.063E+02	1.220E+02
AG109M	0.000E+00	1.896E-05	3.697E-05	5.179E-05	6.709E-05	8.345E-05	1.012E-04	1.158E-04
CD109	0.000E+00	3.918E-10	1.403E-08	7.695E-08	2.426E-07	5.826E-07	1.181E-06	1.841E-06
TC110	0.000E+00	6.454E-08	8.452E-08	1.018E-07	1.191E-07	1.358E-07	1.516E-07	1.635E-07
RU110	0.000E+00	3.631E-06	6.085E-06	7.963E-06	9.683E-06	1.125E-05	1.268E-05	1.369E-05

RH110	0.000E+00	6.950E-06	1.181E-05	1.552E-05	1.890E-05	2.198E-05	2.479E-05	2.677E-05
PD110	0.000E+00	2.263E+00	1.069E+01	2.302E+01	3.873E+01	5.743E+01	7.875E+01	9.585E+01
AG110	0.000E+00	8.977E-07	4.544E-06	1.012E-05	1.774E-05	2.738E-05	3.874E-05	4.862E-05
AG110M	0.000E+00	7.884E-03	8.756E-02	2.565E-01	5.134E-01	8.555E-01	1.272E+00	1.623E+00
CD110	0.000E+00	1.849E-01	2.723E+00	1.003E+01	2.422E+01	4.728E+01	8.085E+01	1.129E+02
RUI11	0.000E+00	2.002E-06	2.823E-06	3.503E-06	4.155E-06	4.765E-06	5.330E-06	5.742E-06
RH111	0.000E+00	1.012E-05	1.518E-05	1.924E-05	2.305E-05	2.657E-05	2.980E-05	3.211E-05
PD111	0.000E+00	2.144E-04	3.236E-04	4.119E-04	4.955E-04	5.738E-04	6.471E-04	7.006E-04
PD111M	0.000E+00	3.470E-05	6.454E-05	8.755E-05	1.099E-04	1.324E-04	1.556E-04	1.740E-04
AG111	0.000E+00	1.048E-01	1.585E-01	2.021E-01	2.436E-01	2.829E-01	3.202E-01	3.477E-01

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
 FISSION PRODUCTS
 POWER= 2.16550E+01 MW, BURNUP= 5.40006E+04 MWD, FLUX= 2.35E+14 N/CM**2-SEC

5 SUMMARY TABLE: CONCENTRATIONS, GRAMS

	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
AG11M	0.000E+00	1.051E-05	1.588E-05	2.032E-05	2.437E-05	2.827E-05	3.194E-05	3.464E-05
CD111	0.000E+00	1.523E+00	6.452E+00	1.322E+01	2.170E+01	3.186E+01	4.375E+01	5.365E+01
CD11M	0.000E+00	1.965E-09	2.934E-08	1.157E-07	3.087E-07	6.728E-07	1.282E-06	1.960E-06
RU112	0.000E+00	5.270E-08	6.214E-08	7.204E-08	8.268E-08	9.327E-08	1.034E-07	1.113E-07
RH112	0.000E+00	4.922E-07	6.305E-07	7.549E-07	8.795E-07	9.988E-07	1.111E-06	1.194E-06
PD112	0.000E+00	7.910E-03	1.030E-02	1.240E-02	1.448E-02	1.646E-02	1.832E-02	1.970E-02
AG112	0.000E+00	1.236E-03	1.609E-03	1.936E-03	2.260E-03	2.570E-03	2.860E-03	3.077E-03
CD112	0.000E+00	1.180E+00	4.304E+00	8.328E+00	1.327E+01	1.916E+01	2.601E+01	3.168E+01
RU113	0.000E+00	1.320E-07	1.422E-07	1.578E-07	1.768E-07	1.971E-07	2.172E-07	2.339E-07
RH113	0.000E+00	7.782E-08	9.139E-08	1.052E-07	1.200E-07	1.346E-07	1.486E-07	1.596E-07
PD113	0.000E+00	8.801E-06	1.077E-05	1.256E-05	1.440E-05	1.620E-05	1.791E-05	1.923E-05
AG113	0.000E+00	1.681E-03	2.057E-03	2.400E-03	2.751E-03	3.095E-03	3.423E-03	3.676E-03
AG113M	0.000E+00	6.509E-07	7.993E-07	9.332E-07	1.070E-06	1.204E-06	1.332E-06	1.430E-06
CD113	0.000E+00	1.363E-01	1.651E-01	1.807E-01	1.887E-01	1.914E-01	1.916E-01	1.895E-01
CD113M	0.000E+00	1.910E-02	6.718E-02	1.291E-01	2.079E-01	3.075E-01	4.325E-01	5.437E-01
IN113	0.000E+00	2.373E-04	2.348E-03	7.040E-03	1.479E-02	2.611E-02	4.153E-02	5.576E-02
RU114	0.000E+00	1.217E-07	1.241E-07	1.332E-07	1.466E-07	1.619E-07	1.778E-07	1.919E-07
RH114	0.000E+00	1.011E-07	1.086E-07	1.192E-07	1.322E-07	1.460E-07	1.597E-07	1.711E-07
PD114	0.000E+00	1.131E-05	1.288E-05	1.441E-05	1.609E-05	1.781E-05	1.950E-05	2.086E-05
AG114	0.000E+00	3.582E-07	4.092E-07	4.583E-07	5.121E-07	5.669E-07	6.206E-07	6.641E-07
CD114	0.000E+00	1.851E+00	6.527E+00	1.206E+01	1.845E+01	2.564E+01	3.358E+01	3.986E+01
IN114M	0.000E+00	6.730E-07	1.013E-05	3.569E-05	8.162E-05	1.739E-04	3.128E-04	4.629E-04
SN114	0.000E+00	2.189E-06	7.361E-05	3.985E-04	1.270E-03	3.129E-03	6.593E-03	1.063E-02
RH115	0.000E+00	2.924E-07	3.015E-07	3.235E-07	3.548E-07	3.904E-07	4.275E-07	4.601E-07
PD115	0.000E+00	3.113E-06	3.387E-06	3.702E-06	4.082E-06	4.491E-06	4.904E-06	5.255E-06
AG115	0.000E+00	7.329E-05	8.009E-05	8.763E-05	9.664E-05	1.063E-04	1.161E-04	1.243E-04
AG115M	0.000E+00	3.946E-07	4.351E-07	4.775E-07	5.272E-07	5.802E-07	6.337E-07	6.788E-07
CD115	0.000E+00	1.487E-02	1.644E-02	1.820E-02	2.034E-02	2.272E-02	2.525E-02	2.745E-02
CD115M	0.000E+00	2.705E-02	3.172E-02	3.527E-02	3.941E-02	4.390E-02	4.856E-02	5.256E-02
IN115	0.000E+00	7.104E-01	1.544E+00	1.912E+00	2.065E+00	2.116E+00	2.125E+00	2.117E+00
IN115M	0.000E+00	1.198E-03	1.325E-03	1.466E-03	1.639E-03	1.831E-03	2.035E-03	2.212E-03
SN115	0.000E+00	3.232E-02	1.040E-01	1.832E-01	2.706E-01	3.663E-01	4.697E-01	5.503E-01
PD116	0.000E+00	9.387E-07	9.939E-07	1.063E-06	1.154E-06	1.255E-06	1.359E-06	1.451E-06
AG116	0.000E+00	5.889E-06	6.335E-06	6.809E-06	7.397E-06	8.044E-06	8.712E-06	9.296E-06
AG116M	0.000E+00	3.809E-07	4.098E-07	4.404E-07	4.785E-07	5.203E-07	5.636E-07	6.014E-07
CD116	0.000E+00	8.510E-01	2.700E+00	4.733E+00	6.937E+00	9.348E+00	1.196E+01	1.400E+01
IN116	0.000E+00	2.548E-07	5.619E-07	7.452E-07	8.891E-07	1.017E-06	1.138E-06	1.241E-06
IN116M	0.000E+00	4.223E-05	9.311E-05	1.473E-04	1.473E-04	1.686E-04	1.886E-04	2.056E-04
SN116	0.000E+00	1.959E-01	1.460E+00	3.456E+00	5.961E+00	8.879E+00	1.216E+01	1.478E+01
PD117	0.000E+00	3.300E-07	3.345E-07	3.486E-07	3.713E-07	3.985E-07	4.276E-07	4.547E-07
AG117	0.000E+00	2.718E-06	2.896E-06	3.090E-06	3.341E-06	3.623E-06	3.919E-06	4.182E-06

AG117M	0.000E+00	1.967E-07	2.096E-07	2.237E-07	2.418E-07	2.622E-07	2.836E-07	3.027E-07
CD117	0.000E+00	4.550E-04	4.877E-04	5.222E-04	5.660E-04	6.153E-04	6.671E-04	7.132E-04
CD117M	0.000E+00	3.218E-04	3.461E-04	3.708E-04	4.018E-04	4.364E-04	4.725E-04	5.046E-04
IN117	0.000E+00	1.183E-04	1.270E-04	1.360E-04	1.474E-04	1.602E-04	1.736E-04	1.855E-04
IN117M	0.000E+00	3.965E-04	4.254E-04	4.554E-04	4.937E-04	5.365E-04	5.816E-04	6.216E-04
SN117	0.000E+00	8.655E-01	2.743E+00	4.788E+00	7.018E+00	9.447E+00	1.208E+01	1.414E+01
SN117M	0.000E+00	1.649E-05	1.247E-04	3.161E-04	6.024E-04	1.002E-03	1.529E-03	2.034E-03
PD118	0.000E+00	1.594E-07	1.633E-07	1.736E-07	1.890E-07	2.069E-07	2.257E-07	2.427E-07
AG118	0.000E+00	1.935E-07	2.013E-07	2.122E-07	2.275E-07	2.450E-07	2.636E-07	2.804E-07
AG118M	0.000E+00	9.464E-08	1.009E-07	1.081E-07	1.175E-07	1.279E-07	1.387E-07	1.483E-07

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
 FISSION PRODUCTS
 POWER= 2.16550E+01 MW, BURNUP= 5.40006E+04 MWD, FLUX= 2.35E+14 N/CM**2-SEC

5 SUMMARY TABLE: CONCENTRATIONS, GRAMS

	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
CD118	0.000E+00	2.297E-04	2.445E-04	2.602E-04	2.806E-04	3.034E-04	3.274E-04	3.487E-04
IN118	0.000E+00	3.806E-07	4.051E-07	4.313E-07	4.651E-07	5.029E-07	5.426E-07	5.779E-07
SN118	0.000E+00	8.850E-01	2.794E+00	4.866E+00	7.121E+00	9.570E+00	1.222E+01	1.429E+01
PD119	0.000E+00	5.482E-08	6.228E-08	6.865E-08	7.602E-08	8.408E-08	9.249E-08	9.976E-08
AG119	0.000E+00	3.942E-07	4.309E-07	4.656E-07	5.077E-07	5.541E-07	6.025E-07	6.449E-07
CD119	0.000E+00	2.115E-05	2.269E-05	2.426E-05	2.624E-05	2.844E-05	3.074E-05	3.278E-05
CD119M	0.000E+00	7.200E-06	7.724E-06	8.258E-06	8.932E-06	9.681E-06	1.046E-05	1.116E-05
IN119	0.000E+00	3.244E-06	3.478E-06	3.717E-06	4.019E-06	4.355E-06	4.706E-06	5.018E-06
SN119	0.000E+00	6.081E-05	6.523E-05	6.973E-05	7.541E-05	8.173E-05	8.833E-05	9.418E-05
IN119M	0.000E+00	8.605E-01	2.739E+00	4.793E+00	7.034E+00	9.472E+00	1.211E+01	1.417E+01
SN119M	0.000E+00	9.795E-03	2.080E-02	2.722E-02	3.280E-02	3.882E-02	4.572E-02	5.157E-02
PD120	0.000E+00	6.174E-08	6.223E-08	6.614E-08	7.222E-08	7.952E-08	8.719E-08	9.409E-08
AG120	0.000E+00	5.891E-08	6.034E-08	6.388E-08	6.908E-08	7.512E-08	8.147E-08	8.717E-08
CD120	0.000E+00	3.859E-06	4.102E-06	4.365E-06	4.706E-06	5.090E-06	5.493E-06	5.853E-06
IN120	0.000E+00	1.112E-06	1.827E-06	1.946E-06	2.099E-06	2.271E-06	2.451E-06	2.612E-06
IN120M	0.000E+00	1.187E-07	1.267E-07	1.350E-07	1.456E-07	1.575E-07	1.700E-07	1.812E-07
SN120	0.000E+00	8.947E-01	2.829E+00	4.931E+00	7.216E+00	9.696E+00	1.238E+01	1.447E+01
AG121	0.000E+00	1.070E-07	1.083E-07	1.145E-07	1.240E-07	1.353E-07	1.472E-07	1.579E-07
CD121	0.000E+00	9.780E-07	1.034E-06	1.098E-06	1.182E-06	1.278E-06	1.378E-06	1.469E-06
IN121	0.000E+00	1.806E-06	1.921E-06	2.043E-06	2.201E-06	2.379E-06	2.566E-06	2.735E-06
IN121M	0.000E+00	3.187E-06	3.417E-06	3.626E-06	3.891E-06	4.190E-06	4.506E-06	4.791E-06
SN121	0.000E+00	7.782E-03	8.295E-03	8.820E-03	9.499E-03	1.027E-02	1.108E-02	1.180E-02
SN121M	0.000E+00	2.518E-04	9.875E-04	1.871E-03	2.848E-03	3.907E-03	5.047E-03	5.934E-03
SB121	0.000E+00	9.208E-01	2.874E+00	4.913E+00	7.031E+00	9.212E+00	1.143E+01	1.307E+01
CD122	0.000E+00	4.172E-07	4.339E-07	4.576E-07	4.911E-07	5.298E-07	5.709E-07	6.082E-07
IN122	0.000E+00	8.052E-07	8.465E-07	8.951E-07	9.612E-07	1.037E-06	1.117E-06	1.190E-06
SN122	0.000E+00	9.935E-01	3.136E+00	5.453E+00	7.959E+00	1.067E+01	1.359E+01	1.586E+01
SB122	0.000E+00	3.222E-04	1.020E-03	1.867E-03	2.953E-03	4.320E-03	5.974E-03	7.472E-03
TE122	0.000E+00	7.816E-03	7.424E-02	2.191E-01	4.616E-01	8.245E-01	1.330E+00	1.804E+00
CD123	0.000E+00	6.198E-07	6.393E-07	6.733E-07	7.208E-07	7.776E-07	8.381E-07	8.935E-07
IN123	0.000E+00	3.998E-07	4.210E-07	4.450E-07	4.776E-07	5.149E-07	5.547E-07	5.908E-07
IN123M	0.000E+00	1.296E-06	1.408E-06	1.500E-06	1.613E-06	1.739E-06	1.873E-06	1.993E-06
SN123	0.000E+00	1.421E-01	2.229E-01	2.451E-01	2.621E-01	2.798E-01	2.984E-01	3.139E-01
SN123M	0.000E+00	1.877E-04	1.994E-04	2.113E-04	2.269E-04	2.447E-04	2.636E-04	2.807E-04
SB123	0.000E+00	9.890E-01	3.315E+00	5.832E+00	8.488E+00	1.127E+01	1.416E+01	1.634E+01
TE123	0.000E+00	2.080E-05	5.151E-04	2.066E-03	5.710E-03	1.162E-02	2.048E-02	2.911E-02
TE123M	0.000E+00	5.085E-06	9.680E-05	3.702E-04	9.372E-04	1.960E-03	3.637E-03	5.457E-03
CD124	0.000E+00	1.195E-06	1.216E-06	1.272E-06	1.359E-06	1.462E-06	1.573E-06	1.674E-06
IN124	0.000E+00	3.576E-07	3.744E-07	3.926E-07	4.1180E-07	4.476E-07	4.793E-07	5.086E-07
SN124	0.000E+00	1.372E+00	4.324E+00	7.482E+00	1.086E+01	1.446E+01	1.830E+01	2.127E+01
SB124	0.000E+00	2.761E-03	1.281E-02	2.564E-02	4.221E-02	6.336E-02	8.941E-02	1.131E-01

TE124	0.000E+00	2.515E-03	3.797E-02	1.288E-01	2.926E-01	5.522E-01	9.344E-01	1.309E+00
CD125	0.000E+00	7.395E-08	7.841E-08	8.433E-08	9.197E-08	1.004E-07	1.092E-07	1.168E-07
INI25	0.000E+00	1.473E-07	1.645E-07	1.782E-07	1.941E-07	2.112E-07	2.290E-07	2.445E-07
INI25M	0.000E+00	5.431E-07	6.180E-07	6.717E-07	7.309E-07	7.944E-07	8.606E-07	9.182E-07
SNI25	0.000E+00	5.215E-02	5.950E-02	6.417E-02	6.932E-02	7.502E-02	8.119E-02	8.690E-02
SNI25M	0.000E+00	5.739E-05	6.548E-05	7.111E-05	7.729E-05	8.395E-05	9.096E-05	9.709E-05
SB125	0.000E+00	1.661E+00	4.986E+00	7.947E+00	1.058E+01	1.297E+01	1.516E+01	1.669E+01
TE125	0.000E+00	9.952E-02	9.810E-01	2.725E+00	5.227E+00	8.395E+00	1.216E+01	1.526E+01
TE125M	0.000E+00	1.353E-02	5.709E-02	9.733E-02	1.330E-01	1.651E-01	1.946E-01	2.149E-01
CD126	0.000E+00	1.388E-07	1.419E-07	1.502E-07	1.620E-07	1.752E-07	1.886E-07	2.004E-07

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
FISSION PRODUCTS
POWER= 2.16550E+01 MW, BURNUP= 5.40006E+04 MWD, FLUX= 2.35E+14 N/CM**2-SEC

5 SUMMARY TABLE: CONCENTRATIONS, GRAMS

	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
INI126	0.000E+00	2.474E-07	2.621E-07	2.750E-07	2.918E-07	3.106E-07	3.306E-07	3.489E-07
SNI26	0.000E+00	2.719E+00	9.015E+00	1.599E+01	2.354E+01	3.164E+01	4.029E+01	4.699E+01
SB126	0.000E+00	3.752E-03	5.065E-03	6.102E-03	7.233E-03	8.515E-03	9.952E-03	1.125E-02
SB126M	0.000E+00	1.896E-06	2.657E-06	3.039E-06	3.383E-06	3.734E-06	4.111E-06	4.433E-06
TEI26	0.000E+00	4.726E-02	1.933E-01	3.857E-01	6.277E-01	9.297E-01	1.305E+00	1.636E+00
INI27	0.000E+00	1.769E-07	1.935E-07	2.086E-07	2.257E-07	2.433E-07	2.607E-07	2.754E-07
INI27M	0.000E+00	3.225E-07	3.527E-07	3.801E-07	4.111E-07	4.430E-07	4.747E-07	5.014E-07
SNI27	0.000E+00	2.442E-03	2.790E-03	3.018E-03	3.257E-03	3.502E-03	3.754E-03	3.969E-03
SNI27M	0.000E+00	3.702E-05	4.400E-05	4.794E-05	5.093E-05	5.446E-05	5.820E-05	6.152E-05
SB127	0.000E+00	1.654E-01	1.931E-01	2.094E-01	2.257E-01	2.424E-01	2.598E-01	2.749E-01
TEI27	0.000E+00	1.591E-02	1.931E-02	2.106E-02	2.273E-02	2.443E-02	2.618E-02	2.768E-02
TEI27M	0.000E+00	4.276E-01	7.074E-01	8.032E-01	8.748E-01	9.420E-01	1.009E+00	1.060E+00
I127	0.000E+00	4.848E+00	1.741E+01	3.141E+01	4.617E+01	6.142E+01	7.691E+01	8.832E+01
XEI27	0.000E+00	6.358E-09	1.139E-07	3.832E-07	9.286E-07	1.908E-06	3.512E-06	5.017E-06
INI28	0.000E+00	6.338E-07	6.441E-07	6.674E-07	7.011E-07	7.372E-07	7.732E-07	8.055E-07
SNI28	0.000E+00	3.301E-03	3.480E-03	3.571E-03	3.693E-03	3.834E-03	3.992E-03	4.151E-03
SB128	0.000E+00	1.825E-03	2.437E-03	2.731E-03	2.990E-03	3.251E-03	3.526E-03	3.761E-03
SB128M	0.000E+00	6.129E-04	6.570E-04	6.794E-04	7.064E-04	7.367E-04	7.702E-04	8.029E-04
TEI28	0.000E+00	1.182E+01	3.833E+01	6.682E+01	9.686E+01	1.283E+02	1.612E+02	1.862E+02
I128	0.000E+00	9.728E-06	3.529E-05	6.809E-05	1.106E-04	1.641E-04	2.290E-04	2.877E-04
XEI28	0.000E+00	3.497E-02	3.716E-01	1.167E+00	2.558E+00	4.706E+00	7.772E+00	1.070E+01
INI29	0.000E+00	1.046E-07	1.089E-07	1.162E-07	1.254E-07	1.350E-07	1.442E-07	1.519E-07
SNI29	0.000E+00	2.634E-04	2.858E-04	2.998E-04	3.156E-04	3.321E-04	3.493E-04	3.649E-04
SNI29M	0.000E+00	1.200E-04	1.203E-04	1.202E-04	1.216E-04	1.236E-04	1.263E-04	1.296E-04
SB129	0.000E+00	2.697E-02	2.945E-02	3.071E-02	3.210E-02	3.358E-02	3.517E-02	3.668E-02
TEI29	0.000E+00	7.099E-03	7.787E-03	8.121E-03	8.487E-03	8.880E-03	9.306E-03	9.705E-03
TEI29M	0.000E+00	7.105E-01	8.135E-01	8.484E-01	8.856E-01	9.255E-01	9.689E-01	1.006E+00
I129	0.000E+00	1.949E+01	6.427E+01	1.113E+02	1.594E+02	2.079E+02	2.562E+02	2.911E+02
XEI29	0.000E+00	3.741E-05	7.467E-04	3.829E-03	1.209E-02	2.982E-02	6.309E-02	1.019E-01
XEI29M	0.000E+00	2.506E-07	2.589E-06	8.671E-06	2.099E-05	4.309E-05	7.930E-05	1.195E-04
INI30	0.000E+00	9.907E-08	9.402E-08	9.270E-08	9.356E-08	9.523E-08	9.728E-08	9.990E-08
SNI30	0.000E+00	4.899E-04	4.967E-04	5.010E-04	5.111E-04	5.235E-04	5.376E-04	5.533E-04
SB130	0.000E+00	1.292E-03	1.463E-03	1.543E-03	1.620E-03	1.701E-03	1.786E-03	1.866E-03
SB130M	0.000E+00	1.087E-03	1.113E-03	1.155E-03	1.148E-03	1.175E-03	1.208E-03	1.244E-03
TEI30	0.000E+00	4.085E+01	1.289E+02	2.209E+02	3.162E+02	4.144E+02	5.153E+02	5.911E+02
I130	0.000E+00	9.444E-04	3.030E-03	5.529E-03	8.673E-03	1.256E-02	1.720E-02	2.134E-02
I130M	0.000E+00	4.365E-06	1.418E-05	2.602E-05	4.094E-05	5.942E-05	8.144E-05	1.011E-04
XEI30	0.000E+00	1.341E-01	1.287E+00	3.817E+00	8.067E+00	1.444E+01	2.336E+01	3.174E+01
SNI31	0.000E+00	1.366E-04	1.309E-04	1.285E-04	1.284E-04	1.291E-04	1.302E-04	1.323E-04
SB131	0.000E+00	7.714E-03	7.604E-03	7.515E-03	7.527E-03	7.577E-03	7.659E-03	7.799E-03
TEI31	0.000E+00	8.596E-03	8.627E-03	8.604E-03	8.680E-03	8.796E-03	8.948E-03	9.151E-03

TE131M	0.000E+00	9.161E-02	9.706E-02	9.910E-02	1.017E-01	1.046E-01	1.080E-01	1.116E-01
I131	0.000E+00	4.446E+00	4.489E+00	4.489E+00	4.538E+00	4.607E+00	4.694E+00	4.807E+00
XE131	0.000E+00	6.767E+01	1.979E+02	3.048E+02	3.872E+02	4.450E+02	4.798E+02	4.926E+02
XE131M	0.000E+00	7.304E-02	7.376E-02	7.380E-02	7.465E-02	7.590E-02	7.753E-02	7.957E-02
SNI32	0.000E+00	5.244E-05	4.769E-05	4.551E-05	4.455E-05	4.397E-05	4.359E-05	4.381E-05
SBI32	0.000E+00	6.053E-04	5.732E-04	5.561E-04	5.495E-04	5.465E-04	5.458E-04	5.511E-04
SBI32M	0.000E+00	5.733E-04	5.560E-04	5.446E-04	5.414E-04	5.410E-04	5.427E-04	5.496E-04
TE132	0.000E+00	2.645E+00	2.635E+00	2.615E+00	2.626E+00	2.650E+00	2.685E+00	2.739E+00
I132	0.000E+00	7.850E-02	7.845E-02	7.800E-02	7.845E-02	7.927E-02	8.043E-02	8.214E-02
XE132	0.000E+00	1.125E+02	3.691E+02	6.552E+02	9.711E+02	1.316E+03	1.689E+03	1.978E+03

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
 FISSION PRODUCTS
 POWER= 2.16550E+01 MW, BURNUP= 5.40006E+04 MWD, FLUX= 2.35E+14 N/CM**2-SEC

5 SUMMARY TABLE: CONCENTRATIONS, GRAMS

	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
CS132	0.000E+00	1.085E-04	3.292E-04	5.667E-04	8.383E-04	1.143E-03	1.467E-03	1.735E-03
BA132	0.000E+00	2.224E-05	2.122E-04	6.079E-04	1.237E-03	2.128E-03	3.303E-03	4.352E-03
SN133	0.000E+00	5.964E-07	5.321E-07	5.059E-07	4.958E-07	4.914E-07	4.893E-07	4.941E-07
SB133	0.000E+00	6.735E-04	6.100E-04	5.738E-04	5.560E-04	5.407E-04	5.282E-04	5.252E-04
TE133	0.000E+00	6.288E-03	6.078E-03	5.955E-03	5.925E-03	5.926E-03	5.950E-03	6.027E-03
TE133M	0.000E+00	1.957E-02	1.820E-02	1.716E-02	1.646E-02	1.590E-02	1.546E-02	1.535E-02
I133	0.000E+00	1.078E+00	1.047E+00	1.023E+00	1.013E+00	1.009E+00	1.010E+00	1.022E+00
I133M	0.000E+00	2.905E-06	3.324E-06	3.501E-06	3.668E-06	3.841E-06	4.031E-06	4.209E-06
XE133	0.000E+00	6.520E+00	6.342E+00	6.198E+00	6.145E+00	6.128E+00	6.144E+00	6.224E+00
XE133M	0.000E+00	8.135E-02	8.075E-02	7.980E-02	7.982E-02	8.027E-02	8.113E-02	8.267E-02
CS133	0.000E+00	1.615E+02	4.826E+02	7.753E+02	1.038E+03	1.266E+03	1.459E+03	1.576E+03
SB134	0.000E+00	7.255E-06	6.897E-06	6.872E-06	6.999E-06	7.159E-06	7.320E-06	7.497E-06
SB134M	0.000E+00	6.573E-06	6.248E-06	6.218E-06	6.319E-06	6.447E-06	6.576E-06	6.720E-06
TE134	0.000E+00	3.434E-02	3.130E-02	2.949E-02	2.834E-02	2.742E-02	2.665E-02	2.640E-02
I134	0.000E+00	5.117E-02	4.921E-02	4.785E-02	4.723E-02	4.689E-02	4.677E-02	4.719E-02
I134M	0.000E+00	2.509E-04	2.860E-04	3.034E-04	3.200E-04	3.368E-04	3.543E-04	3.699E-04
XE134	0.000E+00	1.963E+02	5.862E+02	9.705E+02	1.352E+03	1.731E+03	2.106E+03	2.380E+03
CS134	0.000E+00	2.711E+00	2.181E+01	5.465E+01	9.857E+01	1.516E+02	2.113E+02	2.579E+02
CS134M	0.000E+00	4.378E-04	1.326E-03	2.800E-03	3.370E-03	4.592E-03	5.895E-03	6.970E-03
BA134	0.000E+00	1.695E-01	4.234E+00	1.802E+01	4.596E+01	9.162E+01	1.577E+02	2.200E+02
SB135	0.000E+00	7.709E-07	6.813E-07	6.403E-07	6.199E-07	6.064E-07	5.962E-07	5.964E-07
TE135	0.000E+00	1.330E-04	1.225E-04	1.171E-04	1.143E-04	1.122E-04	1.106E-04	1.105E-04
I135	0.000E+00	3.239E-01	3.146E-01	3.079E-01	3.057E-01	3.050E-01	3.057E-01	3.095E-01
XE135	0.000E+00	2.169E-01	2.127E-01	2.023E-01	1.910E-01	1.797E-01	1.695E-01	1.627E-01
XE135M	0.000E+00	2.372E-03	2.427E-03	2.437E-03	2.468E-03	2.509E-03	2.560E-03	2.624E-03
CS135	0.000E+00	7.812E+01	2.352E+02	3.866E+02	5.310E+02	6.687E+02	8.014E+02	8.969E+02
CS135M	0.000E+00	1.605E-05	8.624E-05	2.175E-04	4.244E-04	7.219E-04	1.116E-03	1.486E-03
BA135	0.000E+00	1.513E-04	9.346E-03	7.002E-02	2.711E-01	7.582E-01	1.740E+00	2.933E+00
BA135M	0.000E+00	3.814E-07	6.244E-06	2.770E-05	7.761E-05	1.724E-04	3.304E-04	5.042E-04
TE136	0.000E+00	8.311E-05	7.430E-05	6.961E-05	6.679E-05	6.455E-05	6.264E-05	6.198E-05
I136	0.000E+00	5.538E-04	5.266E-04	5.129E-04	5.084E-04	5.065E-04	5.062E-04	5.109E-04
I136M	0.000E+00	1.876E-04	1.778E-04	1.710E-04	1.671E-04	1.642E-04	1.621E-04	1.624E-04
XE136	0.000E+00	2.603E+02	7.875E+02	1.321E+03	1.864E+03	2.418E+03	2.981E+03	3.401E+03
CS136	0.000E+00	1.057E-01	2.517E-01	3.970E-01	5.648E-01	7.614E-01	9.878E-01	1.190E+00
BA136	0.000E+00	6.095E-01	4.405E+00	1.138E+01	2.188E+01	3.644E+01	5.567E+01	7.313E+01
TE137	0.000E+00	3.572E-06	3.259E-06	3.138E-06	3.103E-06	3.096E-06	3.101E-06	3.139E-06
I137	0.000E+00	1.723E-04	1.597E-04	1.527E-04	1.489E-04	1.462E-04	1.441E-04	1.442E-04
XE137	0.000E+00	2.999E-02	2.897E-02	2.824E-02	2.794E-02	2.780E-02	2.778E-02	2.807E-02
CS137	0.000E+00	1.596E+02	4.753E+02	7.820E+02	1.081E+03	1.372E+03	1.656E+03	1.859E+03
BA137	0.000E+00	1.025E+00	9.141E+00	2.514E+01	4.875E+01	7.974E+01	1.179E+02	1.502E+02
BA137M	0.000E+00	2.456E-05	7.289E-05	1.198E-04	1.656E-04	2.102E-04	2.536E-04	2.848E-04

TE138	0.000E+00	4.094E-07	3.722E-07	3.603E-07	3.644E-07	3.707E-07	3.803E-07
I138	0.000E+00	2.328E-05	2.115E-05	2.002E-05	1.939E-05	1.856E-05	1.852E-05
XE138	0.000E+00	1.132E-02	1.060E-02	1.013E-02	9.849E-03	9.480E-03	9.475E-03
CS138	0.000E+00	2.796E-02	2.644E-02	2.540E-02	2.480E-02	2.408E-02	2.415E-02
CS138M	0.000E+00	9.900E-05	1.031E-04	1.037E-04	1.050E-04	1.088E-04	1.116E-04
BA138	0.000E+00	1.763E+02	5.208E+02	8.555E+02	1.184E+03	1.506E+03	1.822E+03
LA138	0.000E+00	1.329E-03	3.458E-03	5.010E-03	6.063E-03	6.871E-03	6.817E-03
I139	0.000E+00	4.013E-06	3.604E-06	3.382E-06	3.253E-06	3.160E-06	3.089E-06
XE139	0.000E+00	4.270E-04	3.939E-04	3.734E-04	3.607E-04	3.427E-04	3.410E-04
CS139	0.000E+00	7.806E-03	7.370E-03	7.075E-03	6.907E-03	6.786E-03	6.719E-03

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
 FISSION PRODUCTS
 POWER= 2.16550E+01 MW, BURNUP= 5.40006E+04 MWD, FLUX= 2.35E+14 N/CM**2-SEC

5 SUMMARY TABLE: CONCENTRATIONS, GRAMS

	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
BA139	0.000E+00	6.985E-02	6.639E-02	6.397E-02	6.266E-02	6.177E-02	6.122E-02	6.152E-02
LA139	0.000E+00	1.691E+02	4.993E+02	8.192E+02	1.131E+03	1.435E+03	1.731E+03	1.944E+03
I140	0.000E+00	4.344E-07	3.792E-07	3.496E-07	3.318E-07	3.187E-07	3.084E-07	3.057E-07
XE140	0.000E+00	1.026E-04	9.234E-05	8.609E-05	8.199E-05	7.865E-05	7.583E-05	7.475E-05
CS140	0.000E+00	8.047E-04	7.583E-04	7.270E-04	7.090E-04	6.959E-04	6.867E-04	6.880E-04
BA140	0.000E+00	1.508E+01	1.434E+01	1.382E+01	1.353E+01	1.332E+01	1.320E+01	1.326E+01
LA140	0.000E+00	1.984E+00	1.899E+00	1.842E+00	1.819E+00	1.810E+00	1.814E+00	1.842E+00
CE140	0.000E+00	1.482E+02	4.751E+02	7.959E+02	1.114E+03	1.429E+03	1.744E+03	1.974E+03
XE141	0.000E+00	4.509E-06	4.040E-06	3.794E-06	3.649E-06	3.537E-06	3.442E-06	3.414E-06
CS141	0.000E+00	2.425E-04	2.260E-04	2.149E-04	2.082E-04	2.031E-04	1.993E-04	1.990E-04
BA141	0.000E+00	1.429E-02	1.359E-02	1.306E-02	1.275E-02	1.253E-02	1.239E-02	1.245E-02
LA141	0.000E+00	1.851E-01	1.762E-01	1.694E-01	1.654E-01	1.626E-01	1.608E-01	1.615E-01
CE141	0.000E+00	3.622E+01	3.495E+01	3.360E+01	3.282E+01	3.228E+01	3.195E+01	3.232E+01
PR141	0.000E+00	1.203E+02	4.312E+02	7.314E+02	1.022E+03	1.303E+03	1.574E+03	1.761E+03
XE142	0.000E+00	1.116E-06	9.859E-07	9.240E-07	8.913E-07	8.689E-07	8.516E-07	8.503E-07
CS142	0.000E+00	1.056E-05	9.595E-06	9.015E-06	8.650E-06	8.363E-06	8.127E-06	8.058E-06
BA142	0.000E+00	8.187E-03	7.701E-03	7.350E-03	7.133E-03	6.972E-03	6.857E-03	6.860E-03
LA142	0.000E+00	7.227E-02	6.814E-02	6.512E-02	6.326E-02	6.190E-02	6.094E-02	6.100E-02
CE142	0.000E+00	1.567E+02	4.624E+02	7.578E+02	1.046E+03	1.327E+03	1.601E+03	1.799E+03
PR142	0.000E+00	3.317E-03	1.206E-02	2.191E-02	3.382E-02	4.814E-02	6.482E-02	7.934E-02
PR142M	0.000E+00	7.982E-06	2.903E-05	5.272E-05	8.138E-05	1.159E-04	1.560E-04	1.909E-04
ND142	0.000E+00	2.398E-01	3.111E+00	9.344E+00	1.956E+01	3.452E+01	5.495E+01	7.362E+01
CS143	0.000E+00	5.599E-06	4.947E-06	4.558E-06	4.296E-06	4.081E-06	3.897E-06	3.818E-06
BA143	0.000E+00	1.578E-04	1.464E-04	1.385E-04	1.334E-04	1.295E-04	1.264E-04	1.258E-04
LA143	0.000E+00	1.085E-02	1.009E-02	9.545E-03	9.191E-03	8.916E-03	8.705E-03	8.665E-03
CE143	0.000E+00	1.541E+00	1.434E+00	1.357E+00	1.308E+00	1.269E+00	1.241E+00	1.236E+00
PR143	0.000E+00	1.516E+01	1.410E+01	1.334E+01	1.285E+01	1.247E+01	1.219E+01	1.214E+01
ND143	0.000E+00	1.366E+02	4.063E+02	6.280E+02	8.039E+02	9.342E+02	1.021E+03	1.060E+03
CS144	0.000E+00	8.142E-07	7.544E-07	7.321E-07	7.279E-07	7.292E-07	7.328E-07	7.432E-07
BA144	0.000E+00	1.021E-04	9.261E-05	8.647E-05	8.234E-05	7.900E-05	7.625E-05	7.527E-05
LA144	0.000E+00	4.703E-04	4.327E-04	4.069E-04	3.898E-04	3.761E-04	3.652E-04	3.622E-04
CE144	0.000E+00	1.144E+02	2.180E+02	2.479E+02	2.525E+02	2.485E+02	2.416E+02	2.367E+02
PR144	0.000E+00	4.870E-03	9.242E-03	1.050E-02	1.071E-02	1.054E-02	1.025E-02	1.005E-02
PR144M	0.000E+00	2.418E-05	4.605E-05	5.236E-05	5.335E-05	5.250E-05	5.106E-05	5.002E-05
ND144	0.000E+00	3.497E+01	2.432E+02	5.456E+02	8.983E+02	1.287E+03	1.703E+03	2.025E+03
CS145	0.000E+00	1.105E-07	1.031E-07	1.005E-07	1.006E-07	1.016E-07	1.030E-07	1.053E-07
BA145	0.000E+00	2.815E-05	2.596E-05	2.461E-05	2.380E-05	2.320E-05	2.274E-05	2.270E-05
LA145	0.000E+00	2.400E-04	2.234E-04	2.121E-04	2.050E-04	1.996E-04	1.956E-04	1.952E-04
CE145	0.000E+00	1.586E-03	1.484E-03	1.412E-03	1.367E-03	1.334E-03	1.309E-03	1.308E-03
PR145	0.000E+00	1.898E-01	1.775E-01	1.699E-01	1.636E-01	1.596E-01	1.567E-01	1.565E-01
ND145	0.000E+00	1.051E+02	3.005E+02	4.772E+02	6.363E+02	7.769E+02	8.985E+02	9.758E+02

BA146	0.000E+00	3.618E-06	3.338E-06	3.197E-06	3.132E-06	3.094E-06	3.072E-06	3.093E-06
LA146	0.000E+00	4.406E-05	4.122E-05	3.944E-05	3.845E-05	3.776E-05	3.728E-05	3.738E-05
CE146	0.000E+00	5.842E-03	5.528E-03	5.314E-03	5.195E-03	5.114E-03	5.062E-03	5.085E-03
PR146	0.000E+00	9.987E-03	9.455E-03	9.090E-03	8.887E-03	8.750E-03	8.664E-03	8.704E-03
ND146	0.000E+00	8.425E+01	2.570E+02	4.366E+02	6.260E+02	8.272E+02	1.042E+03	1.208E+03
PM146	0.000E+00	1.814E-04	1.302E-03	2.874E-03	4.574E-03	6.245E-03	7.803E-03	8.859E-03
SM146	0.000E+00	2.048E-05	4.725E-04	1.872E-03	4.468E-03	8.323E-03	1.335E-02	1.767E-02
BA147	0.000E+00	8.087E-07	7.520E-07	7.311E-07	7.294E-07	7.351E-07	7.443E-07	7.603E-07
LA147	0.000E+00	2.549E-05	2.394E-05	2.308E-05	2.269E-05	2.245E-05	2.233E-05	2.249E-05
CE147	0.000E+00	3.648E-04	3.482E-04	3.369E-04	3.314E-04	3.280E-04	3.263E-04	3.288E-04

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
 FISSION PRODUCTS
 POWER= 2.16550E+01 MW, BURNUP= 5.40006E+04 MWD, FLUX= 2.35E+14 N/CM**2-SEC

5 SUMMARY TABLE: CONCENTRATIONS, GRAMS

	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
PR147	0.000E+00	3.844E-03	3.676E-03	3.560E-03	3.503E-03	3.469E-03	3.453E-03	3.480E-03
ND147	0.000E+00	5.083E+00	4.869E+00	4.725E+00	4.663E+00	4.633E+00	4.633E+00	4.688E+00
PM147	0.000E+00	4.826E+01	1.048E+02	1.242E+02	1.261E+02	1.202E+02	1.115E+02	1.050E+02
SM147	0.000E+00	3.641E+00	2.571E+01	5.381E+01	7.192E+01	9.812E+01	1.095E+02	1.134E+02
BA148	0.000E+00	3.413E-07	3.257E-07	3.267E-07	3.370E-07	3.515E-07	3.676E-07	3.844E-07
LA148	0.000E+00	1.196E-06	1.135E-06	1.110E-06	1.107E-06	1.112E-06	1.122E-06	1.141E-06
CE148	0.000E+00	1.583E-04	1.532E-04	1.501E-04	1.493E-04	1.493E-04	1.499E-04	1.520E-04
PR148	0.000E+00	5.613E-04	5.460E-04	5.359E-04	5.336E-04	5.343E-04	5.371E-04	5.448E-04
ND148	0.000E+00	4.888E+01	1.463E+02	2.425E+02	3.381E+02	4.329E+02	5.267E+02	5.949E+02
PM148	0.000E+00	3.028E-01	6.678E-01	8.414E-01	9.303E-01	9.717E-01	9.853E-01	9.988E-01
PM148M	0.000E+00	4.591E-01	1.012E+00	1.236E+00	1.298E+00	1.277E+00	1.220E+00	1.180E+00
SM148	0.000E+00	4.863E+00	3.909E+01	9.390E+01	1.617E+02	2.382E+02	3.199E+02	3.819E+02
LA149	0.000E+00	6.075E-07	5.881E-07	5.894E-07	6.033E-07	6.214E-07	6.411E-07	6.620E-07
CE149	0.000E+00	1.962E-06	1.925E-06	1.913E-06	1.929E-06	1.954E-06	1.984E-06	2.024E-06
PR149	0.000E+00	3.705E-04	3.695E-04	3.692E-04	3.734E-04	3.791E-04	3.859E-04	3.945E-04
ND149	0.000E+00	1.707E-02	1.718E-02	1.733E-02	1.773E-02	1.824E-02	1.885E-02	1.951E-02
PM149	0.000E+00	5.863E-01	6.696E-01	7.204E-01	7.663E-01	8.085E-01	8.480E-01	8.881E-01
SM149	0.000E+00	2.785E+00	3.144E+00	3.174E+00	3.076E+00	2.930E+00	2.784E+00	2.686E+00
CE150	0.000E+00	8.206E-07	8.350E-07	8.558E-07	8.871E-07	9.203E-07	9.539E-07	9.855E-07
PR150	0.000E+00	1.998E-05	2.083E-05	2.149E-05	2.233E-05	2.320E-05	2.409E-05	2.491E-05
ND150	0.000E+00	2.040E+01	6.396E+01	1.098E+02	1.576E+02	2.070E+02	2.579E+02	2.959E+02
PM150	0.000E+00	1.524E-04	1.771E-04	2.027E-04	2.361E-04	2.757E-04	3.201E-04	3.646E-04
SM150	0.000E+00	3.108E+01	1.076E+02	1.882E+02	2.685E+02	3.455E+02	4.168E+02	4.646E+02
EU150	0.000E+00	1.211E-08	1.063E-07	2.415E-07	3.978E-07	5.695E-07	7.772E-07	9.203E-07
CE151	0.000E+00	2.337E-07	2.409E-07	2.516E-07	2.654E-07	2.797E-07	2.936E-07	3.056E-07
PR151	0.000E+00	3.402E-06	3.625E-06	3.806E-06	4.012E-06	4.217E-06	4.419E-06	4.593E-06
ND151	0.000E+00	8.906E-04	9.752E-04	1.037E-03	1.104E-03	1.174E-03	1.245E-03	1.308E-03
PM151	0.000E+00	1.226E-01	1.344E-01	1.429E-01	1.521E-01	1.617E-01	1.715E-01	1.801E-01
SM151	0.000E+00	7.891E+00	1.324E+01	1.585E+01	1.790E+01	1.968E+01	2.129E+01	2.232E+01
EU151	0.000E+00	9.973E-03	2.193E-02	2.514E-02	2.585E-02	2.552E-02	2.561E-02	2.381E-02
CE152	0.000E+00	7.055E-07	7.232E-07	7.642E-07	8.185E-07	8.750E-07	9.300E-07	9.765E-07
PR152	0.000E+00	3.019E-06	3.254E-06	3.469E-06	3.706E-06	3.938E-06	4.159E-06	4.341E-06
ND152	0.000E+00	5.449E-04	6.142E-04	6.622E-04	7.107E-04	7.576E-04	8.031E-04	8.405E-04
PM152	0.000E+00	1.980E-04	2.236E-04	2.413E-04	2.592E-04	2.765E-04	2.933E-04	3.072E-04
PM152M	0.000E+00	5.541E-06	7.134E-06	7.982E-06	8.738E-06	9.468E-06	1.020E-05	1.080E-05
SM152	0.000E+00	1.409E+01	5.141E+01	8.536E+01	1.134E+02	1.356E+02	1.527E+02	1.627E+02
EU152	0.000E+00	6.923E-03	4.366E-02	7.020E-02	8.2291E-02	8.704E-02	9.090E-02	8.687E-02
EU152M	0.000E+00	1.719E-05	3.833E-05	4.707E-05	5.347E-05	5.893E-05	6.592E-05	6.706E-05
GD152	0.000E+00	1.959E-03	1.711E-02	3.818E-02	6.116E-02	8.439E-02	1.104E-01	1.257E-01
PR153	0.000E+00	8.626E-07	9.319E-07	1.010E-06	1.098E-06	1.183E-06	1.264E-06	1.327E-06
ND153	0.000E+00	3.084E-05	3.492E-05	3.807E-05	4.126E-05	4.429E-05	4.718E-05	4.947E-05

PM153	0.000E+00	1.653E-04	1.894E-04	2.071E-04	2.247E-04	2.415E-04	2.575E-04	2.703E-04
SM153	0.000E+00	1.298E-01	2.615E-01	3.979E-01	5.428E-01	6.942E-01	8.477E-01	9.727E-01
EU153	0.000E+00	6.547E+00	2.913E+01	6.183E+01	1.005E+02	1.407E+02	1.787E+02	2.036E+02
GD153	0.000E+00	2.018E-05	4.870E-04	1.645E-03	3.420E-03	5.771E-03	8.913E-03	1.141E-02
ND154	0.000E+00	8.015E-06	9.868E-06	1.129E-05	1.266E-05	1.393E-05	1.512E-05	1.601E-05
PM154	0.000E+00	4.036E-05	5.068E-05	5.820E-05	6.533E-05	7.199E-05	7.823E-05	8.295E-05
SM154M	0.000E+00	3.914E-06	5.397E-06	6.303E-06	7.114E-06	7.874E-06	8.607E-06	9.171E-06
SM154	0.000E+00	2.981E+00	1.075E+01	2.015E+01	3.093E+01	4.290E+01	5.592E+01	6.605E+01
EU154	0.000E+00	4.384E-01	4.459E+00	1.347E+01	2.742E+01	4.503E+01	6.420E+01	7.801E+01
GD154	0.000E+00	6.325E-03	1.864E-01	9.180E-01	2.595E+00	5.507E+00	9.741E+00	1.361E+01

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
FISSION PRODUCTS
POWER= 2.16550E+01 MW, BURNUP= 5.40006E+04 MWD, FLUX= 2.35E+14 N/CM**2-SEC

5 SUMMARY TABLE: CONCENTRATIONS, GRAMS

	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
ND155	0.000E+00	1.894E-06	2.394E-06	2.803E-06	3.1198E-06	3.565E-06	3.904E-06	4.153E-06
PM155	0.000E+00	5.014E-06	6.686E-06	7.899E-06	9.009E-06	1.005E-05	1.102E-05	1.175E-05
SM155	0.000E+00	2.022E-04	2.773E-04	3.392E-04	3.864E-04	4.399E-04	4.938E-04	5.368E-04
EU155	0.000E+00	1.113E+00	3.217E+00	6.392E+00	1.142E+01	1.823E+01	2.614E+01	3.208E+01
GD155	0.000E+00	3.458E-02	1.954E-01	4.341E-01	7.908E-01	1.266E+00	1.806E+00	2.189E+00
ND156	0.000E+00	1.271E-06	1.758E-06	2.171E-06	2.566E-06	2.931E-06	3.263E-06	3.501E-06
PM156	0.000E+00	8.315E-07	1.227E-06	1.523E-06	1.795E-06	2.045E-06	2.275E-06	2.441E-06
SM156	0.000E+00	2.817E-03	4.253E-03	5.264E-03	6.185E-03	7.033E-03	7.824E-03	8.400E-03
EU156	0.000E+00	2.011E-01	4.387E-01	7.893E-01	1.394E+00	2.328E+00	3.578E+00	4.754E+00
GD156	0.000E+00	1.130E+00	7.089E+00	1.862E+01	3.949E+01	7.544E+01	1.325E+02	1.907E+02
PM157	0.000E+00	1.910E-06	2.942E-06	3.764E-06	4.525E-06	5.219E-06	5.849E-06	6.292E-06
SM157	0.000E+00	2.401E-05	3.820E-05	4.861E-05	5.808E-05	6.674E-05	7.470E-05	8.037E-05
EU157	0.000E+00	2.966E-03	4.836E-03	6.410E-03	8.232E-03	1.052E-02	1.341E-02	1.622E-02
GD157	0.000E+00	1.877E-01	3.651E-01	5.003E-01	6.546E-01	9.068E-01	1.227E+00	1.476E+00
SM158	0.000E+00	6.668E-06	1.104E-04	1.439E-04	1.744E-04	2.020E-04	2.270E-04	2.443E-04
EU158	0.000E+00	7.447E-05	1.235E-04	1.608E-04	1.947E-04	2.254E-04	2.534E-04	2.729E-04
GD158	0.000E+00	5.672E-01	3.102E+00	7.036E+00	1.253E+01	2.039E+01	3.148E+01	4.229E+01
SM159	0.000E+00	1.735E-06	3.062E-06	4.111E-06	5.067E-06	5.927E-06	6.700E-06	7.231E-06
EU159	0.000E+00	1.414E-05	2.504E-05	3.348E-05	4.115E-05	4.806E-05	5.429E-05	5.859E-05
GD159	0.000E+00	8.969E-04	1.656E-03	2.321E-03	3.028E-03	3.834E-03	4.817E-03	5.747E-03
TB159	0.000E+00	1.138E-01	5.456E-01	1.175E+00	1.967E+00	2.904E+00	3.979E+00	4.859E+00
SM160	0.000E+00	1.449E-06	2.479E-06	3.265E-06	3.983E-06	4.634E-06	5.226E-06	5.640E-06
EU160	0.000E+00	3.096E-07	5.480E-07	7.262E-07	8.876E-07	1.034E-06	1.168E-06	1.261E-06
GD160	0.000E+00	5.428E-02	2.669E-01	5.815E-01	9.833E-01	1.462E+00	2.007E+00	2.444E+00
TB160	0.000E+00	1.395E-03	9.990E-03	2.516E-02	4.805E-02	8.015E-02	1.226E-01	1.629E-01
DY160	0.000E+00	8.966E-04	1.850E-02	7.113E-02	1.693E-01	3.190E-01	5.214E-01	7.010E-01
EU161	0.000E+00	1.088E-07	1.957E-07	2.602E-07	3.186E-07	3.721E-07	4.211E-07	4.557E-07
GD161	0.000E+00	6.589E-07	1.194E-06	1.592E-06	1.957E-06	2.296E-06	2.614E-06	2.844E-06
TB161	0.000E+00	1.789E-03	3.306E-03	4.527E-03	5.773E-03	7.116E-03	8.626E-03	9.969E-03
DY161	0.000E+00	2.256E-02	1.060E-01	2.153E-01	3.454E-01	4.997E-01	6.858E-01	8.471E-01
EU162	0.000E+00	2.496E-07	3.925E-07	4.995E-07	5.991E-07	6.926E-07	7.801E-07	8.444E-07
GD162	0.000E+00	9.541E-07	1.601E-06	2.038E-06	2.435E-06	2.808E-06	3.161E-06	3.424E-06
TB162	0.000E+00	7.050E-07	1.185E-06	1.508E-06	1.802E-06	2.077E-06	2.338E-06	2.533E-06
TB162M	0.000E+00	3.738E-07	6.563E-07	8.331E-07	9.901E-07	1.138E-06	1.280E-06	1.388E-06
DY162	0.000E+00	1.471E-02	7.388E-02	1.610E-01	2.703E-01	3.999E-01	5.513E-01	6.792E-01
GD163	0.000E+00	6.298E-08	1.014E-07	1.276E-07	1.516E-07	1.745E-07	1.963E-07	2.128E-07
TB163	0.000E+00	8.488E-07	1.381E-06	1.738E-06	2.065E-06	2.375E-06	2.672E-06	2.896E-06
DY163	0.000E+00	7.506E-07	4.320E-02	1.091E-01	2.101E-01	3.498E-01	5.306E-01	6.910E-01
GD164	0.000E+00	3.896E-07	5.839E-07	7.176E-07	8.434E-07	9.653E-07	1.084E-06	1.175E-06
TB164	0.000E+00	6.465E-08	9.997E-08	1.233E-07	1.449E-07	1.658E-07	1.861E-07	2.019E-07
DY164	0.000E+00	3.184E-03	1.397E-02	3.122E-02	5.775E-02	9.626E-02	1.485E-01	1.962E-01

DY165	0.000E+00	2.509E-06	6.752E-06	1.356E-05	2.539E-05	4.506E-05	7.548E-05	1.078E-04
DY165M	0.000E+00	1.251E-08	3.571E-08	7.364E-08	1.398E-07	2.501E-07	4.203E-07	6.010E-07
HO165	0.000E+00	2.311E-03	1.436E-02	3.989E-02	8.720E-02	1.693E-01	3.027E-01	4.440E-01
DY166	0.000E+00	3.042E-05	4.669E-05	5.837E-05	6.976E-05	8.153E-05	9.418E-05	1.053E-04
HO166	0.000E+00	1.113E-05	2.242E-05	4.020E-05	7.364E-05	1.367E-04	2.499E-04	3.860E-04
HO166M	0.000E+00	3.980E-06	5.837E-05	2.516E-04	7.517E-04	1.880E-03	4.199E-03	7.170E-03
ER166	0.000E+00	1.009E-03	5.071E-03	1.260E-02	2.632E-02	5.159E-02	9.783E-02	1.535E-01
ER167	0.000E+00	4.485E-04	1.403E-03	2.274E-03	3.094E-03	4.022E-03	5.377E-03	6.929E-03
ER168	0.000E+00	7.211E-05	6.940E-04	2.013E-03	4.121E-03	7.212E-03	1.172E-02	1.646E-02
ER169	0.000E+00	1.480E-08	1.445E-07	4.488E-07	1.015E-06	1.984E-06	3.593E-06	5.522E-06

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
 FISSION PRODUCTS
 POWER= 2.16550E+01 MW, BURNUP= 5.40006E+04 MWD, FLUX= 2.35E+14 N/CM**2-SEC

5 SUMMARY TABLE: CONCENTRATIONS, GRAMS

	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
TMI69	0.000E+00	6.447E-08	1.833E-06	8.726E-06	2.470E-05	5.444E-05	1.040E-04
TMI70	0.000E+00	1.906E-09	1.187E-07	7.720E-07	2.700E-06	7.066E-06	1.560E-05
YBI70	0.000E+00	4.215E-10	8.322E-08	9.016E-07	4.313E-06	1.404E-05	3.648E-05
TMI71	0.000E+00	1.873E-11	3.523E-09	3.844E-08	1.911E-07	6.571E-07	1.814E-06
YBI71	0.000E+00	2.364E-12	1.453E-09	2.724E-08	1.928E-07	8.564E-07	2.881E-06
YBI72	0.000E+00	4.167E-14	4.054E-11	1.088E-09	1.050E-08	6.127E-08	2.628E-07
SUMTOT	0.000E+00	4.496E+03	1.352E+04	2.247E+04	3.139E+04	4.027E+04	4.913E+04
TOTAL	0.000E+00	4.496E+03	1.352E+04	2.247E+04	3.139E+04	4.027E+04	4.913E+04

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL

FISSION PRODUCTS

POWER= 2.16550E+01 MW, BURNUP= 5.40006E+04 MWD, FLUX= 2.35E+14 N/CM**2-SEC

5 SUMMARY TABLE: CONCENTRATIONS, GRAMS

	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
H	0.000E+00	6.901E-03	2.111E-02	3.528E-02	4.931E-02	6.316E-02	7.677E-02	8.660E-02
LI	0.000E+00	5.431E-05	1.386E-04	1.945E-04	2.268E-04	2.398E-04	2.391E-04	2.329E-04
BE	0.000E+00	1.986E-05	5.948E-05	9.865E-05	1.376E-04	1.763E-04	2.147E-04	2.429E-04
C	0.000E+00	3.492E-06	1.046E-05	1.735E-05	2.419E-05	3.099E-05	3.775E-05	4.270E-05
ZN	0.000E+00	7.254E-04	2.168E-03	3.711E-03	5.389E-03	7.218E-03	9.204E-03	1.076E-02
GA	0.000E+00	1.933E-05	2.054E-05	2.224E-05	2.483E-05	2.828E-05	3.267E-05	3.683E-05
GE	0.000E+00	9.102E-02	2.670E-01	4.371E-01	6.037E-01	7.681E-01	9.311E-01	1.051E+00
AS	0.000E+00	2.882E-02	8.131E-02	1.323E-01	1.822E-01	2.312E-01	2.793E-01	3.141E-01
SE	0.000E+00	8.294E+00	2.408E+01	3.891E+01	5.298E+01	6.638E+01	7.919E+01	8.828E+01
BR	0.000E+00	3.274E+00	9.442E+00	1.513E+01	2.038E+01	2.521E+01	2.962E+01	3.260E+01
KR	0.000E+00	5.951E+01	1.675E+02	2.648E+02	3.538E+02	4.354E+02	5.104E+02	5.618E+02
RB	0.000E+00	5.567E+01	1.567E+02	2.475E+02	3.304E+02	4.061E+02	4.753E+02	5.225E+02
SR	0.000E+00	1.752E+02	4.380E+02	6.665E+02	8.690E+02	1.048E+03	1.206E+03	1.310E+03
Y	0.000E+00	8.736E+01	2.251E+02	3.455E+02	4.539E+02	5.515E+02	6.393E+02	6.983E+02
ZR	0.000E+00	5.387E+02	1.538E+03	2.469E+03	3.348E+03	4.182E+03	4.974E+03	5.532E+03
NB	0.000E+00	2.223E+01	2.741E+01	2.600E+01	2.493E+01	2.405E+01	2.333E+01	2.289E+01
MO	0.000E+00	3.859E+02	1.296E+03	2.195E+03	3.076E+03	3.939E+03	4.786E+03	5.384E+03
TC	0.000E+00	1.104E+02	3.276E+02	5.311E+02	7.201E+02	8.927E+02	1.047E+03	1.149E+03
RU	0.000E+00	2.714E+02	8.317E+02	1.432E+03	2.070E+03	2.748E+03	3.465E+03	4.016E+03
RH	0.000E+00	4.819E+01	1.807E+02	2.975E+02	3.917E+02	4.609E+02	5.062E+02	5.223E+02
PD	0.000E+00	5.305E+01	2.651E+02	5.930E+02	1.026E+03	1.556E+03	2.173E+03	2.670E+03
AG	0.000E+00	3.798E+00	1.862E+01	3.865E+01	6.137E+01	8.491E+01	1.079E+02	1.240E+02
CD	0.000E+00	5.788E+00	2.299E+01	4.873E+01	8.503E+01	1.339E+02	1.969E+02	2.529E+02
IN	0.000E+00	7.125E-01	1.549E+00	1.922E+00	2.082E+00	2.145E+00	2.170E+00	2.177E+00
SN	0.000E+00	9.037E+00	2.947E+01	5.230E+01	7.736E+01	1.046E+02	1.340E+02	1.570E+02
SB	0.000E+00	3.784E+00	1.143E+01	1.898E+01	2.643E+01	3.381E+01	4.117E+01	4.655E+01
TE	0.000E+00	5.680E+01	1.729E+02	2.938E+02	4.244E+02	5.583E+02	6.973E+02	8.026E+02
I	0.000E+00	3.032E+01	8.767E+01	1.487E+02	2.116E+02	2.753E+02	3.393E+02	3.858E+02
XE	0.000E+00	6.438E+02	1.949E+03	3.263E+03	4.591E+03	5.935E+03	7.294E+03	8.301E+03
CS	0.000E+00	4.021E+02	1.215E+03	1.999E+03	2.749E+03	3.460E+03	4.128E+03	4.592E+03
BA	0.000E+00	1.933E+02	5.530E+02	9.240E+02	1.314E+03	1.728E+03	2.168E+03	2.511E+03
LA	0.000E+00	1.713E+02	5.015E+02	8.213E+02	1.133E+03	1.437E+03	1.733E+03	1.946E+03
CE	0.000E+00	4.571E+02	1.192E+03	1.837E+03	2.446E+03	3.038E+03	3.619E+03	4.043E+03
PR	0.000E+00	1.357E+02	4.455E+02	7.449E+02	1.035E+03	1.316E+03	1.587E+03	1.773E+03
ND	0.000E+00	4.355E+02	1.425E+03	2.454E+03	3.484E+03	4.504E+03	5.509E+03	6.237E+03
PM	0.000E+00	4.973E+01	1.073E+02	1.272E+02	1.293E+02	1.234E+02	1.147E+02	1.082E+02
SM	0.000E+00	6.746E+01	2.512E+02	4.608E+02	6.753E+02	8.836E+02	1.080E+03	1.215E+03
EU	0.000E+00	8.319E+00	3.731E+01	8.258E+01	1.408E+02	2.064E+02	2.728E+02	3.185E+02
GD	0.000E+00	1.983E+00	1.122E+01	2.814E+01	5.712E+01	1.051E+02	1.789E+02	2.529E+02
TB	0.000E+00	1.170E-01	5.589E-01	1.205E+00	2.021E+00	2.991E+00	4.110E+00	5.032E+00
DY	0.000E+00	4.889E-02	2.556E-01	5.877E-01	1.053E+00	1.665E+00	2.438E+00	3.115E+00

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL

FISSION PRODUCTS

POWER= 2.16550E+01 MW, BURNUP= 5.40006E+04 MWD, FLUX= 2.35E+14 N/CM**2-SEC

7 SUMMARY TABLE: RADIOACTIVITY, CURIES

	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
H 3	0.000E+00	6.662E+01	2.038E+02	3.406E+02	4.761E+02	6.097E+02	7.411E+02	8.361E+02
ZN 69	0.000E+00	9.307E-04	2.826E-03	5.135E-03	8.182E-03	1.218E-02	1.724E-02	2.201E-02
CO 72	0.000E+00	7.669E-01	7.552E-01	7.892E-01	8.515E-01	9.287E-01	1.012E+00	1.089E+00
NI 72	0.000E+00	1.494E+01	1.477E+01	1.534E+01	1.638E+01	1.767E+01	1.906E+01	2.035E+01
CU 72	0.000E+00	2.735E+01	2.835E+01	2.984E+01	3.200E+01	3.453E+01	3.723E+01	3.971E+01
ZN 72	0.000E+00	3.029E+01	3.255E+01	3.470E+01	3.745E+01	4.056E+01	4.387E+01	4.685E+01
GA 72	0.000E+00	3.033E+01	3.263E+01	3.480E+01	3.757E+01	4.070E+01	4.402E+01	4.702E+01
CO 73	0.000E+00	2.299E-01	2.313E-01	2.466E-01	2.707E-01	2.995E-01	3.301E-01	3.577E-01
NI 73	0.000E+00	1.199E+01	1.183E+01	1.243E+01	1.346E+01	1.471E+01	1.604E+01	1.725E+01
CU 73	0.000E+00	4.194E+01	4.027E+01	4.088E+01	4.283E+01	4.541E+01	4.827E+01	5.108E+01
ZN 73	0.000E+00	6.934E+01	6.881E+01	6.971E+01	7.222E+01	7.560E+01	7.946E+01	8.342E+01
GA 73	0.000E+00	7.145E+01	7.177E+01	7.307E+01	7.591E+01	7.962E+01	8.384E+01	8.809E+01
GE 73M	0.000E+00	7.147E+01	7.181E+01	7.311E+01	7.596E+01	7.968E+01	8.390E+01	8.817E+01
CO 74	0.000E+00	5.119E-02	4.947E-02	5.086E-02	5.415E-02	5.847E-02	6.324E-02	6.782E-02
NI 74	0.000E+00	8.987E+00	8.371E+00	8.306E+00	8.551E+00	8.955E+00	9.437E+00	9.955E+00
CU 74	0.000E+00	6.690E+01	6.164E+01	5.970E+01	5.974E+01	6.079E+01	6.240E+01	6.467E+01
ZN 74	0.000E+00	1.466E+02	1.416E+02	1.392E+02	1.400E+02	1.426E+02	1.464E+02	1.515E+02
GA 74	0.000E+00	1.526E+02	1.493E+02	1.477E+02	1.492E+02	1.525E+02	1.571E+02	1.629E+02
NI 75	0.000E+00	3.667E+00	3.404E+00	3.372E+00	3.468E+00	3.629E+00	3.821E+00	4.028E+00
CU 75	0.000E+00	6.994E+01	6.312E+01	6.032E+01	5.968E+01	6.008E+01	6.106E+01	6.286E+01
ZN 75	0.000E+00	2.960E+02	2.764E+02	2.655E+02	2.617E+02	2.614E+02	2.635E+02	2.694E+02
GA 75	0.000E+00	3.366E+02	3.227E+02	3.142E+02	3.125E+02	3.147E+02	3.196E+02	3.281E+02
GE 75	0.000E+00	3.383E+02	3.254E+02	3.173E+02	3.161E+02	3.187E+02	3.241E+02	3.331E+02
GE 75M	0.000E+00	1.430E+01	1.420E+01	1.409E+01	1.422E+01	1.450E+01	1.491E+01	1.543E+01
NI 76	0.000E+00	1.011E+00	9.202E-01	8.958E-01	9.058E-01	9.328E-01	9.681E-01	1.011E+00
CU 76	0.000E+00	5.911E+01	5.160E+01	4.788E+01	4.600E+01	4.496E+01	4.439E+01	4.482E+01
ZN 76	0.000E+00	6.046E+02	5.329E+02	4.897E+02	4.622E+02	4.420E+02	4.288E+02	4.235E+02
GA 76	0.000E+00	8.467E+02	7.723E+02	7.230E+02	6.924E+02	6.711E+02	6.568E+02	6.576E+02
AS 76	0.000E+00	2.435E+00	7.188E+00	1.236E+01	1.911E+01	2.706E+01	3.642E+01	4.479E+01
NI 77	0.000E+00	1.642E-01	1.514E-01	1.492E-01	1.528E-01	1.593E-01	1.673E-01	1.761E-01
CU 77	0.000E+00	2.684E+01	2.348E+01	2.187E+01	2.112E+01	2.078E+01	2.066E+01	2.098E+01
ZN 77	0.000E+00	6.962E+02	6.046E+02	5.497E+02	5.137E+02	4.867E+02	4.656E+02	4.593E+02
GA 77	0.000E+00	1.627E+03	1.459E+03	1.343E+03	1.263E+03	1.202E+03	1.155E+03	1.142E+03
GE 77	0.000E+00	6.530E+02	6.149E+02	5.822E+02	5.610E+02	5.466E+02	5.382E+02	5.410E+02
GE 77M	0.000E+00	1.536E+03	1.404E+03	1.308E+03	1.243E+03	1.196E+03	1.162E+03	1.157E+03
AS 77	0.000E+00	1.870E+03	1.729E+03	1.621E+03	1.549E+03	1.497E+03	1.462E+03	1.462E+03
SE 77M	0.000E+00	4.644E+00	4.337E+00	4.160E+00	4.1150E+00	4.300E+00	4.640E+00	5.090E+00
NI 78	0.000E+00	1.890E-02	1.748E-02	1.729E-02	1.776E-02	1.857E-02	1.954E-02	2.060E-02
CU 78	0.000E+00	9.867E+00	8.556E+00	7.926E+00	7.613E+00	7.444E+00	7.355E+00	7.430E+00
ZN 78	0.000E+00	7.581E+02	6.372E+02	5.654E+02	5.155E+02	4.751E+02	4.408E+02	4.248E+02
GA 78	0.000E+00	3.148E+03	2.731E+03	2.454E+03	2.254E+03	2.089E+03	1.950E+03	1.886E+03

GE 78	0.000E+00	3.786E+03	3.629E+03	3.482E+03	3.393E+03	3.338E+03	3.312E+03	3.341E+03
AS 78	0.000E+00	3.844E+03	3.706E+03	3.567E+03	3.485E+03	3.437E+03	3.419E+03	3.455E+03
CU 79	0.000E+00	2.147E+00	2.006E+00	2.003E+00	2.075E+00	2.187E+00	2.317E+00	2.452E+00
ZN 79	0.000E+00	3.886E+02	3.426E+02	3.223E+02	3.144E+02	3.121E+02	3.129E+02	3.191E+02
GA 79	0.000E+00	3.218E+03	2.829E+03	2.606E+03	2.469E+03	2.369E+03	2.294E+03	2.280E+03
GE 79	0.000E+00	8.172E+03	7.699E+03	7.333E+03	7.113E+03	6.970E+03	6.892E+03	6.941E+03
AS 79	0.000E+00	9.760E+03	9.168E+03	8.688E+03	8.381E+03	8.168E+03	8.035E+03	8.064E+03
SE 79	0.000E+00	5.734E-02	1.692E-01	2.766E-01	3.805E-01	4.813E-01	5.796E-01	6.505E-01
SE 79M	0.000E+00	9.766E+03	9.180E+03	8.705E+03	8.403E+03	8.196E+03	8.070E+03	8.106E+03
BR 79M	0.000E+00	3.490E-03	6.740E-03	8.357E-03	9.701E-03	1.100E-02	1.233E-02	1.339E-02

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
FISSION PRODUCTS
POWER= 2.16550E+01 MW, BURNUP= 5.40006E+04 MWD, FLUX= 2.35E+14 N/CM**2-SEC

7 SUMMARY TABLE: RADIOACTIVITY, CURIES

	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
CU 80	0.000E+00	2.430E-01	2.229E-01	2.187E-01	2.230E-01	2.315E-01	2.421E-01	2.542E-01
ZN 80	0.000E+00	1.572E+02	1.348E+02	1.232E+02	1.166E+02	1.122E+02	1.091E+02	1.090E+02
GA 80	0.000E+00	3.789E+03	3.184E+03	2.812E+03	2.547E+03	2.329E+03	2.141E+03	2.050E+03
GE 80	0.000E+00	1.887E+04	1.685E+04	1.540E+04	1.434E+04	1.348E+04	1.277E+04	1.249E+04
AS 80	0.000E+00	2.204E+04	2.047E+04	1.918E+04	1.826E+04	1.756E+04	1.705E+04	1.695E+04
BR 80	0.000E+00	2.328E-01	3.500E-01	4.120E-01	4.718E-01	5.387E-01	6.165E-01	6.860E-01
BR 80M	0.000E+00	1.359E-01	2.214E-01	2.637E-01	3.003E-01	3.375E-01	3.772E-01	4.107E-01
CU 81	0.000E+00	1.666E-02	1.564E-02	1.566E-02	1.629E-02	1.723E-02	1.832E-02	1.945E-02
ZN 81	0.000E+00	3.240E+01	2.846E+01	2.672E+01	2.604E+01	2.588E+01	2.598E+01	2.657E+01
GA 81	0.000E+00	2.156E+03	1.814E+03	1.614E+03	1.480E+03	1.374E+03	1.286E+03	1.249E+03
GE 81	0.000E+00	2.462E+04	2.122E+04	1.897E+04	1.734E+04	1.599E+04	1.485E+04	1.431E+04
AS 81	0.000E+00	3.594E+04	3.281E+04	3.044E+04	2.876E+04	2.745E+04	2.645E+04	2.617E+04
SE 81	0.000E+00	3.773E+04	3.477E+04	3.243E+04	3.081E+04	2.956E+04	2.863E+04	2.845E+04
SE 81M	0.000E+00	1.125E+03	1.016E+03	9.235E+02	8.524E+02	7.936E+02	7.464E+02	7.268E+02
KR 81M	0.000E+00	4.415E-03	9.511E-03	1.315E-02	1.711E-02	2.182E-02	2.751E-02	3.270E-02
ZN 82	0.000E+00	3.857E+00	3.470E+00	3.340E+00	3.343E+00	3.408E+00	3.505E+00	3.641E+00
GA 82	0.000E+00	7.552E+02	6.406E+02	5.785E+02	5.339E+02	5.117E+02	4.895E+02	4.831E+02
GE 82	0.000E+00	2.285E+04	1.913E+04	1.682E+04	1.516E+04	1.376E+04	1.256E+04	1.194E+04
AS 82	0.000E+00	3.665E+04	3.148E+04	2.811E+04	2.566E+04	2.362E+04	2.188E+04	2.104E+04
BR 82	0.000E+00	4.687E+02	1.257E+03	2.059E+03	3.006E+03	4.088E+03	5.298E+03	6.343E+03
BR 82M	0.000E+00	1.725E+02	4.678E+02	7.807E+02	1.145E+03	1.567E+03	2.039E+03	2.448E+03
ZN 83	0.000E+00	3.409E-01	3.112E-01	3.038E-01	3.083E-01	3.188E-01	3.322E-01	3.481E-01
GA 83	0.000E+00	1.997E+02	1.709E+02	1.560E+02	1.475E+02	1.419E+02	1.379E+02	1.377E+02
GE 83	0.000E+00	1.684E+04	1.394E+04	1.218E+04	1.092E+04	9.877E+03	8.969E+03	8.503E+03
AS 83	0.000E+00	6.948E+04	5.848E+04	5.137E+04	4.608E+04	4.159E+04	3.769E+04	3.563E+04
SE 83	0.000E+00	3.466E+04	3.138E+04	2.901E+04	2.732E+04	2.598E+04	2.491E+04	2.454E+04
SE 83M	0.000E+00	5.637E+04	4.950E+04	4.478E+04	4.133E+04	3.848E+04	3.608E+04	3.500E+04
BR 83	0.000E+00	9.195E+04	8.207E+04	7.508E+04	7.005E+04	6.595E+04	6.259E+04	6.124E+04
KR 83M	0.000E+00	9.193E+04	8.207E+04	7.512E+04	7.015E+04	6.615E+04	6.294E+04	6.173E+04
GA 84	0.000E+00	1.892E+01	1.747E+01	1.729E+01	1.776E+01	1.853E+01	1.944E+01	2.043E+01
GE 84	0.000E+00	4.128E+03	3.611E+03	3.378E+03	3.272E+03	3.218E+03	3.190E+03	3.222E+03
AS 84	0.000E+00	5.400E+04	4.563E+04	4.050E+04	3.684E+04	3.379E+04	3.116E+04	2.984E+04
SE 84	0.000E+00	1.654E+05	1.435E+05	1.286E+05	1.176E+05	1.083E+05	1.004E+05	9.660E+04
BR 84	0.000E+00	1.690E+05	1.474E+05	1.326E+05	1.227E+05	1.125E+05	1.048E+05	1.011E+05
BR 84M	0.000E+00	3.759E+03	4.081E+03	4.151E+03	4.217E+03	4.325E+03	4.454E+03	4.604E+03
GE 85	0.000E+00	1.221E+03	1.026E+03	9.174E+02	8.463E+02	7.919E+02	7.476E+02	7.309E+02
AS 85	0.000E+00	3.445E+04	2.843E+04	2.468E+04	2.191E+04	1.957E+04	1.752E+04	1.642E+04
SE 85	0.000E+00	1.028E+05	8.715E+04	7.668E+04	6.879E+04	6.207E+04	5.625E+04	5.318E+04
SE 85M	0.000E+00	7.456E+04	6.382E+04	5.642E+04	5.081E+04	4.602E+04	4.188E+04	3.971E+04
BR 85	0.000E+00	2.073E+05	1.800E+05	1.609E+05	1.465E+05	1.344E+05	1.241E+05	1.190E+05

KR 85	0.000E+00	1.607E+03	4.391E+03	6.719E+03	8.682E+03	1.033E+04	1.172E+04	1.172E+04	1.259E+04
KR 85M	0.000E+00	2.096E+05	1.821E+05	1.629E+05	1.485E+05	1.363E+05	1.260E+05	1.260E+05	1.209E+05
GE 86	0.000E+00	2.256E+02	1.905E+02	1.712E+02	1.590E+02	1.502E+02	1.432E+02	1.412E+02	1.412E+02
AS 86	0.000E+00	1.896E+04	1.548E+04	1.333E+04	1.173E+04	1.038E+04	9.199E+03	8.556E+03	8.556E+03
SE 86	0.000E+00	2.122E+05	1.765E+05	1.532E+05	1.356E+05	1.204E+05	1.070E+05	9.965E+04	9.965E+04
BR 86	0.000E+00	1.550E+05	1.324E+05	1.170E+05	1.054E+05	9.550E+04	8.693E+04	8.245E+04	8.245E+04
BR 86M	0.000E+00	1.562E+05	1.333E+05	1.177E+05	1.060E+05	9.591E+04	8.721E+04	8.264E+04	8.264E+04
RB 86	0.000E+00	1.817E+02	4.879E+02	8.123E+02	1.192E+03	1.637E+03	2.141E+03	2.582E+03	2.582E+03
RB 86M	0.000E+00	3.073E+01	6.212E+01	9.058E+01	1.227E+02	1.596E+02	2.013E+02	2.376E+02	2.376E+02
GE 87	0.000E+00	3.416E+01	2.833E+01	2.488E+01	2.250E+01	2.064E+01	1.912E+01	1.847E+01	1.847E+01

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL

FISSION PRODUCTS

POWER= 2.16550E+01 MW, BURNUP= 5.40006E+04 MWD, FLUX= 2.35E+14 N/CM**2-SEC

7 SUMMARY TABLE: RADIOACTIVITY, CURIES

	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
AS 87	0.000E+00	1.034E+04	8.287E+03	6.958E+03	5.939E+03	5.062E+03	4.286E+03	3.844E+03
SE 87	0.000E+00	1.613E+05	1.367E+05	1.204E+05	1.082E+05	9.788E+04	8.897E+04	8.435E+04
BR 87	0.000E+00	3.530E+05	3.016E+05	2.666E+05	2.401E+05	2.176E+05	1.981E+05	1.879E+05
KR 87	0.000E+00	4.182E+05	3.578E+05	3.164E+05	2.850E+05	2.583E+05	2.352E+05	2.231E+05
SR 87M	0.000E+00	5.306E-01	1.139E+00	1.935E+00	3.233E+00	5.300E+00	8.409E+00	1.168E+01
GE 88	0.000E+00	8.335E-01	7.750E-01	7.697E-01	7.940E-01	8.336E-01	8.806E-01	9.307E-01
AS 88	0.000E+00	5.755E+02	4.978E+02	4.593E+02	4.392E+02	4.276E+02	4.207E+02	4.240E+02
SE 88	0.000E+00	6.156E+04	5.140E+04	4.521E+04	4.078E+04	3.712E+04	3.397E+04	3.239E+04
BR 88	0.000E+00	4.014E+05	3.354E+05	2.913E+05	2.576E+05	2.286E+05	2.032E+05	1.894E+05
KR 88	0.000E+00	5.911E+05	5.054E+05	4.462E+05	4.012E+05	3.629E+05	3.299E+05	3.127E+05
RB 88	0.000E+00	5.970E+05	5.116E+05	4.525E+05	4.077E+05	3.696E+05	3.369E+05	3.200E+05
AS 89	0.000E+00	5.452E+01	4.840E+01	4.594E+01	4.530E+01	4.554E+01	4.624E+01	4.763E+01
SE 89	0.000E+00	1.701E+04	1.426E+04	1.267E+04	1.160E+04	1.075E+04	1.005E+04	9.746E+03
BR 89	0.000E+00	3.013E+05	2.457E+05	2.094E+05	1.815E+05	1.574E+05	1.361E+05	1.239E+05
KR 89	0.000E+00	7.447E+05	6.292E+05	5.503E+05	4.900E+05	4.383E+05	3.934E+05	3.692E+05
RB 89	0.000E+00	7.768E+05	6.626E+05	5.835E+05	5.232E+05	4.717E+05	4.273E+05	4.039E+05
SR 89	0.000E+00	7.445E+05	6.849E+05	6.047E+05	5.429E+05	4.894E+05	4.423E+05	4.166E+05
Y 89M	0.000E+00	1.296E-01	2.086E-01	2.465E-01	2.782E-01	3.092E-01	3.413E-01	3.676E-01
SE 90	0.000E+00	5.675E+03	4.659E+03	4.040E+03	3.597E+03	3.235E+03	2.925E+03	2.771E+03
BR 90	0.000E+00	2.005E+05	1.612E+05	1.357E+05	1.159E+05	9.883E+04	8.364E+04	7.487E+04
KR 90	0.000E+00	7.393E+05	6.226E+05	5.439E+05	4.839E+05	4.325E+05	3.875E+05	3.632E+05
RB 90	0.000E+00	7.653E+05	6.485E+05	5.685E+05	5.074E+05	4.550E+05	4.094E+05	3.851E+05
SR 90M	0.000E+00	1.627E+05	1.435E+05	1.293E+05	1.185E+05	1.094E+05	1.018E+05	9.821E+04
SE 90	0.000E+00	1.247E+04	3.440E+04	5.328E+04	6.972E+04	8.400E+04	9.632E+04	1.043E+05
Y 90	0.000E+00	1.268E+04	3.507E+04	5.444E+04	7.144E+04	8.635E+04	9.938E+04	1.079E+05
Y 90M	0.000E+00	4.293E+00	6.575E+00	7.828E+00	8.983E+00	1.018E+01	1.147E+01	1.256E+01
SE 91	0.000E+00	6.897E+02	5.893E+02	5.359E+02	5.050E+02	4.849E+02	4.712E+02	4.714E+02
BR 91	0.000E+00	6.549E+04	5.319E+04	4.542E+04	3.962E+04	3.470E+04	3.041E+04	2.806E+04
KR 91	0.000E+00	5.509E+05	4.619E+05	4.036E+05	3.597E+05	3.222E+05	2.894E+05	2.717E+05
RB 91	0.000E+00	9.174E+05	7.876E+05	6.985E+05	6.313E+05	5.742E+05	5.250E+05	4.996E+05
SR 91	0.000E+00	9.601E+05	8.320E+05	7.429E+05	6.759E+05	6.193E+05	5.711E+05	5.471E+05
Y 91	0.000E+00	8.874E+05	8.595E+05	7.701E+05	7.014E+05	6.423E+05	5.905E+05	5.629E+05
Y 91M	0.000E+00	5.570E+05	4.828E+05	4.311E+05	3.923E+05	3.595E+05	3.316E+05	3.177E+05
SE 92	0.000E+00	2.461E+01	2.350E+01	2.397E+01	2.532E+01	2.710E+01	2.907E+01	3.098E+01
BR 92	0.000E+00	4.632E+03	4.167E+03	4.011E+03	3.997E+03	4.042E+03	4.113E+03	4.227E+03
KR 92	0.000E+00	2.520E+05	2.143E+05	1.915E+05	1.752E+05	1.617E+05	1.500E+05	1.442E+05
RB 92	0.000E+00	7.824E+05	6.758E+05	6.042E+05	5.510E+05	5.059E+05	4.671E+05	4.475E+05
SR 92	0.000E+00	9.957E+05	8.768E+05	7.933E+05	7.315E+05	6.798E+05	6.363E+05	6.160E+05
Y 92	0.000E+00	9.980E+05	8.796E+05	7.963E+05	7.347E+05	6.831E+05	6.397E+05	6.196E+05
BR 93	0.000E+00	9.743E+02	8.390E+02	7.722E+02	7.358E+02	7.121E+02	6.953E+02	6.956E+02
KR 93	0.000E+00	8.894E+04	7.595E+04	6.876E+04	6.400E+04	6.015E+04	5.684E+04	5.534E+04

RB 93	0.000E+00	5.865E+05	5.066E+05	4.554E+05	4.184E+05	3.872E+05	3.602E+05	3.467E+05
SR 93	0.000E+00	1.076E+06	9.646E+05	8.857E+05	8.287E+05	7.819E+05	7.433E+05	7.274E+05
Y 93	0.000E+00	1.095E+06	9.849E+05	9.061E+05	8.494E+05	8.029E+05	7.648E+05	7.495E+05
ZR 93	0.000E+00	2.765E-01	7.937E-01	1.270E+00	1.714E+00	2.128E+00	2.513E+00	2.779E+00
NB 93M	0.000E+00	3.783E-03	3.216E-02	8.485E-02	1.586E-01	2.505E-01	3.581E-01	4.457E-01
BR 94	0.000E+00	7.557E+01	6.637E+01	6.245E+01	6.094E+01	6.046E+01	6.052E+01	6.160E+01
KR 94	0.000E+00	3.726E+04	3.057E+04	2.647E+04	2.345E+04	2.086E+04	1.857E+04	1.731E+04
RB 94	0.000E+00	2.989E+05	2.598E+05	2.358E+05	2.191E+05	2.051E+05	1.931E+05	1.874E+05
SR 94	0.000E+00	9.975E+05	9.006E+05	8.318E+05	7.827E+05	7.424E+05	7.094E+05	6.964E+05
Y 94	0.000E+00	1.065E+06	9.726E+05	9.044E+05	8.561E+05	8.171E+05	7.859E+05	7.752E+05

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
FISSION PRODUCTS
POWER= 2.16550E+01 MW, BURNUP= 5.40006E+04 MWD, FLUX= 2.35E+14 N/CM**2-SEC

7 SUMMARY TABLE: RADIOACTIVITY, CURIES

	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
NB 94M	0.000E+00	2.637E-01	4.497E-01	5.405E-01	6.165E-01	6.905E-01	7.666E-01	8.285E-01
BR 95	0.000E+00	4.333E+00	4.188E+00	4.322E+00	4.611E+00	4.976E+00	5.371E+00	5.741E+00
KR 95	0.000E+00	2.997E+03	2.776E+03	2.757E+03	2.833E+03	2.948E+03	3.076E+03	3.212E+03
RB 95	0.000E+00	1.559E+05	1.327E+05	1.190E+05	1.096E+05	1.017E+05	9.499E+04	9.172E+04
SR 95	0.000E+00	9.268E+05	8.329E+05	7.699E+05	7.260E+05	6.902E+05	6.606E+05	6.490E+05
Y 95	0.000E+00	1.107E+06	1.023E+06	9.611E+05	9.195E+05	8.868E+05	8.617E+05	8.557E+05
ZR 95	0.000E+00	9.953E+05	1.055E+06	9.985E+05	9.576E+05	9.240E+05	8.961E+05	8.866E+05
NB 95	0.000E+00	8.673E+05	1.070E+06	1.015E+06	9.731E+05	9.387E+05	9.103E+05	8.932E+05
NB 95M	0.000E+00	7.002E+03	7.434E+03	7.046E+03	6.764E+03	6.533E+03	6.342E+03	6.290E+03
BR 96	0.000E+00	2.300E-01	2.227E-01	2.296E-01	2.449E-01	2.647E-01	2.864E-01	3.069E-01
KR 96	0.000E+00	4.844E+02	4.428E+02	4.335E+02	4.400E+02	4.535E+02	4.701E+02	4.896E+02
RB 96	0.000E+00	3.909E+04	3.443E+04	3.215E+04	3.093E+04	3.010E+04	2.949E+04	2.947E+04
SR 96	0.000E+00	6.453E+05	5.765E+05	5.334E+05	5.042E+05	4.805E+05	4.607E+05	4.528E+05
Y 96	0.000E+00	1.043E+06	9.648E+05	9.097E+05	8.733E+05	8.450E+05	8.231E+05	8.184E+05
NB 96	0.000E+00	7.985E+02	1.082E+03	1.204E+03	1.350E+03	1.501E+03	1.649E+03	1.770E+03
KR 97	0.000E+00	2.289E+01	2.241E+01	2.341E+01	2.520E+01	2.733E+01	2.957E+01	3.160E+01
RB 97	0.000E+00	7.254E+03	6.413E+03	6.044E+03	5.877E+03	5.780E+03	5.715E+03	5.744E+03
SR 97	0.000E+00	3.389E+05	3.010E+05	2.795E+05	2.657E+05	2.548E+05	2.457E+05	2.424E+05
Y 97	0.000E+00	8.858E+05	8.211E+05	7.780E+05	7.510E+05	7.305E+05	7.149E+05	7.127E+05
ZR 97	0.000E+00	1.047E+06	9.998E+05	9.636E+05	9.437E+05	9.313E+05	9.253E+05	9.257E+05
NB 97	0.000E+00	1.053E+06	1.007E+06	9.712E+05	9.519E+05	9.401E+05	9.346E+05	9.425E+05
NB 97M	0.000E+00	9.925E+05	9.478E+05	9.136E+05	8.949E+05	8.833E+05	8.776E+05	8.848E+05
KR 98	0.000E+00	2.783E+00	2.689E+00	2.767E+00	2.948E+00	3.181E+00	3.437E+00	3.680E+00
RB 98	0.000E+00	1.431E+03	1.302E+03	1.268E+03	1.279E+03	1.310E+03	1.349E+03	1.399E+03
SR 98	0.000E+00	1.314E+05	1.163E+05	1.086E+05	1.044E+05	1.013E+05	9.890E+04	9.850E+04
Y 98	0.000E+00	6.377E+05	5.853E+05	5.536E+05	5.343E+05	5.197E+05	5.082E+05	5.062E+05
ZR 98	0.000E+00	1.039E+06	9.989E+05	9.677E+05	9.519E+05	9.424E+05	9.384E+05	9.464E+05
NB 98	0.000E+00	1.050E+06	1.013E+06	9.826E+05	9.679E+05	9.595E+05	9.566E+05	9.657E+05
NB 98M	0.000E+00	6.409E+03	7.980E+03	8.682E+03	9.298E+03	9.916E+03	1.057E+04	1.115E+04
RB 99	0.000E+00	1.315E+02	1.222E+02	1.217E+02	1.255E+02	1.312E+02	1.376E+02	1.443E+02
SR 99	0.000E+00	3.325E+04	2.986E+04	2.859E+04	2.825E+04	2.825E+04	2.839E+04	2.887E+04
Y 99	0.000E+00	3.642E+05	3.313E+05	3.143E+05	3.051E+05	2.985E+05	2.933E+05	2.930E+05
ZR 99	0.000E+00	1.026E+06	9.845E+05	9.556E+05	9.422E+05	9.347E+05	9.317E+05	9.399E+05
NB 99	0.000E+00	1.055E+06	1.018E+06	9.917E+05	9.802E+05	9.745E+05	9.737E+05	9.838E+05
NB 99M	0.000E+00	3.098E+04	3.537E+04	3.716E+04	3.882E+04	4.056E+04	4.247E+04	4.429E+04
MO 99	0.000E+00	1.092E+06	1.068E+06	1.053E+06	1.056E+06	1.068E+06	1.087E+06	1.115E+06
TC 99	0.000E+00	1.869E+00	5.553E+00	9.004E+00	1.221E+01	1.514E+01	1.776E+01	1.949E+01
TC 99M	0.000E+00	9.556E+05	9.352E+05	9.223E+05	9.247E+05	9.346E+05	9.513E+05	9.758E+05
RB100	0.000E+00	1.004E+01	9.714E+00	1.003E+01	1.071E+01	1.157E+01	1.249E+01	1.335E+01
SR100	0.000E+00	5.999E+03	5.490E+03	5.380E+03	5.450E+03	5.586E+03	5.746E+03	5.938E+03
Y100	0.000E+00	1.637E+05	1.480E+05	1.405E+05	1.369E+05	1.344E+05	1.326E+05	1.328E+05

ZR100	0.000E+00	9.561E+05	9.125E+05	8.834E+05	8.691E+05	8.604E+05	8.561E+05	8.625E+05
NB100	0.000E+00	5.717E+05	5.593E+05	5.482E+05	5.445E+05	5.439E+05	5.460E+05	5.535E+05
NB100M	0.000E+00	5.717E+05	5.593E+05	5.482E+05	5.445E+05	5.439E+05	5.460E+05	5.535E+05
TC100	0.000E+00	2.921E+04	8.800E+04	1.528E+05	2.289E+05	3.169E+05	4.143E+05	4.974E+05
SR101	0.000E+00	8.331E+02	7.644E+02	7.532E+02	7.683E+02	7.941E+02	8.238E+02	8.570E+02
Y101	0.000E+00	5.319E+04	4.758E+04	4.526E+04	4.431E+04	4.380E+04	4.347E+04	4.374E+04
ZR101	0.000E+00	6.268E+05	5.872E+05	5.665E+05	5.573E+05	5.516E+05	5.480E+05	5.511E+05
NB101	0.000E+00	9.221E+05	9.060E+05	8.950E+05	8.962E+05	9.017E+05	9.105E+05	9.261E+05
MO101	0.000E+00	9.547E+05	9.519E+05	9.481E+05	9.560E+05	9.685E+05	9.850E+05	1.007E+06
TC101	0.000E+00	9.548E+05	9.521E+05	9.483E+05	9.563E+05	9.689E+05	9.853E+05	1.007E+06

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
 FISSION PRODUCTS
 POWER= 2.16550E+01 MW, BURNUP= 5.40006E+04 MWD, FLUX= 2.35E+14 N/CM**2-SEC

7 SUMMARY TABLE: RADIOACTIVITY, CURIES

	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
SR102	0.000E+00	6.938E+01	6.542E+01	6.644E+01	6.933E+01	7.333E+01	7.762E+01	8.178E+01
Y102	0.000E+00	1.189E+04	1.089E+04	1.066E+04	1.075E+04	1.114E+04	1.141E+04	1.141E+04
ZR102	0.000E+00	3.367E+05	3.180E+05	3.119E+05	3.122E+05	3.141E+05	3.164E+05	3.208E+05
NB102	0.000E+00	7.331E+05	7.353E+05	7.401E+05	7.537E+05	7.695E+05	7.867E+05	8.058E+05
MO102	0.000E+00	8.323E+05	8.598E+05	8.769E+05	9.014E+05	9.279E+05	9.563E+05	9.850E+05
TC102	0.000E+00	8.328E+05	8.606E+05	8.779E+05	9.025E+05	9.291E+05	9.576E+05	9.864E+05
TC102M	0.000E+00	4.977E+02	7.682E+02	9.014E+02	1.014E+03	1.123E+03	1.236E+03	1.327E+03
RH102	0.000E+00	1.181E-02	1.536E-01	4.266E-01	8.106E-01	1.284E+00	1.819E+00	2.212E+00
SR103	0.000E+00	2.077E+00	2.023E+00	2.120E+00	2.285E+00	2.472E+00	2.661E+00	2.827E+00
Y103	0.000E+00	1.464E+03	1.400E+03	1.438E+03	1.516E+03	1.603E+03	1.688E+03	1.764E+03
ZR103	0.000E+00	1.106E+05	1.077E+05	1.095E+05	1.133E+05	1.174E+05	1.212E+05	1.248E+05
NB103	0.000E+00	4.531E+05	4.746E+05	4.932E+05	5.156E+05	5.383E+05	5.607E+05	5.807E+05
MO103	0.000E+00	6.773E+05	7.566E+05	8.048E+05	8.539E+05	9.025E+05	9.514E+05	9.936E+05
TC103	0.000E+00	6.838E+05	7.666E+05	8.165E+05	8.669E+05	9.170E+05	9.673E+05	1.011E+06
RU103	0.000E+00	6.437E+05	7.674E+05	8.188E+05	8.711E+05	9.236E+05	9.770E+05	1.023E+06
RH103M	0.000E+00	5.797E+05	6.911E+05	7.374E+05	7.846E+05	8.318E+05	8.799E+05	9.211E+05
SR104	0.000E+00	7.098E-02	7.336E-02	8.141E-02	9.175E-02	1.026E-01	1.132E-01	1.217E-01
Y104	0.000E+00	1.027E+02	1.055E+02	1.173E+02	1.318E+02	1.462E+02	1.594E+02	1.696E+02
ZR104	0.000E+00	2.066E+04	2.133E+04	2.339E+04	2.584E+04	2.815E+04	3.020E+04	3.171E+04
NB104	0.000E+00	1.850E+05	2.027E+05	2.220E+05	2.427E+05	2.620E+05	2.796E+05	2.929E+05
MO104	0.000E+00	4.480E+05	5.423E+05	6.077E+05	6.703E+05	7.295E+05	7.860E+05	8.301E+05
TC104	0.000E+00	4.703E+05	5.767E+05	6.483E+05	7.162E+05	7.806E+05	8.424E+05	8.906E+05
RH104	0.000E+00	5.218E+04	1.995E+05	3.521E+05	5.122E+05	6.731E+05	8.238E+05	9.300E+05
RH104M	0.000E+00	3.405E+03	1.302E+04	2.298E+04	3.343E+04	4.393E+04	5.377E+04	6.070E+04
Y105	0.000E+00	6.171E+00	5.985E+00	6.343E+00	6.866E+00	7.396E+00	7.876E+00	8.254E+00
ZR105	0.000E+00	2.700E+03	2.798E+03	3.114E+03	3.481E+03	3.825E+03	4.124E+03	4.337E+03
NB105	0.000E+00	5.432E+04	6.241E+04	7.149E+04	8.080E+04	8.936E+04	9.696E+04	1.024E+05
MO105	0.000E+00	2.693E+05	3.536E+05	4.139E+05	4.702E+05	5.226E+05	5.718E+05	6.087E+05
TC105	0.000E+00	3.168E+05	4.314E+05	5.082E+05	5.788E+05	6.449E+05	7.076E+05	7.550E+05
RU105	0.000E+00	3.194E+05	4.367E+05	5.158E+05	5.889E+05	6.580E+05	7.244E+05	7.751E+05
RH105	0.000E+00	3.086E+05	4.213E+05	4.961E+05	5.640E+05	6.269E+05	6.863E+05	7.306E+05
RH105M	0.000E+00	8.943E+04	1.223E+05	1.444E+05	1.649E+05	1.842E+05	2.028E+05	2.170E+05
ZR106	0.000E+00	4.556E+02	4.148E+02	4.143E+02	4.247E+02	4.345E+02	4.409E+02	4.461E+02
NB106	0.000E+00	1.566E+04	1.688E+04	1.916E+04	2.160E+04	2.376E+04	2.557E+04	2.677E+04
MO106	0.000E+00	1.191E+05	1.683E+05	2.099E+05	2.488E+05	2.839E+05	3.154E+05	3.371E+05
TC106	0.000E+00	1.723E+05	2.669E+05	3.366E+05	4.000E+05	4.580E+05	5.112E+05	5.491E+05
RU106	0.000E+00	4.713E+04	1.592E+05	2.617E+05	3.520E+05	4.317E+05	5.025E+05	5.496E+05
RH106	0.000E+00	5.512E+04	1.703E+05	2.757E+05	3.696E+05	4.534E+05	5.290E+05	5.805E+05
RH106M	0.000E+00	3.592E+03	4.982E+03	6.282E+03	7.888E+03	9.787E+03	1.194E+04	1.390E+04
ZR107	0.000E+00	2.196E+01	1.963E+01	1.928E+01	1.950E+01	1.973E+01	1.985E+01	2.000E+01
NB107	0.000E+00	2.357E+03	2.499E+03	2.886E+03	3.302E+03	3.663E+03	3.952E+03	4.129E+03

MO107	0.000E+00	3.986E+04	5.608E+04	7.363E+04	9.041E+04	1.051E+05	1.176E+05	1.255E+05
TC107	0.000E+00	8.142E+04	1.333E+05	1.779E+05	2.190E+05	2.557E+05	2.879E+05	3.094E+05
RU107	0.000E+00	1.195E+05	2.100E+05	2.755E+05	3.343E+05	3.877E+05	4.366E+05	4.711E+05
RH107	0.000E+00	1.201E+05	2.112E+05	2.769E+05	3.360E+05	3.896E+05	4.388E+05	4.735E+05
PD107	0.000E+00	5.057E-03	2.468E-02	5.311E-02	8.872E-02	1.303E-01	1.767E-01	2.133E-01
PD107M	0.000E+00	1.083E+00	6.649E+00	1.830E+01	3.820E+01	6.876E+01	1.122E+02	1.557E+02
ZR108	0.000E+00	4.563E+00	4.528E+00	4.757E+00	5.162E+00	5.666E+00	6.212E+00	6.718E+00
NB108	0.000E+00	5.964E+02	5.974E+02	6.330E+02	6.885E+02	7.530E+02	8.202E+02	8.800E+02
MO108	0.000E+00	1.469E+04	1.841E+04	2.222E+04	2.605E+04	2.962E+04	3.287E+04	3.520E+04
TC108	0.000E+00	4.648E+04	7.835E+04	1.038E+05	1.270E+05	1.480E+05	1.668E+05	1.798E+05

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
FISSION PRODUCTS
POWER= 2.16550E+01 MW, BURNUP= 5.40006E+04 MWD, FLUX= 2.35E+14 N/CM**2-SEC

7 SUMMARY TABLE: RADIOACTIVITY, CURIES

	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
RU108	0.000E+00	7.529E+04	1.398E+05	1.873E+05	2.299E+05	2.684E+05	3.034E+05	3.278E+05
RH108	0.000E+00	7.593E+04	1.412E+05	1.891E+05	2.321E+05	2.709E+05	3.063E+05	3.309E+05
RH108M	0.000E+00	6.422E+02	1.362E+03	1.801E+03	2.180E+03	2.529E+03	2.861E+03	3.106E+03
AG108	0.000E+00	3.745E-02	1.884E-01	4.192E-01	7.359E-01	1.138E+00	1.613E+00	2.029E+00
ZR109	0.000E+00	3.186E-01	3.220E-01	3.428E-01	3.762E-01	4.167E-01	4.604E-01	5.002E-01
NB109	0.000E+00	1.068E+02	1.109E+02	1.193E+02	1.313E+02	1.456E+02	1.608E+02	1.744E+02
MO109	0.000E+00	4.991E+03	6.207E+03	7.178E+03	8.185E+03	9.213E+03	1.024E+04	1.107E+04
TC109	0.000E+00	2.364E+04	3.858E+04	4.911E+04	5.871E+04	6.766E+04	7.605E+04	8.221E+04
RU109	0.000E+00	4.697E+04	8.710E+04	1.158E+05	1.416E+05	1.650E+05	1.865E+05	2.017E+05
RH109	0.000E+00	4.838E+04	9.032E+04	1.204E+05	1.474E+05	1.719E+05	1.944E+05	2.103E+05
RH109M	0.000E+00	2.419E+04	4.516E+04	6.021E+04	7.370E+04	8.597E+04	9.722E+04	1.052E+05
PD109	0.000E+00	4.960E+04	9.671E+04	1.355E+05	1.755E+05	2.183E+05	2.647E+05	3.031E+05
PD109M	0.000E+00	2.421E+04	4.527E+04	6.046E+04	7.415E+04	8.669E+04	9.830E+04	1.066E+05
AG109M	0.000E+00	4.957E+04	9.667E+04	1.394E+05	1.754E+05	2.182E+05	2.646E+05	3.029E+05
NB110	0.000E+00	1.251E+01	1.264E+01	1.345E+01	1.476E+01	1.635E+01	1.805E+01	1.961E+01
MO110	0.000E+00	1.293E+03	1.357E+03	1.475E+03	1.635E+03	1.818E+03	2.008E+03	2.174E+03
TC110	0.000E+00	7.979E+03	1.045E+04	1.259E+04	1.473E+04	1.679E+04	1.874E+04	2.021E+04
RU110	0.000E+00	2.329E+04	3.902E+04	5.107E+04	6.209E+04	7.216E+04	8.134E+04	8.782E+04
RH110	0.000E+00	2.459E+04	4.179E+04	5.490E+04	6.686E+04	7.777E+04	8.771E+04	9.471E+04
RH110M	0.000E+00	1.307E+03	2.775E+03	3.835E+03	4.774E+03	5.615E+03	6.377E+03	6.900E+03
AG110	0.000E+00	3.744E+03	1.895E+04	4.219E+04	7.399E+04	1.142E+05	1.616E+05	2.028E+05
AG110M	0.000E+00	3.747E+01	4.161E+02	1.219E+03	2.440E+03	4.066E+03	6.047E+03	7.714E+03
NB111	0.000E+00	1.065E+00	1.075E+00	1.144E+00	1.256E+00	1.392E+00	1.538E+00	1.671E+00
MO111	0.000E+00	2.804E+02	2.850E+02	3.049E+02	3.354E+02	3.720E+02	4.110E+02	4.462E+02
TC111	0.000E+00	3.387E+03	3.771E+03	4.240E+03	4.792E+03	5.374E+03	5.955E+03	6.435E+03
RU111	0.000E+00	1.320E+04	1.862E+04	2.310E+04	2.740E+04	3.142E+04	3.515E+04	3.786E+04
RH111	0.000E+00	1.633E+04	2.449E+04	3.105E+04	3.720E+04	4.288E+04	4.810E+04	5.183E+04
PD111	0.000E+00	1.651E+04	2.493E+04	3.173E+04	3.817E+04	4.420E+04	4.985E+04	5.397E+04
PD111M	0.000E+00	1.782E+02	3.314E+02	4.496E+02	5.645E+02	6.801E+02	7.992E+02	8.938E+02
AG111	0.000E+00	1.656E+04	2.504E+04	3.192E+04	3.849E+04	4.469E+04	5.057E+04	5.492E+04
AG111M	0.000E+00	1.644E+04	2.485E+04	3.165E+04	3.813E+04	4.422E+04	4.996E+04	5.418E+04
CD111M	0.000E+00	6.837E-02	1.021E+00	4.028E+00	1.074E+01	2.341E+01	4.462E+01	6.820E+01
MO112	0.000E+00	5.172E+01	5.226E+01	5.570E+01	6.117E+01	6.780E+01	7.491E+01	8.136E+01
TC112	0.000E+00	1.301E+03	1.346E+03	1.458E+03	1.615E+03	1.796E+03	1.983E+03	2.148E+03
RU112	0.000E+00	7.587E+03	8.945E+03	1.037E+04	1.190E+04	1.343E+04	1.489E+04	1.603E+04
RH112	0.000E+00	1.055E+04	1.352E+04	1.619E+04	1.886E+04	2.142E+04	2.381E+04	2.561E+04
PD112	0.000E+00	1.102E+04	1.435E+04	1.727E+04	2.016E+04	2.292E+04	2.551E+04	2.744E+04
AG112	0.000E+00	1.105E+04	1.439E+04	1.731E+04	2.021E+04	2.298E+04	2.557E+04	2.751E+04
MO113	0.000E+00	3.679E+00	3.713E+00	3.957E+00	4.345E+00	4.815E+00	5.320E+00	5.778E+00
TC113	0.000E+00	3.527E+02	3.591E+02	3.894E+02	4.248E+02	4.712E+02	5.201E+02	5.636E+02
RU113	0.000E+00	4.765E+03	5.136E+03	5.698E+03	6.385E+03	7.117E+03	7.844E+03	8.446E+03

RH113	0.000E+00	8.637E+03	1.014E+04	1.168E+04	1.331E+04	1.494E+04	1.650E+04	1.771E+04
PD113	0.000E+00	9.767E+03	1.195E+04	1.394E+04	1.598E+04	1.798E+04	1.988E+04	2.135E+04
AG113	0.000E+00	8.799E+03	1.077E+04	1.256E+04	1.440E+04	1.620E+04	1.792E+04	1.924E+04
AG113M	0.000E+00	9.850E+02	1.210E+03	1.412E+03	1.620E+03	1.823E+03	2.016E+03	2.165E+03
CD113M	0.000E+00	4.143E+00	1.457E+01	2.800E+01	4.510E+01	6.671E+01	9.383E+01	1.179E+02
MO114	0.000E+00	3.769E-01	3.801E-01	4.046E-01	4.441E-01	4.921E-01	5.437E-01	5.907E-01
TC114	0.000E+00	8.073E+01	8.143E+01	8.675E+01	9.521E+01	1.054E+02	1.163E+02	1.262E+02
RU114	0.000E+00	2.384E+03	2.432E+03	2.611E+03	2.872E+03	3.172E+03	3.484E+03	3.759E+03
RH114	0.000E+00	5.888E+03	6.326E+03	6.945E+03	7.700E+03	8.502E+03	9.300E+03	9.966E+03
PD114	0.000E+00	7.778E+03	8.854E+03	9.907E+03	1.1107E+04	1.225E+04	1.340E+04	1.434E+04

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
 FISSION PRODUCTS
 POWER= 2.16550E+01 MW, BURNUP= 5.40006E+04 MWD, FLUX= 2.35E+14 N/CM**2-SEC

7 SUMMARY TABLE: RADIOACTIVITY, CURIES

	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
AG114	0.000E+00	7.845E+03	8.962E+03	1.004E+04	1.122E+04	1.242E+04	1.359E+04	1.455E+04
IN114	0.000E+00	5.941E-02	6.707E-01	2.224E+00	5.238E+00	1.041E+01	1.855E+01	2.733E+01
IN114M	0.000E+00	1.558E-02	2.344E-01	8.260E-01	1.997E+00	4.025E+00	7.240E+00	1.071E+01
MO115	0.000E+00	2.512E-02	2.534E-02	2.697E-02	2.960E-02	3.281E-02	3.625E-02	3.939E-02
TC115	0.000E+00	1.707E+01	1.722E+01	1.833E+01	2.011E+01	2.228E+01	2.461E+01	2.673E+01
RU115	0.000E+00	1.135E+03	1.146E+03	1.220E+03	1.338E+03	1.478E+03	1.628E+03	1.763E+03
RH115	0.000E+00	4.766E+03	4.913E+03	5.273E+03	5.782E+03	6.363E+03	6.967E+03	7.498E+03
PD115	0.000E+00	8.039E+03	8.747E+03	9.562E+03	1.054E+04	1.160E+04	1.267E+04	1.357E+04
AG115	0.000E+00	5.994E+03	6.550E+03	7.167E+03	7.904E+03	8.693E+03	9.492E+03	1.017E+04
AG115M	0.000E+00	2.278E+03	2.512E+03	2.756E+03	3.044E+03	3.349E+03	3.658E+03	3.919E+03
CD115	0.000E+00	7.581E+03	8.381E+03	9.279E+03	1.037E+04	1.159E+04	1.288E+04	1.400E+04
CD115M	0.000E+00	6.891E+02	8.079E+02	8.984E+02	1.004E+03	1.118E+03	1.237E+03	1.339E+03
IN115M	0.000E+00	7.598E+03	8.398E+03	9.297E+03	1.039E+04	1.161E+04	1.290E+04	1.402E+04
TC116	0.000E+00	1.054E+00	1.063E+00	1.131E+00	1.241E+00	1.374E+00	1.518E+00	1.649E+00
RU116	0.000E+00	2.558E+02	2.575E+02	2.736E+02	2.996E+02	3.311E+02	3.647E+02	3.953E+02
RH116	0.000E+00	2.348E+03	2.381E+03	2.527E+03	2.752E+03	3.017E+03	3.297E+03	3.550E+03
PD116	0.000E+00	6.524E+03	6.907E+03	7.391E+03	8.020E+03	8.720E+03	9.446E+03	1.008E+04
AG116	0.000E+00	3.563E+03	3.833E+03	4.120E+03	4.476E+03	4.867E+03	5.272E+03	5.625E+03
AG116M	0.000E+00	3.563E+03	3.834E+03	4.121E+03	4.477E+03	4.868E+03	5.272E+03	5.626E+03
IN116	0.000E+00	1.759E+03	3.878E+03	5.142E+03	6.135E+03	7.020E+03	7.855E+03	8.563E+03
IN116M	0.000E+00	1.265E+03	2.788E+03	3.698E+03	4.412E+03	5.048E+03	5.649E+03	6.158E+03
TC117	0.000E+00	4.564E-02	4.573E-02	4.842E-02	5.290E-02	5.840E-02	6.435E-02	6.980E-02
RU117	0.000E+00	4.156E+01	4.057E+01	4.201E+01	4.502E+01	4.890E+01	5.317E+01	5.721E+01
RH117	0.000E+00	1.779E+03	1.626E+03	1.579E+03	1.592E+03	1.635E+03	1.694E+03	1.768E+03
PD117	0.000E+00	6.368E+03	6.453E+03	6.725E+03	7.163E+03	7.688E+03	8.251E+03	8.773E+03
AG117	0.000E+00	3.582E+03	3.816E+03	4.072E+03	4.403E+03	4.775E+03	5.164E+03	5.511E+03
AG117M	0.000E+00	3.581E+03	3.815E+03	4.071E+03	4.402E+03	4.773E+03	5.163E+03	5.509E+03
CD117	0.000E+00	4.689E+03	5.027E+03	5.382E+03	5.834E+03	6.341E+03	6.876E+03	7.351E+03
CD117M	0.000E+00	2.536E+03	2.728E+03	2.922E+03	3.167E+03	3.439E+03	3.724E+03	3.977E+03
IN117	0.000E+00	4.323E+03	4.641E+03	4.970E+03	5.387E+03	5.853E+03	6.343E+03	6.778E+03
IN117M	0.000E+00	5.477E+03	5.875E+03	6.291E+03	6.819E+03	7.411E+03	8.033E+03	8.586E+03
SN117M	0.000E+00	1.315E+00	9.938E+00	2.520E+01	4.802E+01	7.988E+01	1.219E+02	1.621E+02
RU118	0.000E+00	2.477E+02	2.499E+02	2.659E+02	2.919E+02	3.235E+02	3.575E+02	3.885E+02
RH118	0.000E+00	1.945E+03	1.962E+03	2.087E+03	2.289E+03	2.535E+03	2.799E+03	3.039E+03
PD118	0.000E+00	4.918E+03	5.038E+03	5.358E+03	5.830E+03	6.383E+03	6.965E+03	7.487E+03
AG118	0.000E+00	5.002E+03	5.203E+03	5.485E+03	5.881E+03	6.335E+03	6.814E+03	7.248E+03
AG118M	0.000E+00	3.233E+03	3.446E+03	3.694E+03	4.013E+03	4.369E+03	4.740E+03	5.066E+03
CD118	0.000E+00	7.280E+03	7.747E+03	8.248E+03	8.893E+03	9.616E+03	1.037E+04	1.105E+04
IN118	0.000E+00	7.282E+03	7.750E+03	8.251E+03	8.897E+03	9.621E+03	1.038E+04	1.106E+04
IN118M	0.000E+00	1.705E+00	2.709E+00	3.208E+00	3.630E+00	4.039E+00	4.457E+00	4.797E+00
RH119	0.000E+00	1.261E+02	1.464E+02	1.632E+02	1.823E+02	2.033E+02	2.254E+02	2.445E+02

PD119	0.000E+00	3.037E+03	3.450E+03	3.803E+03	4.211E+03	4.658E+03	5.124E+03	5.527E+03
AG119	0.000E+00	6.232E+03	6.811E+03	7.359E+03	8.025E+03	8.759E+03	9.524E+03	1.019E+04
CD119	0.000E+00	3.557E+03	3.815E+03	4.079E+03	4.412E+03	4.782E+03	5.169E+03	5.512E+03
CD119M	0.000E+00	3.557E+03	3.815E+03	4.079E+03	4.412E+03	4.782E+03	5.169E+03	5.512E+03
IN119	0.000E+00	2.051E+03	2.199E+03	2.350E+03	2.541E+03	2.754E+03	2.976E+03	3.173E+03
IN119M	0.000E+00	5.341E+03	5.728E+03	6.123E+03	6.622E+03	7.177E+03	7.757E+03	8.271E+03
SN119M	0.000E+00	4.388E+01	9.320E+01	1.219E+02	1.469E+02	1.739E+02	2.048E+02	2.311E+02
RU120	0.000E+00	5.170E-02	5.219E-02	5.563E-02	6.110E-02	6.774E-02	7.485E-02	8.131E-02
RH120	0.000E+00	2.362E+01	2.383E+01	2.541E+01	2.791E+01	3.090E+01	3.410E+01	3.699E+01
PD120	0.000E+00	1.359E+03	1.370E+03	1.456E+03	1.591E+03	1.751E+03	1.920E+03	2.072E+03

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
FISSION PRODUCTS
POWER= 2.16550E+01 MW, BURNUP= 5.40006E+04 MWD, FLUX= 2.35E+14 N/CM**2-SEC

7 SUMMARY TABLE: RADIOACTIVITY, CURIES

	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
AG120	0.000E+00	4.736E+03	4.851E+03	5.135E+03	5.553E+03	6.039E+03	6.549E+03	7.007E+03
CD120	0.000E+00	7.144E+03	7.594E+03	8.081E+03	8.714E+03	9.424E+03	1.017E+04	1.084E+04
IN120	0.000E+00	3.626E+03	3.870E+03	4.123E+03	4.447E+03	4.810E+03	5.192E+03	5.532E+03
IN120M	0.000E+00	3.626E+03	3.870E+03	4.123E+03	4.447E+03	4.810E+03	5.192E+03	5.532E+03
RH121	0.000E+00	3.706E+00	3.743E+00	3.994E+00	4.390E+00	4.866E+00	5.374E+00	5.834E+00
PD121	0.000E+00	5.289E+02	5.328E+02	5.674E+02	6.218E+02	6.865E+02	7.550E+02	8.167E+02
AG121	0.000E+00	3.327E+03	3.366E+03	3.559E+03	3.856E+03	4.207E+03	4.576E+03	4.908E+03
CD121	0.000E+00	7.127E+03	7.535E+03	7.999E+03	8.614E+03	9.311E+03	1.004E+04	1.070E+04
IN121	0.000E+00	6.017E+03	6.401E+03	6.806E+03	7.332E+03	7.925E+03	8.550E+03	9.110E+03
IN121M	0.000E+00	1.501E+03	1.610E+03	1.708E+03	1.833E+03	1.974E+03	2.123E+03	2.257E+03
SN121	0.000E+00	7.523E+03	8.020E+03	8.527E+03	9.184E+03	9.925E+03	1.071E+04	1.141E+04
SN121M	0.000E+00	1.490E-02	5.841E-02	1.106E-01	1.685E-01	2.311E-01	2.985E-01	3.510E-01
RH122	0.000E+00	4.495E-01	4.538E-01	4.840E-01	5.319E-01	5.896E-01	6.513E-01	7.070E-01
PD122	0.000E+00	1.613E+02	1.624E+02	1.729E+02	1.895E+02	2.094E+02	2.306E+02	2.497E+02
AG122	0.000E+00	2.060E+03	2.072E+03	2.189E+03	2.375E+03	2.597E+03	2.831E+03	3.043E+03
CD122	0.000E+00	7.017E+03	7.299E+03	7.698E+03	8.261E+03	8.912E+03	9.603E+03	1.023E+04
IN122	0.000E+00	7.449E+03	7.831E+03	8.281E+03	8.892E+03	9.593E+03	1.034E+04	1.101E+04
IN122M	0.000E+00	4.327E+02	5.337E+02	5.854E+02	6.339E+02	6.838E+02	7.364E+02	7.821E+02
SB122	0.000E+00	1.278E+02	1.045E+02	7.405E+01	1.171E+03	1.713E+03	2.369E+03	2.963E+03
RH123	0.000E+00	1.038E+00	3.246E+00	5.910E+00	9.318E+00	1.361E+01	1.880E+01	2.350E+01
RH123	0.000E+00	3.875E-02	3.903E-02	4.153E-02	4.555E-02	5.043E-02	5.567E-02	6.044E-02
PD123	0.000E+00	3.711E+01	3.722E+01	3.948E+01	4.315E+01	4.761E+01	5.238E+01	5.672E+01
AG123	0.000E+00	1.095E+03	1.095E+03	1.152E+03	1.247E+03	1.362E+03	1.484E+03	1.597E+03
CD123	0.000E+00	6.768E+03	6.980E+03	7.341E+03	7.871E+03	8.491E+03	9.151E+03	9.755E+03
IN123	0.000E+00	6.145E+03	6.471E+03	6.840E+03	7.340E+03	7.915E+03	8.525E+03	9.080E+03
IN123M	0.000E+00	2.477E+03	2.691E+03	2.868E+03	3.083E+03	3.324E+03	3.580E+03	3.809E+03
SN123	0.000E+00	1.168E+03	1.832E+03	2.016E+03	2.155E+03	2.300E+03	2.454E+03	2.581E+03
SN123M	0.000E+00	7.161E+03	7.608E+03	8.060E+03	8.656E+03	9.335E+03	1.006E+04	1.071E+04
TE123M	0.000E+00	4.512E-02	8.590E-01	3.285E+00	8.317E+00	1.739E+01	3.228E+01	4.843E+01
PD124	0.000E+00	6.786E+00	6.852E+00	7.329E+00	8.061E+00	8.924E+00	9.832E+00	1.064E+01
AG124	0.000E+00	4.918E+02	4.933E+02	5.221E+02	5.678E+02	6.218E+02	6.786E+02	7.297E+02
CD124	0.000E+00	6.336E+03	6.446E+03	6.742E+03	7.205E+03	7.752E+03	8.336E+03	8.874E+03
IN124	0.000E+00	1.017E+04	1.065E+04	1.117E+04	1.189E+04	1.273E+04	1.363E+04	1.447E+04
SB124	0.000E+00	4.832E+01	2.241E+02	4.487E+02	7.387E+02	1.109E+03	1.565E+03	1.979E+03
SB124M	0.000E+00	2.249E+00	3.682E+00	4.753E+00	5.945E+00	7.361E+00	9.037E+00	1.055E+01
AG125	0.000E+00	1.439E+02	1.477E+02	1.597E+02	1.763E+02	1.951E+02	2.143E+02	2.310E+02
CD125	0.000E+00	4.117E+03	4.365E+03	4.694E+03	5.120E+03	5.592E+03	6.078E+03	6.503E+03
IN125	0.000E+00	5.710E+03	6.373E+03	6.907E+03	7.521E+03	8.185E+03	8.875E+03	9.476E+03
IN125M	0.000E+00	4.086E+03	4.650E+03	5.054E+03	5.499E+03	5.978E+03	6.475E+03	6.909E+03
SN125	0.000E+00	5.654E+03	6.450E+03	6.957E+03	7.515E+03	8.133E+03	8.802E+03	9.421E+03
SN125M	0.000E+00	9.071E+03	1.035E+04	1.124E+04	1.222E+04	1.327E+04	1.438E+04	1.535E+04

SB125	0.000E+00	1.715E+03	5.150E+03	8.209E+03	1.093E+04	1.339E+04	1.566E+04	1.724E+04
TE125M	0.000E+00	2.438E+02	1.029E+03	1.754E+03	2.396E+03	2.975E+03	3.506E+03	3.871E+03
PD126	0.000E+00	9.391E-02	9.726E-02	1.071E-01	1.203E-01	1.348E-01	1.493E-01	1.616E-01
AG126	0.000E+00	4.405E+01	4.520E+01	4.920E+01	5.463E+01	6.056E+01	6.649E+01	7.149E+01
CD126	0.000E+00	3.301E+03	3.375E+03	3.573E+03	3.853E+03	4.166E+03	4.486E+03	4.768E+03
INI26	0.000E+00	1.448E+04	1.534E+04	1.610E+04	1.709E+04	1.819E+04	1.936E+04	2.042E+04
SNI26	0.000E+00	7.716E-02	2.559E-01	4.538E-01	6.681E-01	8.980E-01	1.144E+00	1.334E+00
SB126	0.000E+00	3.138E+02	4.236E+02	5.104E+02	6.050E+02	7.122E+02	8.324E+02	9.412E+02
SB126M	0.000E+00	1.490E+02	2.088E+02	2.388E+02	2.658E+02	2.934E+02	3.230E+02	3.483E+02
CD127	0.000E+00	1.601E+03	1.715E+03	1.912E+03	2.143E+03	2.371E+03	2.586E+03	2.752E+03

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
FISSION PRODUCTS
POWER= 2.16550E+01 MW, BURNUP= 5.40006E+04 MWD, FLUX= 2.35E+14 N/CM**2-SEC

7 SUMMARY TABLE: RADIOACTIVITY, CURIES

	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
IN127	0.000E+00	7.859E+03	8.599E+03	9.270E+03	1.003E+04	1.081E+04	1.159E+04	1.224E+04
IN127M	0.000E+00	7.874E+03	8.611E+03	9.280E+03	1.004E+04	1.082E+04	1.159E+04	1.224E+04
SN127	0.000E+00	2.871E+04	3.280E+04	3.548E+04	3.828E+04	4.117E+04	4.412E+04	4.666E+04
SN127M	0.000E+00	1.327E+04	1.577E+04	1.703E+04	1.825E+04	1.952E+04	2.086E+04	2.205E+04
SB127	0.000E+00	4.420E+04	5.161E+04	5.594E+04	6.030E+04	6.478E+04	6.943E+04	7.346E+04
TE127	0.000E+00	4.202E+04	5.098E+04	5.560E+04	6.001E+04	6.450E+04	6.913E+04	7.308E+04
TE127M	0.000E+00	4.035E+03	6.675E+03	7.579E+03	8.255E+03	8.889E+03	9.518E+03	1.000E+04
XE127	0.000E+00	1.796E-04	3.219E-03	1.082E-02	2.623E-02	5.389E-02	9.920E-02	1.417E-01
AG128	0.000E+00	1.601E+00	1.724E+00	1.986E+00	2.295E+00	2.607E+00	2.900E+00	3.126E+00
CD128	0.000E+00	6.432E+02	6.690E+02	7.398E+02	8.252E+02	9.099E+02	9.880E+02	1.048E+03
IN128	0.000E+00	1.511E+04	1.535E+04	1.590E+04	1.671E+04	1.757E+04	1.843E+04	1.920E+04
SN128	0.000E+00	8.223E+04	8.667E+04	8.896E+04	9.200E+04	9.551E+04	9.944E+04	1.034E+05
SB128	0.000E+00	4.962E+03	6.625E+03	7.424E+03	8.128E+03	8.837E+03	9.584E+03	1.022E+04
SB128M	0.000E+00	8.661E+04	9.284E+04	9.601E+04	9.982E+04	1.041E+05	1.088E+05	1.135E+05
I128	0.000E+00	5.722E+02	2.076E+03	4.005E+03	6.503E+03	9.655E+03	1.347E+04	1.692E+04
CD129	0.000E+00	2.472E+02	2.615E+02	2.929E+02	3.315E+02	3.716E+02	4.101E+02	4.409E+02
IN129	0.000E+00	1.144E+04	1.190E+04	1.271E+04	1.372E+04	1.476E+04	1.577E+04	1.661E+04
SN129	0.000E+00	5.121E+04	5.557E+04	5.830E+04	6.136E+04	6.457E+04	6.792E+04	7.095E+04
SN129M	0.000E+00	7.000E+04	7.019E+04	7.011E+04	7.091E+04	7.212E+04	7.366E+04	7.560E+04
SB129	0.000E+00	1.518E+05	1.657E+05	1.728E+05	1.806E+05	1.889E+05	1.979E+05	2.064E+05
TE129	0.000E+00	1.487E+05	1.631E+05	1.701E+05	1.778E+05	1.860E+05	1.950E+05	2.033E+05
TE129M	0.000E+00	2.141E+04	2.452E+04	2.557E+04	2.669E+04	2.789E+04	2.920E+04	3.031E+04
I129	0.000E+00	3.442E-03	1.135E-02	1.966E-02	2.815E-02	3.671E-02	4.525E-02	5.142E-02
XE129M	0.000E+00	3.172E-02	3.278E-01	1.098E+00	2.657E+00	5.455E+00	1.004E+01	1.512E+01
CD130	0.000E+00	3.051E+02	2.909E+02	2.945E+02	3.078E+02	3.257E+02	3.455E+02	3.650E+02
IN130	0.000E+00	1.623E+04	1.540E+04	1.518E+04	1.533E+04	1.560E+04	1.594E+04	1.636E+04
SN130	0.000E+00	1.906E+05	1.932E+05	1.949E+05	1.988E+05	2.036E+05	2.091E+05	2.152E+05
SB130	0.000E+00	4.674E+04	5.294E+04	5.581E+04	5.862E+04	6.152E+04	6.463E+04	6.749E+04
SB130M	0.000E+00	2.497E+05	2.557E+05	2.584E+05	2.638E+05	2.700E+05	2.774E+05	2.856E+05
I130	0.000E+00	1.843E+03	5.912E+03	1.079E+04	1.692E+04	2.451E+04	3.356E+04	4.164E+04
I130M	0.000E+00	7.019E+02	2.280E+03	4.183E+03	6.582E+03	9.553E+03	1.309E+04	1.626E+04
CD131	0.000E+00	4.538E+01	4.409E+01	4.556E+01	4.863E+01	5.249E+01	5.665E+01	6.057E+01
IN131	0.000E+00	5.896E+03	5.519E+03	5.458E+03	5.552E+03	5.702E+03	5.871E+03	6.064E+03
SN131	0.000E+00	1.868E+05	1.790E+05	1.757E+05	1.757E+05	1.766E+05	1.781E+05	1.810E+05
SB131	0.000E+00	4.816E+05	4.748E+05	4.692E+05	4.699E+05	4.731E+05	4.782E+05	4.869E+05
TE131	0.000E+00	4.937E+05	4.955E+05	4.942E+05	4.986E+05	5.052E+05	5.140E+05	5.256E+05
TE131M	0.000E+00	7.308E+04	7.743E+04	7.906E+04	8.110E+04	8.343E+04	8.614E+04	8.902E+04
I131	0.000E+00	5.515E+05	5.567E+05	5.628E+05	5.628E+05	5.713E+05	5.822E+05	5.961E+05
XE131M	0.000E+00	6.122E+03	6.181E+03	6.185E+03	6.257E+03	6.361E+03	6.497E+03	6.669E+03
CD132	0.000E+00	4.161E+00	4.027E+00	4.149E+00	4.423E+00	4.777E+00	5.165E+00	5.534E+00
IN132	0.000E+00	1.641E+03	1.481E+03	1.428E+03	1.425E+03	1.443E+03	1.470E+03	1.513E+03

SNI32	0.000E+00	1.121E+05	1.019E+05	9.729E+04	9.522E+04	9.400E+04	9.317E+04	9.365E+04
SB132	0.000E+00	3.081E+05	2.918E+05	2.830E+05	2.797E+05	2.781E+05	2.778E+05	2.805E+05
SB132M	0.000E+00	1.945E+05	1.887E+05	1.848E+05	1.837E+05	1.835E+05	1.841E+05	1.865E+05
TE132	0.000E+00	8.035E+05	8.003E+05	7.943E+05	7.976E+05	8.048E+05	8.154E+05	8.321E+05
I132	0.000E+00	8.106E+05	8.101E+05	8.055E+05	8.102E+05	8.186E+05	8.305E+05	8.482E+05
CSI32	0.000E+00	1.659E+01	5.032E+01	8.662E+01	1.281E+02	1.746E+02	2.243E+02	2.653E+02
INI33	0.000E+00	1.576E+02	1.488E+02	1.502E+02	1.570E+02	1.663E+02	1.766E+02	1.868E+02
SNI33	0.000E+00	3.443E+04	3.072E+04	2.920E+04	2.862E+04	2.837E+04	2.825E+04	2.852E+04
SB133	0.000E+00	3.969E+05	3.595E+05	3.393E+05	3.276E+05	3.187E+05	3.113E+05	3.095E+05
TE133	0.000E+00	7.144E+05	6.905E+05	6.765E+05	6.731E+05	6.732E+05	6.759E+05	6.847E+05

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
 FISSION PRODUCTS
 POWER= 2.16550E+01 MW, BURNUP= 5.40006E+04 MWD, FLUX= 2.35E+14 N/CM**2-SEC

7 SUMMARY TABLE: RADIOACTIVITY, CURIES

	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
TE133M	0.000E+00	4.997E+05	4.645E+05	4.382E+05	4.202E+05	4.059E+05	3.947E+05	3.918E+05
I133	0.000E+00	1.222E+06	1.187E+06	1.159E+06	1.148E+06	1.143E+06	1.144E+06	1.158E+06
I133M	0.000E+00	2.739E+04	3.134E+04	3.301E+04	3.458E+04	3.622E+04	3.801E+04	3.969E+04
XE133	0.000E+00	1.221E+06	1.187E+06	1.161E+06	1.151E+06	1.147E+06	1.150E+06	1.166E+06
XE133M	0.000E+00	3.649E+04	3.622E+04	3.579E+04	3.580E+04	3.600E+04	3.639E+04	3.708E+04
IN134	0.000E+00	7.762E+00	7.686E+00	8.081E+00	8.765E+00	9.601E+00	1.049E+01	1.131E+01
SN134	0.000E+00	3.809E+03	3.621E+03	3.678E+03	3.850E+03	4.065E+03	4.291E+03	4.507E+03
SB134	0.000E+00	5.555E+04	5.281E+04	5.262E+04	5.359E+04	5.481E+04	5.605E+04	5.741E+04
SB134M	0.000E+00	5.174E+04	4.919E+04	4.894E+04	4.974E+04	5.075E+04	5.176E+04	5.290E+04
TE134	0.000E+00	1.153E+06	1.051E+06	1.051E+06	9.903E+05	9.517E+05	9.208E+05	8.949E+05
I134	0.000E+00	1.366E+06	1.313E+06	1.277E+06	1.261E+06	1.252E+06	1.248E+06	1.259E+06
I134M	0.000E+00	9.520E+04	1.085E+05	1.151E+05	1.214E+05	1.278E+05	1.344E+05	1.404E+05
XE134M	0.000E+00	5.699E+03	7.138E+03	7.800E+03	8.382E+03	8.965E+03	9.580E+03	1.012E+04
CS134	0.000E+00	3.509E+03	2.823E+04	7.074E+04	1.276E+05	1.962E+05	2.735E+05	3.338E+05
CS134M	0.000E+00	3.532E+03	1.069E+04	1.839E+04	2.719E+04	3.705E+04	4.756E+04	5.623E+04
SN135	0.000E+00	4.467E+02	4.182E+02	4.189E+02	4.345E+02	4.570E+02	4.822E+02	5.081E+02
SB135	0.000E+00	3.791E+04	3.351E+04	3.149E+04	3.049E+04	2.982E+04	2.932E+04	2.933E+04
TE135	0.000E+00	5.793E+05	5.334E+05	5.100E+05	4.978E+05	4.888E+05	4.815E+05	4.810E+05
I135	0.000E+00	1.138E+06	1.105E+06	1.082E+06	1.074E+06	1.072E+06	1.074E+06	1.087E+06
XE135	0.000E+00	5.543E+05	5.435E+05	5.168E+05	4.881E+05	4.591E+05	4.331E+05	4.156E+05
XE135M	0.000E+00	2.162E+05	2.212E+05	2.221E+05	2.249E+05	2.286E+05	2.333E+05	2.391E+05
CS135	0.000E+00	8.999E-02	2.709E-01	4.454E-01	6.117E-01	7.702E-01	9.231E-01	1.033E+00
CS135M	0.000E+00	4.221E+02	2.267E+03	5.718E+03	1.116E+04	1.898E+04	2.933E+04	3.908E+04
BA135M	0.000E+00	3.087E-01	5.053E+00	2.241E+01	6.281E+01	1.396E+02	2.674E+02	4.081E+02
SN136	0.000E+00	3.518E+01	3.407E+01	3.513E+01	3.748E+01	4.048E+01	4.374E+01	4.683E+01
SB136	0.000E+00	6.822E+03	6.148E+03	5.918E+03	5.885E+03	5.927E+03	6.000E+03	6.136E+03
TE136	0.000E+00	3.284E+05	2.936E+05	2.751E+05	2.639E+05	2.551E+05	2.475E+05	2.449E+05
I136	0.000E+00	5.537E+05	5.265E+05	5.128E+05	5.083E+05	5.064E+05	5.061E+05	5.108E+05
I136M	0.000E+00	3.385E+05	3.208E+05	3.085E+05	3.014E+05	2.962E+05	2.925E+05	2.931E+05
CS136	0.000E+00	7.749E+03	1.846E+04	2.910E+04	4.141E+04	5.582E+04	7.241E+04	8.722E+04
BA136M	0.000E+00	1.277E+03	3.042E+03	4.796E+03	6.824E+03	9.199E+03	1.193E+04	1.437E+04
SB137	0.000E+00	8.422E+02	8.004E+02	8.112E+02	8.500E+02	9.016E+02	9.583E+02	1.014E+03
TE137	0.000E+00	8.407E+04	7.671E+04	7.386E+04	7.304E+04	7.288E+04	7.298E+04	7.388E+04
I137	0.000E+00	5.770E+05	5.349E+05	5.114E+05	4.988E+05	4.896E+05	4.826E+05	4.828E+05
XE137	0.000E+00	1.075E+06	1.038E+06	1.012E+06	1.002E+06	9.965E+05	9.960E+05	1.006E+06
CS137	0.000E+00	1.389E+04	4.136E+04	6.805E+04	9.407E+04	1.194E+05	1.441E+05	1.618E+05
BA137M	0.000E+00	1.321E+04	3.922E+04	6.449E+04	8.911E+04	1.131E+05	1.365E+05	1.532E+05
SB138	0.000E+00	9.665E+01	9.419E+01	9.759E+01	1.045E+02	1.133E+02	1.228E+02	1.317E+02
TE138	0.000E+00	2.042E+04	1.856E+04	1.797E+04	1.796E+04	1.817E+04	1.848E+04	1.897E+04
I138	0.000E+00	2.975E+05	2.703E+05	2.559E+05	2.478E+05	2.419E+05	2.372E+05	2.366E+05
XE138	0.000E+00	1.089E+06	1.020E+06	9.746E+05	9.474E+05	9.271E+05	9.119E+05	9.115E+05

CS138	0.000E+00	1.184E+06	1.119E+06	1.075E+06	1.050E+06	1.032E+06	1.020E+06	1.023E+06
CS138M	0.000E+00	4.653E+04	4.846E+04	4.876E+04	4.933E+04	5.010E+04	5.114E+04	5.245E+04
SB139	0.000E+00	6.877E+00	6.787E+00	7.098E+00	7.668E+00	8.381E+00	9.154E+00	9.873E+00
TE139	0.000E+00	3.732E+03	3.453E+03	3.394E+03	3.451E+03	3.560E+03	3.692E+03	3.846E+03
I139	0.000E+00	1.358E+05	1.219E+05	1.144E+05	1.101E+05	1.069E+05	1.045E+05	1.042E+05
XE139	0.000E+00	8.777E+05	8.097E+05	7.675E+05	7.414E+05	7.209E+05	7.046E+05	7.009E+05
CS139	0.000E+00	1.124E+06	1.061E+06	1.019E+06	9.944E+05	9.770E+05	9.650E+05	9.674E+05
BA139	0.000E+00	1.143E+06	1.086E+06	1.047E+06	1.025E+06	1.011E+06	1.002E+06	1.007E+06
TE140	0.000E+00	4.377E+02	4.087E+02	4.066E+02	4.194E+02	4.393E+02	4.626E+02	4.873E+02
I140	0.000E+00	4.072E+04	3.554E+04	3.277E+04	3.110E+04	2.988E+04	2.891E+04	2.866E+04

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL

FISSION PRODUCTS

POWER= 2.16550E+01 MW, BURNUP= 5.40006E+04 MWD, FLUX= 2.35E+14 N/CM**2-SEC

7 SUMMARY TABLE: RADIOACTIVITY, CURIES

	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
XE140	0.000E+00	6.084E+05	5.474E+05	5.104E+05	4.860E+05	4.662E+05	4.495E+05	4.431E+05
CS140	0.000E+00	1.017E+06	9.581E+05	9.187E+05	8.959E+05	8.794E+05	8.677E+05	8.693E+05
BA140	0.000E+00	1.100E+06	1.046E+06	1.088E+06	9.868E+05	9.720E+05	9.627E+05	9.675E+05
LA140	0.000E+00	1.104E+06	1.057E+06	1.026E+06	1.013E+06	1.008E+06	1.010E+06	1.025E+06
PR140	0.000E+00	1.107E+00	4.027E+00	7.314E+00	1.129E+01	1.607E+01	2.164E+01	2.649E+01
TE141	0.000E+00	1.893E+01	1.790E+01	1.805E+01	1.887E+01	2.002E+01	2.133E+01	2.264E+01
I141	0.000E+00	6.456E+03	5.661E+03	5.280E+03	5.089E+03	4.979E+03	4.912E+03	4.945E+03
XE141	0.000E+00	2.099E+05	1.880E+05	1.766E+05	1.698E+05	1.646E+05	1.602E+05	1.589E+05
CS141	0.000E+00	7.765E+05	7.235E+05	6.882E+05	6.665E+05	6.503E+05	6.381E+05	6.372E+05
BA141	0.000E+00	1.043E+06	9.927E+05	9.539E+05	9.311E+05	9.153E+05	9.052E+05	9.090E+05
LA141	0.000E+00	1.047E+06	9.969E+05	9.581E+05	9.354E+05	9.197E+05	9.098E+05	9.137E+05
CE141	0.000E+00	1.032E+06	9.960E+05	9.575E+05	9.352E+05	9.198E+05	9.104E+05	9.209E+05
TE142	0.000E+00	1.721E+00	1.717E+00	1.812E+00	1.975E+00	2.174E+00	2.388E+00	2.585E+00
I142	0.000E+00	7.485E+02	6.955E+02	6.900E+02	7.093E+02	7.402E+02	7.763E+02	8.151E+02
XE142	0.000E+00	7.270E+04	6.423E+04	6.020E+04	5.807E+04	5.661E+04	5.548E+04	5.540E+04
CS142	0.000E+00	4.938E+05	4.486E+05	4.215E+05	4.044E+05	3.910E+05	3.800E+05	3.767E+05
BA142	0.000E+00	1.014E+06	9.535E+05	9.100E+05	8.831E+05	8.632E+05	8.490E+05	8.493E+05
LA142	0.000E+00	1.033E+06	9.738E+05	9.306E+05	9.040E+05	8.845E+05	8.708E+05	8.718E+05
PR142	0.000E+00	3.828E+03	1.392E+04	2.528E+04	3.903E+04	5.556E+04	7.481E+04	9.156E+04
PR142M	0.000E+00	7.242E+02	2.634E+03	4.783E+03	7.384E+03	1.051E+04	1.416E+04	1.732E+04
I143	0.000E+00	4.404E+01	4.234E+01	4.342E+01	4.601E+01	4.933E+01	5.291E+01	5.632E+01
XE143	0.000E+00	1.102E+04	9.992E+03	9.653E+03	9.606E+03	9.655E+03	9.737E+03	9.909E+03
CS143	0.000E+00	2.600E+05	2.297E+05	2.116E+05	1.994E+05	1.895E+05	1.809E+05	1.772E+05
BA143	0.000E+00	9.158E+05	8.498E+05	8.040E+05	7.744E+05	7.513E+05	7.335E+05	7.300E+05
LA143	0.000E+00	1.019E+06	9.477E+05	8.969E+05	8.636E+05	8.377E+05	8.179E+05	8.142E+05
CE143	0.000E+00	1.024E+06	9.524E+05	9.016E+05	8.687E+05	8.434E+05	8.243E+05	8.214E+05
PR143	0.000E+00	1.021E+06	9.495E+05	8.987E+05	8.656E+05	8.400E+05	8.206E+05	8.174E+05
I144	0.000E+00	3.337E+00	3.285E+00	3.433E+00	3.705E+00	4.043E+00	4.408E+00	4.745E+00
XE144	0.000E+00	1.791E+03	1.653E+03	1.630E+03	1.662E+03	1.715E+03	1.777E+03	1.846E+03
CS144	0.000E+00	6.256E+04	5.797E+04	5.626E+04	5.593E+04	5.603E+04	5.631E+04	5.711E+04
BA144	0.000E+00	7.271E+05	6.599E+05	6.161E+05	5.867E+05	5.629E+05	5.433E+05	5.363E+05
LA144	0.000E+00	9.216E+05	8.479E+05	7.974E+05	7.638E+05	7.370E+05	7.156E+05	7.096E+05
CE144	0.000E+00	3.650E+05	6.956E+05	7.910E+05	8.059E+05	7.930E+05	7.712E+05	7.554E+05
PR144	0.000E+00	3.681E+05	6.985E+05	7.940E+05	8.091E+05	7.965E+05	7.749E+05	7.595E+05
PR144M	0.000E+00	4.387E+03	8.355E+03	9.500E+03	9.680E+03	9.525E+03	9.263E+03	9.075E+03
XE145	0.000E+00	1.462E+02	1.484E+02	1.584E+02	1.733E+02	1.907E+02	2.089E+02	2.250E+02
CS145	0.000E+00	1.536E+04	1.433E+04	1.397E+04	1.398E+04	1.412E+04	1.432E+04	1.464E+04
BA145	0.000E+00	3.535E+05	3.259E+05	3.090E+05	2.988E+05	2.912E+05	2.855E+05	2.850E+05
LA145	0.000E+00	6.442E+05	5.996E+05	5.692E+05	5.502E+05	5.359E+05	5.251E+05	5.239E+05
CE145	0.000E+00	6.859E+05	6.415E+05	6.105E+05	5.912E+05	5.767E+05	5.661E+05	5.656E+05
PR145	0.000E+00	6.861E+05	6.417E+05	6.107E+05	5.914E+05	5.769E+05	5.664E+05	5.658E+05

XE146	0.000E+00	1.023E+01	1.005E+01	1.047E+01	1.125E+01	1.222E+01	1.327E+01	1.424E+01
CS146	0.000E+00	2.099E+03	1.980E+03	1.970E+03	2.018E+03	2.087E+03	2.164E+03	2.247E+03
BA146	0.000E+00	1.271E+05	1.173E+05	1.123E+05	1.100E+05	1.087E+05	1.079E+05	1.087E+05
LA146	0.000E+00	4.104E+05	3.839E+05	3.674E+05	3.581E+05	3.517E+05	3.472E+05	3.481E+05
CE146	0.000E+00	5.301E+05	5.016E+05	4.821E+05	4.713E+05	4.640E+05	4.593E+05	4.614E+05
PR146	0.000E+00	5.317E+05	5.034E+05	4.839E+05	4.732E+05	4.658E+05	4.612E+05	4.634E+05
PM146	0.000E+00	8.081E-02	5.800E-01	1.280E+00	2.037E+00	2.781E+00	3.475E+00	3.946E+00
XE147	0.000E+00	8.499E-01	8.523E-01	9.029E-01	9.867E-01	1.089E+00	1.200E+00	1.301E+00
CS147	0.000E+00	3.072E+02	2.982E+02	3.064E+02	3.250E+02	3.490E+02	3.751E+02	4.000E+02
BA147	0.000E+00	2.788E+04	2.593E+04	2.521E+04	2.515E+04	2.534E+04	2.566E+04	2.621E+04

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
FISSION PRODUCTS
POWER= 2.16550E+01 MW, BURNUP= 5.40006E+04 MWD, FLUX= 2.35E+14 N/CM**2-SEC

7 SUMMARY TABLE: RADIOACTIVITY, CURIES

	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
LA147	0.000E+00	1.957E+05	1.838E+05	1.772E+05	1.742E+05	1.724E+05	1.715E+05	1.727E+05
CE147	0.000E+00	4.001E+05	3.819E+05	3.696E+05	3.635E+05	3.598E+05	3.579E+05	3.606E+05
PR147	0.000E+00	4.100E+05	3.920E+05	3.796E+05	3.735E+05	3.699E+05	3.682E+05	3.711E+05
ND147	0.000E+00	4.084E+05	3.912E+05	3.797E+05	3.746E+05	3.723E+05	3.722E+05	3.766E+05
PM147	0.000E+00	4.476E+04	9.717E+04	1.152E+05	1.170E+05	1.114E+05	1.034E+05	9.734E+04
CS148	0.000E+00	1.862E+01	1.844E+01	1.932E+01	2.088E+01	2.280E+01	2.489E+01	2.681E+01
BA148	0.000E+00	4.411E+03	4.210E+03	4.222E+03	4.355E+03	4.542E+03	4.751E+03	4.967E+03
LA148	0.000E+00	7.016E+04	6.658E+04	6.509E+04	6.494E+04	6.525E+04	6.582E+04	6.696E+04
CE148	0.000E+00	2.807E+05	2.717E+05	2.662E+05	2.648E+05	2.648E+05	2.659E+05	2.695E+05
PR148	0.000E+00	3.102E+05	3.017E+05	2.961E+05	2.949E+05	2.952E+05	2.968E+05	3.010E+05
PM148	0.000E+00	4.977E+04	1.098E+05	1.383E+05	1.529E+05	1.597E+05	1.619E+05	1.642E+05
PM148M	0.000E+00	9.813E+03	2.163E+04	2.641E+04	2.774E+04	2.730E+04	2.608E+04	2.523E+04
BA149	0.000E+00	4.470E+02	4.396E+02	4.555E+02	4.856E+02	5.224E+02	5.618E+02	5.985E+02
LA149	0.000E+00	1.607E+04	1.556E+04	1.559E+04	1.596E+04	1.644E+04	1.695E+04	1.751E+04
CE149	0.000E+00	1.486E+05	1.458E+05	1.449E+05	1.461E+05	1.480E+05	1.503E+05	1.533E+05
PR149	0.000E+00	2.034E+05	2.028E+05	2.026E+05	2.050E+05	2.081E+05	2.118E+05	2.165E+05
ND149	0.000E+00	2.077E+05	2.090E+05	2.108E+05	2.115E+05	2.219E+05	2.293E+05	2.372E+05
PM149	0.000E+00	2.324E+05	2.654E+05	2.856E+05	3.038E+05	3.205E+05	3.361E+05	3.520E+05
CS150	0.000E+00	1.668E-02	1.677E-02	1.780E-02	1.948E-02	2.153E-02	2.373E-02	2.578E-02
BA150	0.000E+00	3.195E+01	3.179E+01	3.339E+01	3.607E+01	3.931E+01	4.275E+01	4.589E+01
LA150	0.000E+00	2.819E+03	2.792E+03	2.872E+03	3.015E+03	3.181E+03	3.352E+03	3.511E+03
CE150	0.000E+00	6.175E+04	6.283E+04	6.439E+04	6.674E+04	6.925E+04	7.177E+04	7.416E+04
PM150	0.000E+00	1.213E+05	1.264E+05	1.304E+05	1.355E+05	1.408E+05	1.462E+05	1.511E+05
PM150	0.000E+00	1.189E+03	1.381E+03	1.581E+03	1.841E+03	2.150E+03	2.496E+03	2.844E+03
LA151	0.000E+00	3.388E+02	3.391E+02	3.555E+02	3.809E+02	4.098E+02	4.393E+02	4.656E+02
CE151	0.000E+00	1.747E+04	1.801E+04	1.880E+04	1.984E+04	2.090E+04	2.194E+04	2.285E+04
PR151	0.000E+00	6.358E+04	6.774E+04	7.112E+04	7.497E+04	7.880E+04	8.257E+04	8.583E+04
ND151	0.000E+00	8.947E+04	9.797E+04	1.041E+05	1.109E+05	1.179E+05	1.251E+05	1.314E+05
PM151	0.000E+00	8.970E+04	9.829E+04	1.045E+05	1.113E+05	1.183E+05	1.254E+05	1.317E+05
SM151	0.000E+00	2.077E+02	3.486E+02	4.171E+02	4.711E+02	5.179E+02	5.604E+02	5.875E+02
BA152	0.000E+00	8.085E-02	8.147E-02	8.670E-02	9.507E-02	1.052E-01	1.160E-01	1.258E-01
LA152	0.000E+00	3.649E+01	3.670E+01	3.895E+01	4.241E+01	4.643E+01	5.062E+01	5.434E+01
CE152	0.000E+00	3.734E+03	3.827E+03	4.045E+03	4.332E+03	4.631E+03	4.922E+03	5.168E+03
PR152	0.000E+00	2.695E+04	2.905E+04	3.097E+04	3.308E+04	3.515E+04	3.713E+04	3.875E+04
ND152	0.000E+00	5.864E+04	6.610E+04	7.126E+04	7.648E+04	8.152E+04	8.642E+04	9.045E+04
PM152	0.000E+00	5.976E+04	6.750E+04	7.284E+04	7.822E+04	8.345E+04	8.853E+04	9.272E+04
PM152M	0.000E+00	9.143E+02	1.177E+03	1.317E+03	1.442E+03	1.562E+03	1.683E+03	1.783E+03
EU152	0.000E+00	1.198E+00	7.553E+00	1.434E+01	1.434E+01	1.506E+01	1.573E+01	1.503E+01
EU152M	0.000E+00	3.804E+01	8.484E+01	1.042E+02	1.183E+02	1.304E+02	1.459E+02	1.484E+02
LA153	0.000E+00	3.680E+00	3.721E+00	3.973E+00	4.363E+00	4.826E+00	5.317E+00	5.758E+00
CE153	0.000E+00	6.215E+02	6.394E+02	6.875E+02	7.522E+02	8.223E+02	8.925E+02	9.520E+02

PR153	0.000E+00	8.218E+03	8.878E+03	9.624E+03	1.046E+04	1.127E+04	1.204E+04	1.265E+04
ND153	0.000E+00	3.368E+04	3.814E+04	4.158E+04	4.506E+04	4.838E+04	5.153E+04	5.403E+04
PM153	0.000E+00	3.764E+04	4.312E+04	4.714E+04	5.116E+04	5.498E+04	5.863E+04	6.153E+04
SML53	0.000E+00	5.695E+04	1.148E+05	1.746E+05	2.382E+05	3.047E+05	3.720E+05	4.269E+05
GDI53	0.000E+00	7.121E-02	1.718E+00	5.802E+00	1.207E+01	2.036E+01	3.144E+01	4.026E+01
LAI54	0.000E+00	1.695E-01	1.717E-01	1.834E-01	2.017E-01	2.235E-01	2.468E-01	2.678E-01
CE154	0.000E+00	6.918E+01	7.186E+01	7.809E+01	8.643E+01	9.564E+01	1.050E+02	1.129E+02
PR154	0.000E+00	1.764E+03	1.982E+03	2.222E+03	2.481E+03	2.731E+03	2.965E+03	3.144E+03
ND154	0.000E+00	1.469E+04	1.808E+04	2.069E+04	2.319E+04	2.553E+04	2.770E+04	2.934E+04
PM154	0.000E+00	1.761E+04	2.211E+04	2.539E+04	2.850E+04	3.140E+04	3.413E+04	3.619E+04

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL

FISSION PRODUCTS

POWER= 2.16550E+01 MW, BURNUP= 5.40006E+04 MWD, FLUX= 2.35E+14 N/CM**2-SEC

7 SUMMARY TABLE: RADIOACTIVITY, CURIES

	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
PM154M	0.000E+00	2.656E+03	3.663E+03	4.277E+03	4.827E+03	5.344E+03	5.841E+03	6.223E+03
EUI54	0.000E+00	1.184E+02	1.204E+02	1.204E+02	1.204E+02	1.204E+02	1.204E+02	1.204E+02
CEI55	0.000E+00	7.928E+00	8.217E+00	8.912E+00	9.882E+00	1.099E+01	1.214E+01	1.314E+01
PR155	0.000E+00	3.369E+02	3.819E+02	4.343E+02	4.918E+02	5.490E+02	6.034E+02	6.458E+02
ND155	0.000E+00	5.293E+03	6.689E+03	7.833E+03	8.936E+03	9.962E+03	1.091E+04	1.160E+04
PM155	0.000E+00	9.986E+03	1.332E+04	1.571E+04	1.794E+04	2.002E+04	2.196E+04	2.340E+04
SMI55	0.000E+00	1.105E+04	1.516E+04	1.818E+04	2.113E+04	2.405E+04	2.700E+04	2.934E+04
EUI55	0.000E+00	5.177E+02	1.497E+03	2.946E+03	5.311E+03	8.482E+03	1.216E+04	1.492E+04
GD155M	0.000E+00	6.636E-04	1.984E-02	1.074E-01	3.268E-01	7.743E-01	1.526E+00	2.333E+00
CE156	0.000E+00	7.477E-01	7.747E-01	8.398E-01	9.320E-01	1.039E+00	1.150E+00	1.248E+00
PR156	0.000E+00	5.817E+01	6.785E+01	7.886E+01	9.090E+01	1.030E+02	1.146E+02	1.237E+02
ND156	0.000E+00	1.573E+03	2.175E+03	2.686E+03	3.174E+03	3.625E+03	4.037E+03	4.331E+03
PM156	0.000E+00	4.592E+03	6.779E+03	8.409E+03	9.912E+03	1.129E+04	1.256E+04	1.348E+04
SMI56	0.000E+00	6.023E+03	9.093E+03	1.126E+04	1.322E+04	1.504E+04	1.673E+04	1.796E+04
EUI56	0.000E+00	1.109E+04	2.419E+04	4.352E+04	7.689E+04	1.284E+05	1.973E+05	2.622E+05
CE157	0.000E+00	5.984E-02	6.111E-02	6.584E-02	7.247E-02	8.057E-02	8.916E-02	9.685E-02
PR157	0.000E+00	9.619E+00	1.069E+01	1.215E+01	1.387E+01	1.568E+01	1.746E+01	1.891E+01
ND157	0.000E+00	4.251E+02	5.875E+02	7.378E+02	8.844E+02	1.021E+03	1.145E+03	1.233E+03
PM157	0.000E+00	2.018E+03	3.109E+03	3.978E+03	4.782E+03	5.516E+03	6.182E+03	6.650E+03
SMI57	0.000E+00	3.596E+03	5.721E+03	7.280E+03	8.699E+03	9.996E+03	1.119E+04	1.204E+04
EUI57	0.000E+00	3.897E+03	6.353E+03	8.421E+03	1.081E+04	1.382E+04	1.762E+04	2.131E+04
PR158	0.000E+00	7.588E-01	8.134E-01	9.032E-01	1.022E+00	1.148E+00	1.277E+00	1.385E+00
ND158	0.000E+00	6.530E+01	8.890E+01	1.120E+02	1.347E+02	1.560E+02	1.754E+02	1.893E+02
PM158	0.000E+00	6.033E+02	9.644E+02	1.266E+03	1.546E+03	1.799E+03	2.025E+03	2.180E+03
SMI58	0.000E+00	1.805E+03	2.988E+03	3.896E+03	4.722E+03	5.468E+03	6.144E+03	6.614E+03
EUI58	0.000E+00	1.931E+03	3.204E+03	4.171E+03	5.051E+03	5.848E+03	6.572E+03	7.079E+03
PR159	0.000E+00	3.081E-02	3.236E-02	3.594E-02	3.979E-02	4.457E-02	4.949E-02	5.372E-02
ND159	0.000E+00	6.976E+00	8.972E+00	1.107E+01	1.322E+01	1.528E+01	1.719E+01	1.860E+01
PM159	0.000E+00	1.297E+02	2.124E+02	2.842E+02	3.513E+02	4.121E+02	4.662E+02	5.032E+02
SMI59	0.000E+00	7.592E+02	1.340E+03	1.799E+03	2.217E+03	2.594E+03	2.932E+03	3.165E+03
EUI59	0.000E+00	9.243E+02	1.637E+03	2.188E+03	2.690E+03	3.141E+03	3.549E+03	3.830E+03
GD159	0.000E+00	9.508E+02	1.755E+03	2.461E+03	3.210E+03	4.065E+03	5.107E+03	6.092E+03
ND160	0.000E+00	7.125E+01	7.972E+01	8.985E+01	1.014E+02	1.134E+02	1.251E+02	1.345E+02
PM160	0.000E+00	2.712E+01	3.903E+01	4.899E+01	5.845E+01	6.718E+01	7.514E+01	8.083E+01
SMI160	0.000E+00	2.929E+02	5.009E+02	6.598E+02	8.047E+02	9.364E+02	1.056E+03	1.140E+03
EUI160	0.000E+00	4.282E+02	7.580E+02	1.004E+03	1.228E+03	1.430E+03	1.615E+03	1.745E+03
TB160	0.000E+00	1.575E+01	1.128E+02	2.841E+02	5.425E+02	9.050E+02	1.385E+03	1.839E+03
ND161	0.000E+00	5.301E-02	5.696E-02	6.302E-02	7.079E-02	7.941E-02	8.826E-02	9.583E-02
PM161	0.000E+00	3.199E+00	4.509E+00	5.639E+00	6.745E+00	7.802E+00	8.791E+00	9.524E+00
SMI161	0.000E+00	7.780E+01	1.347E+02	1.785E+02	2.187E+02	2.556E+02	2.894E+02	3.132E+02
EUI161	0.000E+00	1.814E+02	3.263E+02	4.337E+02	5.311E+02	6.201E+02	7.018E+02	7.596E+02

GDI61	0.000E+00	2.081E+02	3.770E+02	5.026E+02	6.179E+02	7.249E+02	8.253E+02	8.981E+02
TB161	0.000E+00	2.097E+02	3.877E+02	5.308E+02	6.768E+02	8.343E+02	1.011E+03	1.169E+03
PMI62	0.000E+00	1.852E-01	2.129E-01	2.505E-01	2.926E-01	3.348E-01	3.750E-01	4.061E-01
SMI62	0.000E+00	1.378E+01	1.873E+01	2.337E+01	2.798E+01	3.237E+01	3.643E+01	3.941E+01
EU162	0.000E+00	6.446E+01	1.014E+02	1.290E+02	1.547E+02	1.788E+02	2.014E+02	2.180E+02
GDI62	0.000E+00	1.108E+02	1.859E+02	2.367E+02	2.828E+02	3.260E+02	3.671E+02	3.976E+02
TB162	0.000E+00	1.096E+02	1.841E+02	2.345E+02	2.800E+02	3.228E+02	3.635E+02	3.937E+02
TB162M	0.000E+00	3.244E+00	5.696E+00	7.230E+00	8.593E+00	9.876E+00	1.111E+01	1.205E+01
SMI63	0.000E+00	1.827E+00	2.224E+00	2.659E+00	3.124E+00	3.583E+00	4.020E+00	4.355E+00
EU163	0.000E+00	1.702E+01	2.437E+01	3.029E+01	3.602E+01	4.152E+01	4.671E+01	5.060E+01

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
 FISSION PRODUCTS
 POWER= 2.16550E+01 MW, BURNUP= 5.40006E+04 MWD, FLUX= 2.35E+14 N/CM**2-SEC

7 SUMMARY TABLE: RADIOACTIVITY, CURIES

	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
GD163	0.000E+00	4.701E+01	7.568E+01	9.522E+01	1.132E+02	1.302E+02	1.465E+02	1.588E+02
TB163	0.000E+00	5.023E+01	8.173E+01	1.029E+02	1.222E+02	1.405E+02	1.581E+02	1.714E+02
SM164	0.000E+00	1.853E-01	2.073E-01	2.366E-01	2.710E-01	3.071E-01	3.428E-01	3.718E-01
EU164	0.000E+00	4.024E+00	5.160E+00	6.159E+00	7.186E+00	8.208E+00	9.198E+00	9.972E+00
GD164	0.000E+00	2.061E+01	3.089E+01	3.796E+01	4.461E+01	5.106E+01	5.733E+01	6.217E+01
TB164	0.000E+00	2.472E+01	3.822E+01	4.714E+01	5.539E+01	6.338E+01	7.116E+01	7.718E+01
SM165	0.000E+00	1.256E-02	1.339E-02	1.485E-02	1.672E-02	1.879E-02	2.089E-02	2.267E-02
EU165	0.000E+00	7.267E-01	8.508E-01	9.789E-01	1.122E+00	1.270E+00	1.418E+00	1.538E+00
GD165	0.000E+00	7.793E+00	1.069E+01	1.280E+01	1.487E+01	1.693E+01	1.896E+01	2.056E+01
TB165	0.000E+00	1.173E+01	1.723E+01	2.087E+01	2.430E+01	2.768E+01	3.101E+01	3.364E+01
DY165	0.000E+00	2.029E+01	5.459E+01	1.097E+02	2.053E+02	3.644E+02	6.103E+02	8.717E+02
DY165M	0.000E+00	1.136E+01	3.241E+01	6.684E+01	1.269E+02	2.270E+02	3.815E+02	5.456E+02
DY166	0.000E+00	7.048E+00	1.082E+01	1.353E+01	1.616E+01	1.889E+01	2.182E+01	2.439E+01
HO166	0.000E+00	7.844E+00	1.580E+01	2.833E+01	5.189E+01	9.632E+01	1.761E+02	2.720E+02
HO166M	0.000E+00	7.145E-06	1.048E-04	4.517E-04	1.350E-03	3.375E-03	7.539E-03	1.287E-02
ER167M	0.000E+00	3.208E-02	1.632E-01	4.342E-01	1.002E+00	2.192E+00	4.632E+00	7.953E+00
ER169	0.000E+00	1.217E-03	1.188E-02	3.690E-02	8.349E-02	1.632E-01	2.955E-01	4.541E-01
TMI70	0.000E+00	1.139E-05	7.096E-04	4.613E-03	1.614E-02	4.223E-02	9.319E-02	1.569E-01
TMI70M	0.000E+00	3.539E-06	1.021E-04	5.204E-04	1.628E-03	4.006E-03	8.532E-03	1.423E-02
SUMTOT	0.000E+00	1.039E+08	1.018E+08	9.995E+07	9.954E+07	9.971E+07	1.004E+08	1.019E+08
TOTAL	0.000E+00	1.039E+08	1.018E+08	9.995E+07	9.954E+07	9.971E+07	1.004E+08	1.019E+08

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
FISSION PRODUCTS
POWER= 2.16550E+01 MW, BURNUP= 5.40006E+04 MWD, FLUX= 2.35E+14 N/CM**2-SEC

7 SUMMARY TABLE: RADIOACTIVITY, CURIES

	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
H	0.000E+00	6.662E+01	2.038E+02	3.406E+02	4.761E+02	6.097E+02	7.411E+02	8.361E+02
CO	0.000E+00	1.055E+00	1.043E+00	1.093E+00	1.184E+00	1.294E+00	1.414E+00	1.523E+00
NI	0.000E+00	4.078E+01	3.947E+01	4.050E+01	4.293E+01	4.607E+01	4.951E+01	5.279E+01
CU	0.000E+00	3.044E+02	2.793E+02	2.707E+02	2.713E+02	2.764E+02	2.839E+02	2.943E+02
ZN	0.000E+00	3.183E+03	2.804E+03	2.590E+03	2.463E+03	2.378E+03	2.318E+03	2.318E+03
GA	0.000E+00	1.635E+04	1.419E+04	1.287E+04	1.199E+04	1.129E+04	1.073E+04	1.053E+04
GE	0.000E+00	1.034E+05	8.975E+04	8.098E+04	7.478E+04	6.975E+04	6.558E+04	6.378E+04
AS	0.000E+00	3.117E+05	2.685E+05	2.402E+05	2.196E+05	2.025E+05	1.879E+05	1.810E+05
SE	0.000E+00	9.409E+05	8.045E+05	7.136E+05	6.462E+05	5.893E+05	5.404E+05	5.157E+05
BR	0.000E+00	2.111E+06	1.783E+06	1.563E+06	1.397E+06	1.256E+06	1.134E+06	1.069E+06
KR	0.000E+00	3.729E+06	3.170E+06	2.795E+06	2.513E+06	2.273E+06	2.065E+06	1.956E+06
RB	0.000E+00	5.091E+06	4.371E+06	3.887E+06	3.526E+06	3.219E+06	2.955E+06	2.820E+06
SR	0.000E+00	6.869E+06	6.156E+06	5.638E+06	5.266E+06	4.958E+06	4.700E+06	4.586E+06
Y	0.000E+00	8.883E+06	8.148E+06	7.577E+06	7.182E+06	6.863E+06	6.602E+06	6.509E+06
ZR	0.000E+00	6.162E+06	5.988E+06	5.784E+06	5.677E+06	5.608E+06	5.568E+06	5.601E+06
NB	0.000E+00	8.573E+06	8.627E+06	8.689E+06	8.428E+06	8.432E+06	8.471E+06	8.580E+06
MO	0.000E+00	4.453E+06	4.783E+06	5.020E+06	5.283E+06	5.549E+06	5.816E+06	6.051E+06
TC	0.000E+00	4.581E+06	5.145E+06	5.561E+06	6.002E+06	6.447E+06	6.896E+06	7.275E+06
RU	0.000E+00	1.305E+06	1.876E+06	2.270E+06	2.630E+06	2.964E+06	3.275E+06	3.505E+06
RH	0.000E+00	1.440E+06	2.222E+06	2.820E+06	3.389E+06	3.929E+06	4.434E+06	4.800E+06
PD	0.000E+00	1.500E+05	2.351E+05	3.043E+05	3.739E+05	4.448E+05	5.180E+05	5.764E+05
AG	0.000E+00	1.640E+05	2.531E+05	3.394E+05	4.364E+05	5.447E+05	6.633E+05	7.625E+05
CD	0.000E+00	7.455E+04	7.892E+04	8.434E+04	9.145E+04	9.944E+04	1.078E+05	1.153E+05
IN	0.000E+00	1.670E+05	1.786E+05	1.901E+05	2.042E+05	2.195E+05	2.353E+05	2.495E+05
SN	0.000E+00	8.042E+05	8.043E+05	8.080E+05	8.233E+05	8.433E+05	8.662E+05	8.920E+05
SB	0.000E+00	2.120E+06	2.089E+06	2.073E+06	2.086E+06	2.111E+06	2.144E+06	2.190E+06
TE	0.000E+00	4.970E+06	4.752E+06	4.614E+06	4.554E+06	4.523E+06	4.512E+06	4.554E+06
I	0.000E+00	7.163E+06	6.939E+06	6.789E+06	6.744E+06	6.741E+06	6.770E+06	6.866E+06
XE	0.000E+00	5.986E+06	5.681E+06	5.462E+06	5.330E+06	5.230E+06	5.159E+06	5.162E+06
CS	0.000E+00	5.011E+06	4.765E+06	4.647E+06	4.634E+06	4.669E+06	4.743E+06	4.856E+06
BA	0.000E+00	6.471E+06	6.105E+06	5.860E+06	5.722E+06	5.628E+06	5.568E+06	5.592E+06
LA	0.000E+00	6.465E+06	6.076E+06	5.806E+06	5.646E+06	5.532E+06	5.455E+06	5.468E+06
CE	0.000E+00	4.550E+06	4.672E+06	4.611E+06	4.539E+06	4.465E+06	4.405E+06	4.411E+06
PR	0.000E+00	3.761E+06	3.949E+06	3.950E+06	3.926E+06	3.898E+06	3.880E+06	3.905E+06
ND	0.000E+00	8.199E+05	8.300E+05	8.591E+05	8.823E+05	9.085E+05	9.365E+05	9.618E+05
PM	0.000E+00	5.636E+05	7.556E+05	8.522E+05	9.132E+05	9.551E+05	9.876E+05	1.018E+06
SM	0.000E+00	8.079E+04	1.501E+05	2.183E+05	2.897E+05	3.635E+05	4.379E+05	4.981E+05
EU	0.000E+00	1.921E+04	3.939E+04	6.664E+04	1.102E+05	1.742E+05	2.573E+05	3.333E+05
GD	0.000E+00	1.345E+03	2.437E+03	3.352E+03	4.295E+03	5.335E+03	6.555E+03	7.672E+03
TB	0.000E+00	4.250E+02	8.275E+02	1.227E+03	1.710E+03	2.304E+03	3.031E+03	3.696E+03
DY	0.000E+00	3.870E+01	9.782E+01	1.900E+02	3.484E+02	6.102E+02	1.014E+03	1.442E+03

HO	0.000E+00	7.84E+00	1.580E+01	2.833E+01	5.189E+01	9.632E+01	1.761E+02	2.720E+02
ER	0.000E+00	3.329E-02	1.751E-01	4.712E-01	1.085E+00	2.355E+00	4.928E+00	8.407E+00
TM	0.000E+00	1.495E-05	8.157E-04	5.178E-03	1.799E-02	4.699E-02	1.038E-01	1.752E-01
SUMTOT	0.000E+00	1.039E+08	1.018E+08	9.995E+07	9.954E+07	9.971E+07	1.004E+08	1.019E+08
TOTAL	0.000E+00	1.039E+08	1.018E+08	9.995E+07	9.954E+07	9.971E+07	1.004E+08	1.019E+08

CUMULATIVE TABLE TOTALS

AP+FP	0.000E+00	1.039E+08	1.018E+08	9.995E+07	9.954E+07	9.971E+07	1.004E+08	1.019E+08
ACT+FP	2.315E+00	1.230E+08	1.214E+08	1.211E+08	1.231E+08	1.263E+08	1.301E+08	1.345E+08
AP+ACT+FP	2.315E+00	1.230E+08	1.214E+08	1.211E+08	1.231E+08	1.263E+08	1.301E+08	1.345E+08

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
 FISSION PRODUCTS
 POWER= 2.16550E+01 MW, BURNUP= 5.40006E+04 MWD, FLUX= 2.35E+14 N/CM**2-SEC

9 SUMMARY TABLE: THERMAL POWER, WATTS

	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
H 3	0.000E+00	2.243E-03	6.862E-03	1.147E-02	1.603E-02	2.053E-02	2.495E-02	2.815E-02
CO 72	0.000E+00	3.900E-02	3.841E-02	4.014E-02	4.330E-02	4.723E-02	5.146E-02	5.537E-02
NI 72	0.000E+00	2.839E-01	2.808E-01	2.915E-01	3.113E-01	3.358E-01	3.622E-01	3.869E-01
CU 72	0.000E+00	7.606E-01	7.883E-01	8.297E-01	8.897E-01	9.601E-01	1.035E+00	1.104E+00
ZN 72	0.000E+00	4.583E-02	4.926E-02	5.251E-02	5.667E-02	6.139E-02	6.639E-02	7.090E-02
GA 72	0.000E+00	5.766E-01	6.204E-01	6.616E-01	7.142E-01	7.737E-01	8.369E-01	8.938E-01
CO 73	0.000E+00	1.039E-02	1.046E-02	1.114E-02	1.223E-02	1.354E-02	1.492E-02	1.616E-02
NI 73	0.000E+00	3.821E-01	3.771E-01	3.960E-01	4.289E-01	4.687E-01	5.110E-01	5.496E-01
CU 73	0.000E+00	8.598E-01	8.254E-01	8.380E-01	8.779E-01	9.309E-01	9.894E-01	1.047E+00
ZN 73	0.000E+00	1.009E+00	1.001E+00	1.014E+00	1.051E+00	1.100E+00	1.156E+00	1.214E+00
GA 73	0.000E+00	3.232E-01	3.246E-01	3.305E-01	3.433E-01	3.601E-01	3.792E-01	3.984E-01
GE 73M	0.000E+00	2.839E-02	2.852E-02	2.904E-02	3.017E-02	3.164E-02	3.332E-02	3.502E-02
CO 74	0.000E+00	2.894E-03	2.797E-03	2.875E-03	3.061E-03	3.305E-03	3.575E-03	3.834E-03
NI 74	0.000E+00	2.264E-01	2.109E-01	2.092E-01	2.115E-01	2.256E-01	2.377E-01	2.508E-01
CU 74	0.000E+00	2.223E+00	2.048E+00	1.984E+00	1.985E+00	2.020E+00	2.074E+00	2.149E+00
ZN 74	0.000E+00	9.420E-01	9.098E-01	8.943E-01	8.994E-01	9.161E-01	9.408E-01	9.737E-01
GA 74	0.000E+00	3.927E+00	3.843E+00	3.801E+00	3.840E+00	3.925E+00	4.044E+00	4.193E+00
CO 75	0.000E+00	3.444E-04	3.328E-04	3.422E-04	3.644E-04	3.936E-04	4.257E-04	4.565E-04
NI 75	0.000E+00	1.395E-01	1.295E-01	1.283E-01	1.320E-01	1.381E-01	1.454E-01	1.533E-01
CU 75	0.000E+00	1.868E+00	1.686E+00	1.611E+00	1.594E+00	1.605E+00	1.631E+00	1.679E+00
ZN 75	0.000E+00	5.751E+00	5.370E+00	5.160E+00	5.084E+00	5.079E+00	5.121E+00	5.235E+00
GA 75	0.000E+00	2.756E+00	2.642E+00	2.572E+00	2.558E+00	2.576E+00	2.616E+00	2.686E+00
GE 75	0.000E+00	9.345E-01	8.988E-01	8.765E-01	8.731E-01	8.804E-01	8.953E-01	9.201E-01
GE 75M	0.000E+00	1.178E-02	1.170E-02	1.161E-02	1.171E-02	1.195E-02	1.228E-02	1.271E-02
NI 76	0.000E+00	3.160E-02	2.876E-02	2.799E-02	2.831E-02	2.915E-02	3.025E-02	3.160E-02
CU 76	0.000E+00	2.323E+00	2.027E+00	1.881E+00	1.807E+00	1.767E+00	1.744E+00	1.761E+00
ZN 76	0.000E+00	7.881E+00	6.946E+00	6.384E+00	6.025E+00	5.762E+00	5.564E+00	5.521E+00
GA 76	0.000E+00	2.444E+01	2.229E+01	2.087E+01	1.998E+01	1.937E+01	1.896E+01	1.898E+01
AS 76	0.000E+00	2.156E-02	6.366E-02	1.112E-01	1.692E-01	2.397E-01	3.225E-01	3.967E-01
NI 77	0.000E+00	7.192E-03	6.634E-03	6.537E-03	6.694E-03	6.979E-03	7.328E-03	7.715E-03
CU 77	0.000E+00	8.785E-01	7.685E-01	7.159E-01	6.914E-01	6.801E-01	6.764E-01	6.868E-01
ZN 77	0.000E+00	1.744E+01	1.515E+01	1.377E+01	1.287E+01	1.219E+01	1.167E+01	1.151E+01
GA 77	0.000E+00	2.468E+01	2.213E+01	2.037E+01	1.916E+01	1.823E+01	1.752E+01	1.732E+01
GE 77	0.000E+00	6.708E+00	6.316E+00	5.980E+00	5.763E+00	5.615E+00	5.528E+00	5.557E+00
GE 77M	0.000E+00	9.412E+00	8.607E+00	8.018E+00	7.622E+00	7.329E+00	7.120E+00	7.093E+00
AS 77	0.000E+00	2.633E+00	2.435E+00	2.282E+00	2.181E+00	2.109E+00	2.059E+00	2.059E+00
SE 77M	0.000E+00	6.882E-03	6.427E-03	6.165E-03	6.149E-03	6.372E-03	6.876E-03	7.543E-03
NI 78	0.000E+00	7.063E-04	6.532E-04	6.460E-04	6.637E-04	6.939E-04	7.301E-04	7.695E-04
CU 78	0.000E+00	4.440E-01	3.850E-01	3.566E-01	3.426E-01	3.350E-01	3.309E-01	3.343E-01
ZN 78	0.000E+00	1.390E+01	1.169E+01	1.037E+01	9.455E+00	8.714E+00	8.085E+00	7.792E+00
GA 78	0.000E+00	8.555E+01	7.420E+01	6.669E+01	6.125E+01	5.676E+01	5.298E+01	5.124E+01

GE 78	0.000E+00	1.156E+01	1.108E+01	1.063E+01	1.036E+01	1.019E+01	1.011E+01	1.020E+01
AS 78	0.000E+00	6.008E+01	5.793E+01	5.575E+01	5.448E+01	5.372E+01	5.344E+01	5.400E+01
CU 79	0.000E+00	8.322E-02	7.775E-02	7.761E-02	8.043E-02	8.476E-02	8.979E-02	9.503E-02
ZN 79	0.000E+00	1.212E+01	1.068E+01	1.005E+01	9.804E+00	9.734E+00	9.758E+00	9.953E+00
GA 79	0.000E+00	6.680E+01	5.873E+01	5.411E+01	5.125E+01	4.918E+01	4.762E+01	4.733E+01
GE 79	0.000E+00	1.039E+02	9.785E+01	9.319E+01	9.039E+01	8.859E+01	8.759E+01	8.821E+01
AS 79	0.000E+00	5.085E+01	4.777E+01	4.527E+01	4.367E+01	4.256E+01	4.186E+01	4.202E+01
SE 79	0.000E+00	1.428E-05	4.212E-05	6.887E-05	9.473E-05	1.198E-04	1.443E-04	1.620E-04
SE 79M	0.000E+00	5.500E+00	5.170E+00	4.902E+00	4.732E+00	4.615E+00	4.544E+00	4.565E+00
CU 80	0.000E+00	1.374E-02	1.260E-02	1.236E-02	1.261E-02	1.309E-02	1.369E-02	1.437E-02

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
 FISSION PRODUCTS
 POWER= 2.16550E+01 MW, BURNUP= 5.40006E+04 MWD, FLUX= 2.35E+14 N/CM**2-SEC

9 SUMMARY TABLE: THERMAL POWER, WATTS

	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
ZN 80	0.000E+00	3.789E+00	3.248E+00	2.968E+00	2.809E+00	2.703E+00	2.628E+00	2.626E+00
GA 80	0.000E+00	1.263E+02	1.061E+02	9.374E+01	8.490E+01	7.762E+01	7.138E+01	6.832E+01
GE 80	0.000E+00	1.151E+02	1.028E+02	9.390E+01	8.745E+01	8.220E+01	7.792E+01	7.619E+01
AS 80	0.000E+00	4.088E+02	3.797E+02	3.557E+02	3.387E+02	3.257E+02	3.162E+02	3.144E+02
BR 80	0.000E+00	1.106E-03	1.663E-03	1.957E-03	2.241E-03	2.559E-03	2.929E-03	3.259E-03
BR 80M	0.000E+00	6.812E-05	1.109E-04	1.321E-04	1.505E-04	1.691E-04	1.890E-04	2.058E-04
CU 81	0.000E+00	9.000E-04	8.446E-04	8.460E-04	8.799E-04	9.308E-04	9.897E-04	1.050E-03
ZN 81	0.000E+00	1.396E+00	1.226E+00	1.151E+00	1.122E+00	1.114E+00	1.119E+00	1.144E+00
GA 81	0.000E+00	5.727E+01	4.816E+01	4.287E+01	3.929E+01	3.648E+01	3.415E+01	3.317E+01
GE 81	0.000E+00	4.739E+02	4.084E+02	3.652E+02	3.338E+02	3.078E+02	2.858E+02	2.755E+02
AS 81	0.000E+00	3.555E+02	3.246E+02	3.011E+02	2.846E+02	2.716E+02	2.617E+02	2.589E+02
SE 81	0.000E+00	1.371E+02	1.263E+02	1.179E+02	1.119E+02	1.074E+02	1.040E+02	1.034E+02
SE 81M	0.000E+00	6.870E-01	6.201E-01	5.638E-01	5.204E-01	4.845E-01	4.557E-01	4.438E-01
ZN 82	0.000E+00	1.539E-01	1.384E-01	1.332E-01	1.333E-01	1.359E-01	1.398E-01	1.452E-01
GA 82	0.000E+00	3.398E+01	2.882E+01	2.603E+01	2.429E+01	2.302E+01	2.202E+01	2.173E+01
GE 82	0.000E+00	2.795E+02	2.340E+02	2.058E+02	1.854E+02	1.684E+02	1.537E+02	1.461E+02
AS 82	0.000E+00	7.579E+02	6.511E+02	5.814E+02	5.306E+02	4.884E+02	4.525E+02	4.351E+02
AS 82M	0.000E+00	4.643E+02	4.160E+02	3.802E+02	3.539E+02	3.322E+02	3.144E+02	3.070E+02
BR 82	0.000E+00	7.721E+00	2.071E+01	3.408E+01	4.952E+01	6.734E+01	8.727E+01	1.045E+02
BR 82M	0.000E+00	7.988E-02	2.166E-01	3.615E-01	5.301E-01	7.254E-01	9.442E-01	1.133E+00
ZN 83	0.000E+00	1.662E-02	1.517E-02	1.481E-02	1.503E-02	1.554E-02	1.620E-02	1.697E-02
GA 83	0.000E+00	8.452E+00	7.232E+00	6.602E+00	6.241E+00	6.003E+00	5.835E+00	5.829E+00
GE 83	0.000E+00	5.031E+02	4.165E+02	3.641E+02	3.264E+02	2.951E+02	2.680E+02	2.541E+02
AS 83	0.000E+00	1.096E+03	9.224E+02	8.102E+02	7.268E+02	6.560E+02	5.945E+02	5.620E+02
SE 83	0.000E+00	6.165E+02	5.583E+02	5.160E+02	4.861E+02	4.621E+02	4.431E+02	4.366E+02
SE 83M	0.000E+00	7.387E+02	6.487E+02	5.859E+02	5.417E+02	5.043E+02	4.729E+02	4.587E+02
BR 83	0.000E+00	1.791E+02	1.599E+02	1.462E+02	1.364E+02	1.285E+02	1.219E+02	1.193E+02
KR 83M	0.000E+00	2.221E+01	1.983E+01	1.815E+01	1.695E+01	1.598E+01	1.521E+01	1.492E+01
GA 84	0.000E+00	9.581E-01	8.848E-01	8.757E-01	8.994E-01	9.387E-01	9.849E-01	1.035E+00
GE 84	0.000E+00	1.061E+02	9.280E+01	8.681E+01	8.408E+01	8.268E+01	8.196E+01	8.279E+01
AS 84	0.000E+00	1.877E+03	1.586E+03	1.408E+03	1.281E+03	1.175E+03	1.083E+03	1.037E+03
SE 84	0.000E+00	9.206E+02	7.987E+02	7.158E+02	6.544E+02	6.029E+02	5.590E+02	5.377E+02
BR 84	0.000E+00	3.041E+03	2.653E+03	2.388E+03	2.189E+03	2.025E+03	1.885E+03	1.819E+03
BR 84M	0.000E+00	8.163E+01	8.863E+01	9.016E+01	9.181E+01	9.393E+01	9.673E+01	9.999E+01
GE 85	0.000E+00	4.392E+01	3.692E+01	3.300E+01	3.044E+01	2.849E+01	2.689E+01	2.629E+01
AS 85	0.000E+00	1.028E+03	8.498E+02	7.369E+02	6.543E+02	5.844E+02	5.232E+02	4.904E+02
SE 85	0.000E+00	2.045E+03	1.733E+03	1.524E+03	1.368E+03	1.234E+03	1.118E+03	1.057E+03
SE 85M	0.000E+00	1.544E+03	1.322E+03	1.169E+03	1.052E+03	9.531E+02	8.673E+02	8.225E+02
BR 85	0.000E+00	1.279E+03	1.111E+03	9.929E+02	9.042E+02	8.294E+02	7.657E+02	7.342E+02
KR 85	0.000E+00	2.407E+00	6.578E+00	1.006E+01	1.301E+01	1.548E+01	1.755E+01	1.886E+01
KR 85M	0.000E+00	5.131E+02	4.460E+02	3.989E+02	3.635E+02	3.338E+02	3.085E+02	2.962E+02

GE 86	0.000E+00	7.430E+00	6.274E+00	5.639E+00	5.239E+00	4.946E+00	4.718E+00	4.652E+00
AS 86	0.000E+00	7.647E+02	6.247E+02	5.377E+02	4.734E+02	4.189E+02	3.711E+02	3.452E+02
SE 86	0.000E+00	3.068E+03	2.552E+03	2.215E+03	1.960E+03	1.740E+03	1.547E+03	1.441E+03
BR 86	0.000E+00	4.678E+03	3.997E+03	3.533E+03	3.182E+03	2.883E+03	2.624E+03	2.489E+03
BR 86M	0.000E+00	4.399E+03	3.755E+03	3.316E+03	2.985E+03	2.702E+03	2.456E+03	2.328E+03
RB 86	0.000E+00	8.211E-01	2.205E+00	3.670E+00	5.387E+00	7.396E+00	9.674E+00	1.167E+01
RB 86M	0.000E+00	1.020E-01	2.062E-01	3.007E-01	4.072E-01	5.299E-01	6.681E-01	7.886E-01
GE 87	0.000E+00	1.443E+00	1.196E+00	1.051E+00	9.504E-01	8.719E-01	8.073E-01	7.800E-01
AS 87	0.000E+00	3.613E+02	2.897E+02	2.432E+02	2.076E+02	1.769E+02	1.498E+02	1.344E+02
SE 87	0.000E+00	4.052E+03	3.434E+03	3.024E+03	2.718E+03	2.459E+03	2.235E+03	2.119E+03

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
 FISSION PRODUCTS
 POWER= 2.16550E+01 MW, BURNUP= 5.40006E+04 MWD, FLUX= 2.35E+14 N/CM**2-SEC

9 SUMMARY TABLE: THERMAL POWER, WATTS

	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
BR 87	0.000E+00	8.082E+03	6.904E+03	6.102E+03	5.497E+03	4.981E+03	4.535E+03	4.302E+03
KR 87	0.000E+00	5.255E+03	4.497E+03	3.976E+03	3.582E+03	3.246E+03	2.955E+03	2.804E+03
SR 87M	0.000E+00	1.217E-03	2.613E-03	4.437E-03	7.415E-03	1.215E-02	1.929E-02	2.678E-02
GE 88	0.000E+00	3.211E-02	2.986E-02	2.965E-02	3.059E-02	3.211E-02	3.392E-02	3.585E-02
AS 88	0.000E+00	2.697E+01	2.333E+01	2.152E+01	2.058E+01	2.004E+01	1.972E+01	1.987E+01
SE 88	0.000E+00	1.360E+03	1.136E+03	9.988E+02	9.010E+02	8.201E+02	7.504E+02	7.156E+02
BR 88	0.000E+00	6.017E+03	5.028E+03	4.366E+03	3.861E+03	3.427E+03	3.047E+03	2.839E+03
KR 88	0.000E+00	8.126E+03	6.947E+03	6.134E+03	5.516E+03	4.989E+03	4.535E+03	4.298E+03
RB 88	0.000E+00	9.499E+03	8.139E+03	7.199E+03	6.486E+03	5.880E+03	5.360E+03	5.092E+03
AS 89	0.000E+00	2.370E+00	2.104E+00	1.997E+00	1.969E+00	1.980E+00	2.010E+00	2.071E+00
SE 89	0.000E+00	5.137E+02	4.307E+02	3.828E+02	3.504E+02	3.248E+02	3.035E+02	2.944E+02
BR 89	0.000E+00	8.569E+03	6.987E+03	5.953E+03	5.161E+03	4.476E+03	3.869E+03	3.524E+03
KR 89	0.000E+00	1.412E+04	1.193E+04	1.043E+04	9.289E+03	8.309E+03	7.457E+03	6.999E+03
RB 89	0.000E+00	1.427E+04	1.217E+04	1.072E+04	9.611E+03	8.665E+03	7.849E+03	7.420E+03
SR 89	0.000E+00	2.574E+03	2.368E+03	2.090E+03	1.877E+03	1.692E+03	1.529E+03	1.440E+03
Y 89M	0.000E+00	7.045E-04	1.133E-03	1.340E-03	1.512E-03	1.680E-03	1.855E-03	1.998E-03
SE 90	0.000E+00	1.544E+02	1.268E+02	1.099E+02	9.788E+01	8.800E+01	7.958E+01	7.540E+01
BR 90	0.000E+00	6.743E+03	5.423E+03	4.562E+03	3.899E+03	3.324E+03	2.813E+03	2.518E+03
KR 90	0.000E+00	1.135E+04	9.563E+03	8.394E+03	7.433E+03	6.642E+03	5.952E+03	5.578E+03
RB 90	0.000E+00	1.824E+04	1.546E+04	1.355E+04	1.209E+04	1.084E+04	9.759E+03	9.178E+03
RB 90M	0.000E+00	4.314E+03	3.803E+03	3.426E+03	3.141E+03	2.901E+03	2.699E+03	2.604E+03
SR 90	0.000E+00	1.447E+01	3.992E+01	6.183E+01	8.092E+01	9.749E+01	1.118E+02	1.210E+02
Y 90	0.000E+00	7.026E+01	1.944E+02	3.017E+02	3.959E+02	4.786E+02	5.508E+02	5.982E+02
Y 90M	0.000E+00	1.738E-02	2.662E-02	3.169E-02	3.637E-02	4.123E-02	4.643E-02	5.084E-02
SE 91	0.000E+00	2.676E+01	2.286E+01	2.079E+01	1.959E+01	1.881E+01	1.828E+01	1.829E+01
BR 91	0.000E+00	2.093E+03	1.700E+03	1.452E+03	1.266E+03	1.109E+03	9.718E+02	8.969E+02
KR 91	0.000E+00	1.078E+04	9.039E+03	7.898E+03	7.039E+03	6.305E+03	5.663E+03	5.317E+03
RB 91	0.000E+00	2.212E+04	1.899E+04	1.684E+04	1.522E+04	1.384E+04	1.266E+04	1.205E+04
SR 91	0.000E+00	7.695E+03	6.668E+03	5.994E+03	5.417E+03	4.964E+03	4.577E+03	4.385E+03
Y 91	0.000E+00	3.187E+03	3.087E+03	2.766E+03	2.519E+03	2.307E+03	2.121E+03	2.022E+03
Y 91M	0.000E+00	1.841E+03	1.596E+03	1.425E+03	1.297E+03	1.188E+03	1.096E+03	1.050E+03
SE 92	0.000E+00	8.125E-01	7.760E-01	7.914E-01	8.359E-01	8.949E-01	9.599E-01	1.023E+00
BR 92	0.000E+00	1.837E+02	1.652E+02	1.591E+02	1.585E+02	1.603E+02	1.631E+02	1.676E+02
KR 92	0.000E+00	4.763E+03	4.052E+03	3.619E+03	3.312E+03	3.057E+03	2.836E+03	2.726E+03
RB 92	0.000E+00	1.732E+04	1.496E+04	1.379E+04	1.220E+04	1.120E+04	1.034E+04	9.906E+03
SR 92	0.000E+00	9.059E+03	7.978E+03	7.219E+03	6.656E+03	6.186E+03	5.789E+03	5.605E+03
Y 92	0.000E+00	1.005E+04	8.854E+03	8.015E+03	7.394E+03	6.876E+03	6.439E+03	6.237E+03
BR 93	0.000E+00	3.791E+01	3.264E+01	3.005E+01	2.863E+01	2.771E+01	2.705E+01	2.706E+01
KR 93	0.000E+00	2.529E+03	2.160E+03	1.955E+03	1.820E+03	1.710E+03	1.616E+03	1.574E+03
RB 93	0.000E+00	1.197E+04	1.034E+04	9.292E+03	8.536E+03	7.899E+03	7.348E+03	7.074E+03
SR 93	0.000E+00	1.630E+04	1.461E+04	1.342E+04	1.256E+04	1.185E+04	1.126E+04	1.102E+04

Y 93	0.000E+00	8.192E+03	7.367E+03	6.778E+03	6.354E+03	6.006E+03	5.721E+03	5.607E+03
ZR 93	0.000E+00	3.212E-05	9.222E-05	1.476E-04	1.992E-04	2.473E-04	2.920E-04	3.229E-04
BR 94	0.000E+00	3.788E+00	3.327E+00	3.130E+00	3.054E+00	3.031E+00	3.033E+00	3.087E+00
KR 94	0.000E+00	8.542E+02	7.010E+02	6.070E+02	5.376E+02	4.784E+02	4.259E+02	3.968E+02
RB 94	0.000E+00	8.390E+03	7.292E+03	6.619E+03	6.149E+03	5.758E+03	5.420E+03	5.261E+03
SR 94	0.000E+00	1.249E+04	1.127E+04	1.041E+04	9.798E+03	9.294E+03	8.881E+03	8.719E+03
Y 94	0.000E+00	1.775E+04	1.621E+04	1.507E+04	1.427E+04	1.362E+04	1.310E+04	1.292E+04
NB 94M	0.000E+00	7.363E-05	1.255E-04	1.509E-04	1.721E-04	1.928E-04	2.140E-04	2.313E-04
BR 95	0.000E+00	1.925E-01	1.861E-01	1.920E-01	2.049E-01	2.211E-01	2.386E-01	2.551E-01
KR 95	0.000E+00	1.046E+02	9.690E+01	9.624E+01	9.890E+01	1.029E+02	1.074E+02	1.121E+02

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
 FISSION PRODUCTS
 POWER= 2.16550E+01 MW, BURNUP= 5.40006E+04 MWD, FLUX= 2.35E+14 N/CM**2-SEC

9 SUMMARY TABLE: THERMAL POWER, WATTS

	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
RB 95	0.000E+00	4.178E+03	3.556E+03	3.190E+03	2.937E+03	2.727E+03	2.546E+03	2.459E+03
SR 95	0.000E+00	1.814E+04	1.630E+04	1.506E+04	1.421E+04	1.350E+04	1.293E+04	1.270E+04
Y 95	0.000E+00	1.466E+04	1.354E+04	1.273E+04	1.218E+04	1.174E+04	1.141E+04	1.133E+04
ZR 95	0.000E+00	5.042E+03	5.342E+03	5.058E+03	4.851E+03	4.680E+03	4.539E+03	4.491E+03
NB 95	0.000E+00	4.160E+03	5.133E+03	4.868E+03	4.668E+03	4.503E+03	4.366E+03	4.284E+03
NB 95M	0.000E+00	9.729E+00	1.033E+01	9.791E+00	9.399E+00	9.077E+00	8.812E+00	8.740E+00
BR 96	0.000E+00	1.277E-02	1.237E-02	1.275E-02	1.360E-02	1.470E-02	1.590E-02	1.705E-02
KR 96	0.000E+00	1.393E+01	1.274E+01	1.247E+01	1.266E+01	1.305E+01	1.352E+01	1.408E+01
RB 96	0.000E+00	1.430E+03	1.259E+03	1.176E+03	1.131E+03	1.101E+03	1.079E+03	1.078E+03
SR 96	0.000E+00	9.455E+03	8.448E+03	7.816E+03	7.389E+03	7.041E+03	6.750E+03	6.635E+03
Y 96	0.000E+00	2.391E+04	2.213E+04	2.086E+04	2.003E+04	1.938E+04	1.888E+04	1.877E+04
NB 96	0.000E+00	1.328E+01	1.799E+01	2.002E+01	2.245E+01	2.496E+01	2.742E+01	2.943E+01
KR 97	0.000E+00	9.494E-01	9.292E-01	9.708E-01	1.045E+00	1.134E+00	1.226E+00	1.310E+00
RB 97	0.000E+00	2.249E+02	1.988E+02	1.874E+02	1.822E+02	1.792E+02	1.772E+02	1.781E+02
SR 97	0.000E+00	8.410E+03	7.472E+03	6.936E+03	6.595E+03	6.324E+03	6.098E+03	6.017E+03
Y 97	0.000E+00	1.626E+04	1.507E+04	1.428E+04	1.379E+04	1.341E+04	1.312E+04	1.308E+04
ZR 97	0.000E+00	5.457E+03	5.210E+03	5.021E+03	4.918E+03	4.853E+03	4.822E+03	4.860E+03
NB 97	0.000E+00	7.009E+03	6.703E+03	6.465E+03	6.337E+03	6.258E+03	6.221E+03	6.274E+03
NB 97M	0.000E+00	4.369E+03	4.173E+03	4.022E+03	3.940E+03	3.889E+03	3.864E+03	3.895E+03
KR 98	0.000E+00	9.413E-02	9.096E-02	9.361E-02	9.972E-02	1.076E-01	1.163E-01	1.245E-01
RB 98	0.000E+00	5.772E+01	5.253E+01	5.115E+01	5.159E+01	5.283E+01	5.442E+01	5.641E+01
SR 98	0.000E+00	2.481E+03	2.196E+03	2.052E+03	1.971E+03	1.913E+03	1.868E+03	1.860E+03
Y 98	0.000E+00	1.810E+04	1.661E+04	1.571E+04	1.516E+04	1.475E+04	1.442E+04	1.436E+04
ZR 98	0.000E+00	5.563E+03	5.347E+03	5.180E+03	5.095E+03	5.045E+03	5.023E+03	5.066E+03
NB 98	0.000E+00	1.296E+04	1.250E+04	1.213E+04	1.194E+04	1.184E+04	1.181E+04	1.192E+04
NB 98M	0.000E+00	1.233E+02	1.535E+02	1.670E+02	1.789E+02	1.907E+02	2.034E+02	2.146E+02
RB 99	0.000E+00	4.695E+00	4.361E+00	4.344E+00	4.481E+00	4.684E+00	4.913E+00	5.152E+00
SR 99	0.000E+00	1.026E+03	9.210E+02	8.818E+02	8.714E+02	8.714E+02	8.758E+02	8.906E+02
Y 99	0.000E+00	8.070E+03	7.341E+03	6.963E+03	6.760E+03	6.614E+03	6.500E+03	6.492E+03
ZR 99	0.000E+00	1.468E+04	1.409E+04	1.367E+04	1.348E+04	1.337E+04	1.333E+04	1.345E+04
NB 99	0.000E+00	9.741E+03	9.400E+03	9.153E+03	9.046E+03	8.994E+03	8.986E+03	9.079E+03
NB 99M	0.000E+00	3.983E+02	4.548E+02	4.777E+02	4.991E+02	5.215E+02	5.461E+02	5.694E+02
MO 99	0.000E+00	3.506E+03	3.431E+03	3.383E+03	3.392E+03	3.428E+03	3.490E+03	3.579E+03
TC 99	0.000E+00	9.375E-04	2.785E-03	4.515E-03	6.123E-03	7.591E-03	8.907E-03	9.772E-03
TC 99M	0.000E+00	8.055E+02	7.883E+02	7.774E+02	7.794E+02	7.878E+02	8.018E+02	8.225E+02
RB100	0.000E+00	5.032E-01	4.871E-01	5.032E-01	5.372E-01	5.800E-01	6.261E-01	6.692E-01
SR100	0.000E+00	1.410E+02	1.290E+02	1.264E+02	1.280E+02	1.312E+02	1.350E+02	1.395E+02
Y100	0.000E+00	5.652E+03	5.111E+03	4.853E+03	4.726E+03	4.642E+03	4.578E+03	4.585E+03
ZR100	0.000E+00	7.759E+03	7.405E+03	7.168E+03	7.053E+03	6.982E+03	6.947E+03	6.999E+03
NB100	0.000E+00	1.349E+04	1.320E+04	1.293E+04	1.285E+04	1.283E+04	1.288E+04	1.306E+04
NB100M	0.000E+00	1.181E+04	1.155E+04	1.132E+04	1.124E+04	1.123E+04	1.128E+04	1.143E+04

TC100	0.000E+00	2.571E+02	7.746E+02	1.345E+03	2.015E+03	2.789E+03	3.647E+03	4.378E+03
SR101	0.000E+00	3.010E+01	2.761E+01	2.721E+01	2.775E+01	2.869E+01	2.976E+01	3.096E+01
Y101	0.000E+00	1.454E+03	1.301E+03	1.237E+03	1.212E+03	1.198E+03	1.189E+03	1.196E+03
ZR101	0.000E+00	1.160E+04	1.087E+04	1.049E+04	1.032E+04	1.021E+04	1.014E+04	1.020E+04
NB101	0.000E+00	1.219E+04	1.198E+04	1.184E+04	1.185E+04	1.192E+04	1.204E+04	1.225E+04
MO101	0.000E+00	1.091E+04	1.087E+04	1.083E+04	1.092E+04	1.106E+04	1.125E+04	1.150E+04
TC101	0.000E+00	4.583E+03	4.570E+03	4.552E+03	4.590E+03	4.650E+03	4.729E+03	4.835E+03
SR102	0.000E+00	2.007E+00	1.892E+00	1.916E+00	2.005E+00	2.121E+00	2.245E+00	2.366E+00
Y102	0.000E+00	4.746E+02	4.346E+02	4.255E+02	4.292E+02	4.366E+02	4.448E+02	4.555E+02
ZR102	0.000E+00	4.330E+03	4.090E+03	4.012E+03	4.016E+03	4.040E+03	4.069E+03	4.126E+03

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
 FISSION PRODUCTS
 POWER= 2.16550E+01 MW, BURNUP= 5.40006E+04 MWD, FLUX= 2.35E+14 N/CM**2-SEC

9 SUMMARY TABLE: THERMAL POWER, WATTS

	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
NB102	0.000E+00	1.814E+04	1.820E+04	1.832E+04	1.865E+04	1.904E+04	1.947E+04	1.994E+04
MO102	0.000E+00	1.534E+03	1.585E+03	1.617E+03	1.662E+03	1.711E+03	1.763E+03	1.816E+03
TC102	0.000E+00	8.590E+03	8.877E+03	9.054E+03	9.308E+03	9.583E+03	9.877E+03	1.017E+04
TC102M	0.000E+00	9.446E+00	1.458E+01	1.711E+01	1.924E+01	2.132E+01	2.345E+01	2.519E+01
RH102	0.000E+00	1.506E-04	1.959E-03	5.442E-03	1.034E-02	1.638E-02	2.321E-02	2.822E-02
SR103	0.000E+00	8.644E-02	8.420E-02	8.826E-02	9.511E-02	1.029E-01	1.108E-01	1.177E-01
Y103	0.000E+00	4.807E+01	4.597E+01	4.722E+01	4.978E+01	5.264E+01	5.543E+01	5.790E+01
ZR103	0.000E+00	2.712E+03	2.641E+03	2.684E+03	2.778E+03	2.878E+03	2.973E+03	3.060E+03
NB103	0.000E+00	8.377E+03	8.775E+03	9.118E+03	9.533E+03	9.952E+03	1.037E+04	1.074E+04
MO103	0.000E+00	9.209E+03	1.029E+04	1.094E+04	1.161E+04	1.227E+04	1.294E+04	1.351E+04
TC103	0.000E+00	4.974E+03	5.576E+03	5.939E+03	6.308E+03	6.669E+03	7.035E+03	7.351E+03
RH103	0.000E+00	2.154E+03	2.567E+03	2.739E+03	2.914E+03	3.090E+03	3.269E+03	3.422E+03
RH103M	0.000E+00	1.334E+02	1.591E+02	1.697E+02	1.806E+02	1.915E+02	2.025E+02	2.120E+02
SR104	0.000E+00	2.513E-03	2.597E-03	2.882E-03	3.248E-03	3.633E-03	4.006E-03	4.309E-03
Y104	0.000E+00	4.641E+00	4.771E+00	5.302E+00	5.957E+00	6.608E+00	7.207E+00	7.665E+00
ZR104	0.000E+00	3.646E+02	3.763E+02	4.128E+02	4.559E+02	4.968E+02	5.330E+02	5.595E+02
NB104	0.000E+00	5.587E+03	6.121E+03	6.706E+03	7.329E+03	7.913E+03	8.445E+03	8.847E+03
MO104	0.000E+00	2.749E+03	3.327E+03	3.728E+03	4.112E+03	4.476E+03	4.823E+03	5.093E+03
TC104	0.000E+00	1.023E+04	1.254E+04	1.410E+04	1.557E+04	1.697E+04	1.832E+04	1.936E+04
RH104	0.000E+00	3.085E+02	1.179E+03	2.081E+03	3.028E+03	3.979E+03	4.871E+03	5.499E+03
RH104M	0.000E+00	2.82E+00	1.080E+01	1.907E+01	2.774E+01	3.646E+01	4.462E+01	5.037E+01
Y105	0.000E+00	2.431E-01	2.358E-01	2.499E-01	2.705E-01	2.914E-01	3.103E-01	3.252E-01
ZR105	0.000E+00	8.018E+01	8.309E+01	9.249E+01	1.034E+02	1.136E+02	1.225E+02	1.288E+02
NB105	0.000E+00	1.274E+03	1.463E+03	1.677E+03	1.895E+03	2.095E+03	2.274E+03	2.401E+03
MO105	0.000E+00	4.973E+03	6.529E+03	7.642E+03	8.681E+03	9.650E+03	1.056E+04	1.124E+04
TC105	0.000E+00	3.495E+03	4.758E+03	5.606E+03	6.385E+03	7.114E+03	7.806E+03	8.328E+03
RH105	0.000E+00	2.242E+03	3.065E+03	3.620E+03	4.113E+03	4.618E+03	5.084E+03	5.440E+03
RH105	0.000E+00	4.224E+02	5.766E+02	6.790E+02	7.719E+02	8.580E+02	9.393E+02	1.000E+03
RH105M	0.000E+00	6.833E+01	9.343E+01	1.103E+02	1.260E+02	1.408E+02	1.550E+02	1.658E+02
ZR106	0.000E+00	1.070E+01	9.736E+00	9.726E+00	9.970E+00	1.020E+01	1.035E+01	1.047E+01
NB106	0.000E+00	5.574E+02	6.010E+02	6.822E+02	7.689E+02	8.459E+02	9.103E+02	9.528E+02
MO106	0.000E+00	1.267E+03	1.791E+03	2.233E+03	2.647E+03	3.021E+03	3.356E+03	3.587E+03
TC106	0.000E+00	3.970E+03	6.151E+03	7.757E+03	9.219E+03	1.055E+04	1.178E+04	1.266E+04
RH106	0.000E+00	2.802E+00	9.464E+00	1.556E+01	2.093E+01	2.566E+01	2.988E+01	3.268E+01
RH106	0.000E+00	5.286E+02	1.633E+03	2.644E+03	3.544E+03	4.349E+03	5.074E+03	5.568E+03
RH106M	0.000E+00	6.845E+01	9.494E+01	1.197E+02	1.503E+02	1.865E+02	2.275E+02	2.649E+02
Y107	0.000E+00	2.927E-04	2.452E-04	2.202E-04	2.040E-04	1.908E-04	1.792E-04	1.736E-04
ZR107	0.000E+00	7.807E+01	6.981E-01	6.858E-01	6.933E-01	7.016E-01	7.059E-01	7.111E-01
NB107	0.000E+00	6.942E+01	7.359E+01	8.499E+01	9.723E+01	1.079E+02	1.164E+02	1.216E+02
MO107	0.000E+00	8.726E+02	1.228E+03	1.612E+03	1.979E+03	2.301E+03	2.574E+03	2.748E+03
TC107	0.000E+00	1.352E+03	2.214E+03	2.954E+03	3.637E+03	4.245E+03	4.780E+03	5.138E+03

RUI07	0.000E+00	1.029E+03	1.808E+03	2.371E+03	2.877E+03	3.337E+03	3.758E+03	4.055E+03
RHI07	0.000E+00	5.744E+02	1.010E+03	1.325E+03	1.607E+03	1.864E+03	2.099E+03	2.265E+03
PDJ07M	0.000E+00	1.348E-03	8.277E-03	2.278E-02	4.756E-02	8.559E-02	1.397E-01	1.938E-01
ZRI08	0.000E+00	1.313E-01	1.303E-01	1.369E-01	1.486E-01	1.631E-01	1.788E-01	1.934E-01
NBI08	0.000E+00	2.479E+01	2.484E+01	2.631E+01	2.862E+01	3.130E+01	3.410E+01	3.658E+01
MOI08	0.000E+00	2.343E+02	2.937E+02	3.545E+02	4.155E+02	4.725E+02	5.243E+02	5.615E+02
TCI08	0.000E+00	1.273E+03	2.146E+03	2.842E+03	3.479E+03	4.054E+03	4.570E+03	4.925E+03
RUI08	0.000E+00	2.303E+02	4.277E+02	5.729E+02	7.031E+02	8.209E+02	9.280E+02	1.003E+03
RHI08	0.000E+00	1.050E+03	1.952E+03	2.614E+03	3.208E+03	3.745E+03	4.233E+03	4.574E+03
RHI08M	0.000E+00	1.210E+01	2.567E+01	3.394E+01	4.107E+01	4.765E+01	5.392E+01	5.853E+01

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL

FISSION PRODUCTS

POWER= 2.16550E+01 MW, BURNUP= 5.40006E+04 MWD, FLUX= 2.35E+14 N/CM**2-SEC

9 SUMMARY TABLE: THERMAL POWER, WATTS

	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
AG108	0.000E+00	1.394E-04	7.014E-04	1.561E-03	2.740E-03	4.236E-03	6.007E-03	7.552E-03
ZR109	0.000E+00	1.296E-02	1.310E-02	1.394E-02	1.530E-02	1.695E-02	1.872E-02	2.034E-02
NB109	0.000E+00	3.733E+00	3.876E+00	4.168E+00	4.590E+00	5.089E+00	5.620E+00	6.097E+00
MO109	0.000E+00	1.358E+02	1.690E+02	1.954E+02	2.228E+02	2.508E+02	2.786E+02	3.012E+02
TC109	0.000E+00	5.217E+02	8.515E+02	1.084E+03	1.296E+03	1.493E+03	1.678E+03	1.814E+03
RUI09	0.000E+00	6.632E+02	1.230E+03	1.635E+03	1.999E+03	2.330E+03	2.633E+03	2.848E+03
RH109	0.000E+00	3.656E+02	6.826E+02	9.102E+02	1.114E+03	1.299E+03	1.470E+03	1.589E+03
RH109M	0.000E+00	3.585E+01	6.692E+01	8.923E+01	1.092E+02	1.274E+02	1.441E+02	1.558E+02
PD109	0.000E+00	1.319E+02	2.572E+02	3.603E+02	4.667E+02	5.805E+02	7.039E+02	8.059E+02
PD109M	0.000E+00	2.698E+01	5.045E+01	6.738E+01	8.263E+01	9.661E+01	1.095E+02	1.188E+02
AG109M	0.000E+00	2.555E+01	4.983E+01	6.981E+01	9.043E+01	1.125E+02	1.364E+02	1.561E+02
NB110	0.000E+00	5.808E-01	5.866E-01	6.246E-01	6.852E-01	7.589E-01	8.382E-01	9.102E-01
MO110	0.000E+00	2.688E+01	2.822E+01	3.067E+01	3.400E+01	3.780E+01	4.175E+01	4.520E+01
TC110	0.000E+00	2.667E+02	3.492E+02	4.208E+02	4.921E+02	5.610E+02	6.262E+02	6.755E+02
RUI10	0.000E+00	2.124E+02	3.560E+02	4.659E+02	5.665E+02	6.583E+02	7.421E+02	8.011E+02
RH110	0.000E+00	5.267E+02	8.951E+02	1.176E+03	1.432E+03	1.665E+03	1.878E+03	2.028E+03
RH110M	0.000E+00	1.965E+01	4.173E+01	5.767E+01	7.179E+01	8.445E+01	9.589E+01	1.038E+02
AG110	0.000E+00	2.690E+01	1.362E+02	3.031E+02	5.316E+02	8.204E+02	1.161E+03	1.457E+03
AG110M	0.000E+00	6.257E-01	6.948E+00	2.035E+01	4.074E+01	6.789E+01	1.010E+02	1.288E+02
NB111	0.000E+00	4.277E-02	4.315E-02	4.594E-02	5.042E-02	5.587E-02	6.175E-02	6.709E-02
MO111	0.000E+00	9.106E+00	9.255E+00	9.899E+00	1.089E+01	1.208E+01	1.335E+01	1.449E+01
TC111	0.000E+00	9.170E+01	1.021E+02	1.148E+02	1.297E+02	1.455E+02	1.613E+02	1.742E+02
RUI11	0.000E+00	2.537E+02	3.577E+02	4.439E+02	5.265E+02	6.038E+02	6.754E+02	7.276E+02
RH111	0.000E+00	2.202E+02	3.303E+02	4.187E+02	5.017E+02	5.783E+02	6.486E+02	6.990E+02
PD111	0.000E+00	8.780E+01	1.326E+02	1.687E+02	2.029E+02	2.350E+02	2.650E+02	2.870E+02
PD111M	0.000E+00	6.211E-01	1.155E+00	1.567E+00	1.967E+00	2.371E+00	2.785E+00	3.115E+00
AG111	0.000E+00	3.710E+01	5.610E+01	7.151E+01	8.621E+01	1.001E+02	1.133E+02	1.230E+02
AG111M	0.000E+00	6.334E+00	9.574E+00	1.220E+01	1.469E+01	1.704E+01	1.925E+01	2.088E+01
CD111M	0.000E+00	1.605E-04	2.397E-03	9.455E-03	2.521E-02	5.496E-02	1.047E-01	1.601E-01
MO112	0.000E+00	1.329E+00	1.343E+00	1.431E+00	1.572E+00	1.742E+00	1.924E+00	2.090E+00
TC112	0.000E+00	5.051E+01	5.228E+01	5.661E+01	6.271E+01	6.971E+01	7.700E+01	8.339E+01
RUI12	0.000E+00	9.921E+01	1.170E+02	1.356E+02	1.556E+02	1.756E+02	1.947E+02	2.096E+02
RH112	0.000E+00	2.548E+02	3.264E+02	3.908E+02	4.553E+02	5.170E+02	5.750E+02	6.183E+02
PD112	0.000E+00	1.012E+01	1.319E+01	1.587E+01	1.853E+01	2.106E+01	2.344E+01	2.521E+01
AG112	0.000E+00	1.371E+02	1.785E+02	2.148E+02	2.507E+02	2.851E+02	3.173E+02	3.413E+02
MO113	0.000E+00	1.398E-01	1.411E-01	1.504E-01	1.651E-01	1.830E-01	2.022E-01	2.196E-01
TC113	0.000E+00	1.135E+01	1.155E+01	1.240E+01	1.367E+01	1.516E+01	1.673E+01	1.813E+01
RUI13	0.000E+00	1.142E+02	1.231E+02	1.366E+02	1.531E+02	1.706E+02	1.880E+02	2.025E+02
RH113	0.000E+00	1.543E+02	1.811E+02	2.085E+02	2.378E+02	2.668E+02	2.946E+02	3.163E+02
PD113	0.000E+00	1.150E+02	1.407E+02	1.641E+02	1.881E+02	2.116E+02	2.340E+02	2.513E+02
AG113	0.000E+00	5.492E+01	6.722E+01	7.841E+01	8.990E+01	1.011E+02	1.119E+02	1.201E+02

AG113M	0.000E+00	6.896E+00	8.468E+00	9.886E+00	1.134E+01	1.276E+01	1.411E+01	1.515E+01
CD113M	0.000E+00	6.974E-03	2.454E-02	4.714E-02	7.592E-02	1.123E-01	1.580E-01	1.986E-01
MO114	0.000E+00	1.161E-02	1.171E-02	1.247E-02	1.368E-02	1.516E-02	1.675E-02	1.820E-02
TC114	0.000E+00	3.580E+00	3.611E+00	3.847E+00	4.222E+00	4.675E+00	5.159E+00	5.598E+00
RU114	0.000E+00	4.163E+01	4.246E+01	4.559E+01	5.014E+01	5.539E+01	6.085E+01	6.565E+01
RH114	0.000E+00	1.696E+02	1.822E+02	2.000E+02	2.217E+02	2.448E+02	2.678E+02	2.870E+02
PD114	0.000E+00	5.408E+01	6.156E+01	6.889E+01	7.694E+01	8.515E+01	9.320E+01	9.973E+01
AG114	0.000E+00	9.533E+01	1.089E+02	1.220E+02	1.363E+02	1.509E+02	1.652E+02	1.768E+02
IN114	0.000E+00	2.830E-04	3.194E-03	1.059E-02	2.495E-02	4.958E-02	8.836E-02	1.302E-01
IN114M	0.000E+00	2.210E-05	3.327E-04	1.172E-03	2.833E-03	5.712E-03	1.027E-02	1.520E-02

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
 FISSION PRODUCTS
 POWER= 2.16550E+01 MW, BURNUP= 5.40006E+04 MWD, FLUX= 2.35E+14 N/CM**2-SEC

9 SUMMARY TABLE: THERMAL POWER, WATTS

	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
M0115	0.000E+00	1.075E-03	1.084E-03	1.154E-03	1.267E-03	1.404E-03	1.551E-03	1.686E-03
TC115	0.000E+00	6.399E-01	6.453E-01	6.870E-01	7.538E-01	8.351E-01	9.224E-01	1.002E+00
RU115	0.000E+00	3.290E+01	3.321E+01	3.537E+01	3.878E+01	4.285E+01	4.719E+01	5.111E+01
RH115	0.000E+00	1.069E+02	1.102E+02	1.183E+02	1.297E+02	1.428E+02	1.563E+02	1.682E+02
PD115	0.000E+00	1.229E+02	1.337E+02	1.462E+02	1.612E+02	1.773E+02	1.936E+02	2.075E+02
AG115	0.000E+00	6.129E+01	6.697E+01	7.328E+01	8.082E+01	8.889E+01	9.706E+01	1.040E+02
AG115M	0.000E+00	2.577E+01	2.841E+01	3.118E+01	3.442E+01	3.788E+01	4.137E+01	4.432E+01
CD115	0.000E+00	2.406E+01	2.660E+01	2.945E+01	3.292E+01	3.678E+01	4.087E+01	4.443E+01
CD115M	0.000E+00	2.570E+00	3.013E+00	3.351E+00	3.744E+00	4.170E+00	4.614E+00	4.993E+00
IN115M	0.000E+00	1.515E+01	1.675E+01	1.854E+01	2.072E+01	2.315E+01	2.572E+01	2.796E+01
TC116	0.000E+00	5.164E-02	5.205E-02	5.539E-02	6.076E-02	6.730E-02	7.434E-02	8.074E-02
RU116	0.000E+00	5.654E+00	5.692E+00	6.049E+00	6.623E+00	7.318E+00	8.062E+00	8.738E+00
RH116	0.000E+00	7.985E+01	8.097E+01	8.593E+01	9.357E+01	1.026E+02	1.121E+02	1.207E+02
PD116	0.000E+00	6.067E+01	6.424E+01	6.874E+01	7.459E+01	8.110E+01	8.785E+01	9.379E+01
AG116	0.000E+00	7.232E+01	7.780E+01	8.362E+01	9.085E+01	9.879E+01	1.070E+02	1.142E+02
AG116M	0.000E+00	8.470E+01	9.113E+01	9.794E+01	1.064E+02	1.157E+02	1.253E+02	1.337E+02
IN116	0.000E+00	1.441E+01	3.176E+01	4.213E+01	5.026E+01	5.751E+01	6.435E+01	7.015E+01
IN116M	0.000E+00	2.082E+01	4.590E+01	6.088E+01	7.263E+01	8.310E+01	9.299E+01	1.014E+02
TC117	0.000E+00	1.900E-03	1.904E-03	2.016E-03	2.202E-03	2.431E-03	2.679E-03	2.906E-03
RU117	0.000E+00	1.434E+00	1.399E+00	1.449E+00	1.553E+00	1.687E+00	1.834E+00	1.974E+00
RH117	0.000E+00	4.837E+01	4.421E+01	4.295E+01	4.330E+01	4.447E+01	4.607E+01	4.809E+01
PD117	0.000E+00	1.272E+02	1.289E+02	1.343E+02	1.431E+02	1.535E+02	1.648E+02	1.752E+02
AG117	0.000E+00	5.263E+01	5.608E+01	5.984E+01	6.470E+01	7.016E+01	7.589E+01	8.098E+01
AG117M	0.000E+00	5.518E+01	5.880E+01	6.274E+01	6.784E+01	7.356E+01	7.957E+01	8.491E+01
CD117	0.000E+00	3.377E+01	3.620E+01	3.876E+01	4.202E+01	4.567E+01	4.952E+01	5.294E+01
CD117M	0.000E+00	2.061E+01	2.217E+01	2.375E+01	2.573E+01	2.795E+01	3.027E+01	3.232E+01
IN117	0.000E+00	1.947E+01	2.091E+01	2.239E+01	2.427E+01	2.637E+01	2.857E+01	3.053E+01
IN117M	0.000E+00	2.068E+01	2.218E+01	2.375E+01	2.575E+01	2.798E+01	3.033E+01	3.242E+01
SN117M	0.000E+00	2.438E-03	1.843E-02	4.673E-02	8.907E-02	1.482E-01	2.261E-01	3.007E-01
RU118	0.000E+00	6.503E+00	6.560E+00	6.982E+00	7.663E+00	8.492E+00	9.385E+00	1.020E+01
RH118	0.000E+00	7.712E+01	7.778E+01	8.276E+01	9.076E+01	1.005E+02	1.110E+02	1.205E+02
PD118	0.000E+00	6.577E+01	6.737E+01	7.165E+01	7.797E+01	8.535E+01	9.314E+01	1.001E+02
AG118	0.000E+00	9.440E+01	9.820E+01	1.035E+02	1.110E+02	1.196E+02	1.286E+02	1.368E+02
AG118M	0.000E+00	4.068E+01	4.337E+01	4.649E+01	5.051E+01	5.498E+01	5.965E+01	6.376E+01
CD118	0.000E+00	1.894E+01	2.016E+01	2.146E+01	2.314E+01	2.502E+01	2.700E+01	2.876E+01
IN118	0.000E+00	8.792E+01	9.358E+01	9.962E+01	1.074E+02	1.162E+02	1.253E+02	1.335E+02
IN118M	0.000E+00	3.338E-02	5.305E-02	6.284E-02	7.109E-02	7.910E-02	8.729E-02	9.394E-02
RH119	0.000E+00	3.972E+00	4.615E+00	5.141E+00	5.744E+00	6.407E+00	7.102E+00	7.703E+00
PD119	0.000E+00	7.709E+01	8.757E+01	9.653E+01	1.069E+02	1.182E+02	1.301E+02	1.403E+02
AG119	0.000E+00	1.175E+02	1.284E+02	1.387E+02	1.513E+02	1.651E+02	1.795E+02	1.922E+02
CD119	0.000E+00	3.900E+01	4.184E+01	4.474E+01	4.838E+01	5.244E+01	5.669E+01	6.044E+01

CDI19M	0.000E+00	4.351E+01	4.668E+01	4.991E+01	5.398E+01	5.851E+01	6.324E+01	6.744E+01
INI19	0.000E+00	1.640E+01	1.758E+01	1.879E+01	2.032E+01	2.202E+01	2.380E+01	2.537E+01
INI19M	0.000E+00	4.511E+01	4.838E+01	5.172E+01	5.594E+01	6.063E+01	6.552E+01	6.987E+01
SN119M	0.000E+00	2.268E-02	4.817E-02	6.303E-02	7.595E-02	8.990E-02	1.059E-01	1.194E-01
RU120	0.000E+00	1.631E-03	1.646E-03	1.755E-03	1.927E-03	2.137E-03	2.361E-03	2.565E-03
RH120	0.000E+00	1.034E+00	1.043E+00	1.112E+00	1.221E+00	1.353E+00	1.492E+00	1.619E+00
PD120	0.000E+00	2.378E+01	2.397E+01	2.547E+01	2.783E+01	3.062E+01	3.358E+01	3.624E+01
AG120	0.000E+00	7.212E+01	7.387E+01	7.819E+01	8.457E+01	9.196E+01	9.973E+01	1.067E+02
CDI20	0.000E+00	4.014E+01	4.268E+01	4.541E+01	4.897E+01	5.296E+01	5.715E+01	6.090E+01
INI20	0.000E+00	8.394E+01	8.960E+01	9.545E+01	1.030E+02	1.114E+02	1.202E+02	1.281E+02

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
 FISSION PRODUCTS
 POWER= 2.16550E+01 MW, BURNUP= 5.40006E+04 MWD, FLUX= 2.35E+14 N/CM**2-SEC

9 SUMMARY TABLE: THERMAL POWER, WATTS

	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
INI20M	0.000E+00	5.809E+01	6.201E+01	6.606E+01	7.125E+01	7.707E+01	8.319E+01	8.864E+01
RH121	0.000E+00	1.369E-01	1.383E-01	1.476E-01	1.622E-01	1.798E-01	1.986E-01	2.155E-01
PD121	0.000E+00	1.555E+01	1.566E+01	1.668E+01	1.828E+01	2.018E+01	2.219E+01	2.401E+01
AG121	0.000E+00	7.617E+01	7.706E+01	8.147E+01	8.828E+01	9.630E+01	1.047E+02	1.124E+02
CD121	0.000E+00	1.181E+02	1.248E+02	1.325E+02	1.427E+02	1.543E+02	1.664E+02	1.773E+02
INI21	0.000E+00	7.248E+01	7.710E+01	8.197E+01	8.831E+01	9.545E+01	1.030E+02	1.097E+02
INI21M	0.000E+00	1.934E+01	2.073E+01	2.200E+01	2.361E+01	2.542E+01	2.734E+01	2.907E+01
SN121	0.000E+00	9.098E+00	9.698E+00	1.031E+01	1.111E+01	1.200E+01	1.295E+01	1.380E+01
SN121M	0.000E+00	2.984E-05	1.170E-04	2.217E-04	3.376E-04	4.631E-04	5.981E-04	7.032E-04
RH122	0.000E+00	2.124E-02	2.144E-02	2.287E-02	2.513E-02	2.786E-02	3.077E-02	3.341E-02
PD122	0.000E+00	3.601E+00	3.625E+00	3.860E+00	4.231E+00	4.675E+00	5.148E+00	5.573E+00
AG122	0.000E+00	7.179E+01	7.221E+01	7.628E+01	8.276E+01	9.047E+01	9.863E+01	1.060E+02
CD122	0.000E+00	6.027E+01	6.269E+01	6.612E+01	7.095E+01	7.655E+01	8.248E+01	8.787E+01
INI22	0.000E+00	2.053E+02	2.158E+02	2.282E+02	2.450E+02	2.644E+02	2.848E+02	3.034E+02
INI22M	0.000E+00	8.487E-01	1.047E+00	1.148E+00	1.243E+00	1.341E+00	1.444E+00	1.534E+00
SB122	0.000E+00	7.619E-01	2.412E+00	4.416E+00	6.982E+00	1.021E+01	1.413E+01	1.767E+01
SB122M	0.000E+00	9.971E-04	3.117E-03	5.676E-03	8.194E-03	1.107E-02	1.480E-02	1.956E-02
RH123	0.000E+00	1.589E-03	1.601E-03	1.703E-03	1.868E-03	2.068E-03	2.283E-03	2.478E-03
PD123	0.000E+00	1.252E+00	1.255E+00	1.331E+00	1.455E+00	1.606E+00	1.767E+00	1.913E+00
AG123	0.000E+00	3.049E+01	3.049E+01	3.208E+01	3.473E+01	3.793E+01	4.135E+01	4.447E+01
CD123	0.000E+00	1.351E+02	1.394E+02	1.466E+02	1.571E+02	1.695E+02	1.827E+02	1.948E+02
INI23	0.000E+00	8.528E+01	8.980E+01	9.491E+01	1.019E+02	1.098E+02	1.183E+02	1.260E+02
INI23M	0.000E+00	3.993E+01	4.338E+01	4.622E+01	4.970E+01	5.358E+01	5.770E+01	6.140E+01
SN123	0.000E+00	3.649E+00	5.723E+00	6.295E+00	6.731E+00	7.185E+00	7.664E+00	8.062E+00
SN123M	0.000E+00	2.610E+01	2.772E+01	2.937E+01	3.155E+01	3.402E+01	3.665E+01	3.903E+01
TE123M	0.000E+00	6.572E-05	1.251E-03	4.785E-03	1.211E-02	2.533E-02	4.701E-02	7.054E-02
PD124	0.000E+00	1.817E-01	1.835E-01	1.963E-01	2.159E-01	2.390E-01	2.633E-01	2.850E-01
AG124	0.000E+00	1.934E+01	1.940E+01	2.053E+01	2.233E+01	2.445E+01	2.668E+01	2.869E+01
CD124	0.000E+00	8.590E+01	8.739E+01	9.140E+01	9.767E+01	1.051E+02	1.130E+02	1.203E+02
INI24	0.000E+00	2.686E+02	2.813E+02	2.949E+02	3.140E+02	3.362E+02	3.600E+02	3.820E+02
SB124	0.000E+00	6.416E-01	2.976E+00	5.958E+00	9.808E+00	1.472E+01	2.078E+01	2.628E+01
SB124M	0.000E+00	5.782E-03	9.467E-03	1.222E-02	1.528E-02	1.892E-02	2.323E-02	2.711E-02
AG125	0.000E+00	4.674E+00	4.798E+00	5.185E+00	5.727E+00	6.337E+00	6.961E+00	7.502E+00
CD125	0.000E+00	9.858E+01	1.045E+02	1.124E+02	1.226E+02	1.339E+02	1.456E+02	1.557E+02
INI25	0.000E+00	1.094E+02	1.221E+02	1.323E+02	1.440E+02	1.568E+02	1.700E+02	1.815E+02
INI25M	0.000E+00	8.117E+01	9.237E+01	1.004E+02	1.092E+02	1.187E+02	1.286E+02	1.372E+02
SN125	0.000E+00	3.747E+01	4.275E+01	4.610E+01	4.980E+01	5.390E+01	5.833E+01	6.243E+01
SN125M	0.000E+00	6.103E+01	6.964E+01	7.562E+01	8.220E+01	8.929E+01	9.673E+01	1.033E+02
SB125	0.000E+00	5.363E+00	1.610E+01	2.566E+01	3.417E+01	4.187E+01	4.897E+01	5.389E+01
TE125M	0.000E+00	2.049E-01	8.647E-01	1.474E+00	2.014E+00	2.501E+00	2.947E+00	3.254E+00
PD126	0.000E+00	2.969E-03	3.075E-03	3.386E-03	3.802E-03	4.260E-03	4.721E-03	5.109E-03

AG126	0.000E+00	1.897E+00	1.947E+00	2.119E+00	2.353E+00	2.609E+00	2.864E+00	3.079E+00
CD126	0.000E+00	5.793E+01	5.922E+01	6.269E+01	6.761E+01	7.310E+01	7.872E+01	8.365E+01
INI26	0.000E+00	4.405E+02	4.668E+02	4.899E+02	5.197E+02	5.533E+02	5.888E+02	6.213E+02
SNI26	0.000E+00	9.623E-05	3.191E-04	5.660E-04	8.332E-04	1.120E-03	1.426E-03	1.663E-03
SB126	0.000E+00	5.799E+00	7.827E+00	9.429E+00	1.118E+01	1.316E+01	1.538E+01	1.739E+01
SB126M	0.000E+00	1.897E+00	2.658E+00	3.041E+00	3.384E+00	3.736E+00	4.113E+00	4.435E+00
CD127	0.000E+00	4.421E+01	4.735E+01	5.281E+01	5.917E+01	6.549E+01	7.141E+01	7.601E+01
INI27	0.000E+00	1.894E+02	2.073E+02	2.234E+02	2.417E+02	2.605E+02	2.792E+02	2.950E+02
INI27M	0.000E+00	1.983E+02	2.168E+02	2.337E+02	2.527E+02	2.723E+02	2.918E+02	3.083E+02
SNI27	0.000E+00	4.156E+02	4.747E+02	5.136E+02	5.541E+02	5.959E+02	6.387E+02	6.755E+02

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
 FISSION PRODUCTS
 POWER= 2.16550E+01 MW, BURNUP= 5.40006E+04 MWD, FLUX= 2.35E+14 N/CM**2-SEC

9 SUMMARY TABLE: THERMAL POWER, WATTS

	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
SNI27M	0.000E+00	1.280E+02	1.522E+02	1.644E+02	1.761E+02	1.883E+02	2.013E+02	2.127E+02
SB127	0.000E+00	2.623E+02	3.062E+02	3.319E+02	3.578E+02	3.844E+02	4.119E+02	4.359E+02
TE127	0.000E+00	5.673E+01	6.883E+01	7.507E+01	8.104E+01	8.710E+01	9.334E+01	9.868E+01
TEI27M	0.000E+00	2.170E+00	3.591E+00	4.077E+00	4.440E+00	4.781E+00	5.119E+00	5.379E+00
XE127	0.000E+00	3.291E-07	5.898E-06	1.983E-05	4.806E-05	9.874E-05	1.818E-04	2.596E-04
AG128	0.000E+00	7.492E-02	8.068E-02	9.291E-02	1.074E-01	1.220E-01	1.357E-01	1.463E-01
CD128	0.000E+00	1.409E+01	1.465E+01	1.620E+01	1.807E+01	1.993E+01	2.164E+01	2.295E+01
INI28	0.000E+00	5.255E+02	5.340E+02	5.533E+02	5.812E+02	6.112E+02	6.410E+02	6.678E+02
SNI28	0.000E+00	3.968E+02	4.182E+02	4.292E+02	4.439E+02	4.608E+02	4.798E+02	4.989E+02
SB128	0.000E+00	1.024E+02	1.367E+02	1.532E+02	1.678E+02	1.824E+02	1.978E+02	2.110E+02
SBI28M	0.000E+00	1.520E+03	1.629E+03	1.685E+03	1.751E+03	1.827E+03	1.910E+03	1.991E+03
I128	0.000E+00	2.838E+00	1.030E+01	1.987E+01	3.226E+01	4.789E+01	6.683E+01	8.395E+01
CD129	0.000E+00	7.952E+00	8.411E+00	9.423E+00	1.067E+01	1.195E+01	1.319E+01	1.418E+01
INI29	0.000E+00	3.132E+02	3.260E+02	3.480E+02	3.756E+02	4.041E+02	4.318E+02	4.547E+02
SNI29	0.000E+00	7.679E+02	8.334E+02	8.743E+02	9.202E+02	9.683E+02	1.019E+03	1.064E+03
SNI29M	0.000E+00	1.115E+03	1.118E+03	1.117E+03	1.129E+03	1.149E+03	1.173E+03	1.204E+03
SB129	0.000E+00	1.696E+03	1.851E+03	1.931E+03	2.018E+03	2.111E+03	2.211E+03	2.306E+03
TE129	0.000E+00	5.313E+02	5.829E+02	6.079E+02	6.352E+02	6.647E+02	6.966E+02	7.265E+02
TEI29M	0.000E+00	3.755E+01	4.299E+01	4.483E+01	4.680E+01	4.891E+01	5.120E+01	5.315E+01
XE129M	0.000E+00	4.437E-05	4.585E-04	1.535E-03	3.716E-03	7.631E-03	1.404E-02	2.115E-02
CD130	0.000E+00	8.278E+00	7.894E+00	7.991E+00	8.354E+00	8.840E+00	9.376E+00	9.906E+00
INI30	0.000E+00	5.169E+02	4.905E+02	4.836E+02	4.881E+02	4.968E+02	5.075E+02	5.212E+02
SNI30	0.000E+00	1.485E+03	1.506E+03	1.519E+03	1.550E+03	1.587E+03	1.630E+03	1.678E+03
SB130	0.000E+00	1.094E+03	1.239E+03	1.306E+03	1.372E+03	1.440E+03	1.513E+03	1.580E+03
SB130M	0.000E+00	5.500E+03	5.633E+03	5.692E+03	5.807E+03	5.947E+03	6.110E+03	6.292E+03
I130	0.000E+00	2.653E+01	8.512E+01	1.553E+02	2.436E+02	3.529E+02	4.832E+02	5.996E+02
I130M	0.000E+00	1.280E+00	4.156E+00	7.627E+00	1.200E+01	1.742E+01	2.388E+01	2.965E+01
CD131	0.000E+00	1.991E+00	1.935E+00	2.000E+00	2.134E+00	2.304E+00	2.486E+00	2.658E+00
INI31	0.000E+00	1.894E+02	1.773E+02	1.733E+02	1.783E+02	1.831E+02	1.886E+02	1.948E+02
SNI31	0.000E+00	3.336E+03	3.196E+03	3.137E+03	3.136E+03	3.153E+03	3.180E+03	3.231E+03
SB131	0.000E+00	6.972E+03	6.872E+03	6.792E+03	6.802E+03	6.848E+03	6.922E+03	7.048E+03
TEI31	0.000E+00	3.334E+03	3.345E+03	3.337E+03	3.366E+03	3.411E+03	3.470E+03	3.549E+03
TEI31M	0.000E+00	7.027E+02	7.444E+02	7.601E+02	7.797E+02	8.022E+02	8.282E+02	8.559E+02
I131	0.000E+00	1.873E+03	1.891E+03	1.891E+03	1.911E+03	1.940E+03	1.977E+03	2.025E+03
XE131M	0.000E+00	5.899E+00	5.947E+00	5.950E+00	6.019E+00	6.120E+00	6.251E+00	6.416E+00
CD132	0.000E+00	1.650E-01	1.597E-01	1.645E-01	1.754E-01	1.894E-01	2.048E-01	2.194E-01
INI32	0.000E+00	8.255E+01	7.450E+01	7.181E+01	7.165E+01	7.255E+01	7.395E+01	7.609E+01
SNI32	0.000E+00	1.370E+03	1.246E+03	1.189E+03	1.164E+03	1.149E+03	1.139E+03	1.145E+03
SB132	0.000E+00	7.188E+03	6.807E+03	6.603E+03	6.525E+03	6.489E+03	6.481E+03	6.544E+03
SB132M	0.000E+00	4.533E+03	4.396E+03	4.306E+03	4.280E+03	4.277E+03	4.291E+03	4.345E+03
TEI32	0.000E+00	1.592E+03	1.585E+03	1.574E+03	1.580E+03	1.594E+03	1.615E+03	1.648E+03

II132	0.000E+00	1.332E+04	1.332E+04	1.324E+04	1.332E+04	1.346E+04	1.365E+04	1.394E+04
CS132	0.000E+00	7.161E-02	2.172E-01	3.739E-01	5.532E-01	7.539E-01	9.682E-01	1.145E+00
INI133	0.000E+00	7.290E+00	6.881E+00	6.946E+00	7.261E+00	7.691E+00	8.167E+00	8.639E+00
SNI133	0.000E+00	9.974E+02	8.899E+02	8.460E+02	8.292E+02	8.218E+02	8.183E+02	8.262E+02
SB133	0.000E+00	8.706E+03	7.885E+03	7.443E+03	7.186E+03	6.989E+03	6.827E+03	6.788E+03
TE133	0.000E+00	7.394E+03	7.146E+03	7.001E+03	6.966E+03	6.968E+03	6.995E+03	7.087E+03
TE133M	0.000E+00	8.833E+03	8.211E+03	7.745E+03	7.427E+03	7.174E+03	6.976E+03	6.926E+03
II133	0.000E+00	7.337E+03	7.126E+03	6.958E+03	6.891E+03	6.864E+03	6.872E+03	6.953E+03
II133M	0.000E+00	2.648E+02	3.030E+02	3.191E+02	3.343E+02	3.502E+02	3.675E+02	3.837E+02
XE133	0.000E+00	1.308E+03	1.272E+03	1.243E+03	1.232E+03	1.229E+03	1.232E+03	1.248E+03

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
 FISSION PRODUCTS
 POWER= 2.16550E+01 MW, BURNUP= 5.40006E+04 MWD, FLUX= 2.35E+14 N/CM**2-SEC

9 SUMMARY TABLE: THERMAL POWER, WATTS

	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
XE133M	0.000E+00	5.011E+01	4.975E+01	4.916E+01	4.917E+01	4.945E+01	4.998E+01	5.092E+01
IN134	0.000E+00	4.209E-01	4.168E-01	4.382E-01	4.753E-01	5.206E-01	5.691E-01	6.135E-01
SN134	0.000E+00	9.337E+01	8.876E+01	9.014E+01	9.436E+01	9.963E+01	1.052E+02	1.105E+02
SB134	0.000E+00	1.623E+03	1.543E+03	1.538E+03	1.566E+03	1.602E+03	1.638E+03	1.678E+03
SB134M	0.000E+00	1.548E+03	1.472E+03	1.465E+03	1.488E+03	1.519E+03	1.549E+03	1.583E+03
TE134	0.000E+00	8.079E+03	7.366E+03	6.938E+03	6.668E+03	6.451E+03	6.270E+03	6.212E+03
I134	0.000E+00	2.629E+04	2.529E+04	2.459E+04	2.427E+04	2.410E+04	2.403E+04	2.425E+04
I134M	0.000E+00	1.957E+02	2.231E+02	2.366E+02	2.496E+02	2.627E+02	2.763E+02	2.885E+02
XE134M	0.000E+00	6.432E+01	8.056E+01	8.803E+01	9.460E+01	1.012E+02	1.081E+02	1.142E+02
CS134	0.000E+00	3.571E+01	2.873E+02	7.200E+02	1.299E+03	1.997E+03	2.783E+03	3.398E+03
CS134M	0.000E+00	2.831E+00	8.571E+00	1.474E+01	2.179E+01	2.969E+01	3.811E+01	4.506E+01
SN135	0.000E+00	1.494E+01	1.399E+01	1.401E+01	1.453E+01	1.528E+01	1.612E+01	1.699E+01
SB135	0.000E+00	1.095E+03	9.676E+02	9.094E+02	8.804E+02	8.613E+02	8.467E+02	8.471E+02
TE135	0.000E+00	1.067E+04	9.821E+03	9.389E+03	9.164E+03	8.999E+03	8.865E+03	8.856E+03
I135	0.000E+00	1.306E+04	1.268E+04	1.241E+04	1.232E+04	1.230E+04	1.232E+04	1.247E+04
XE135	0.000E+00	1.855E+03	1.819E+03	1.729E+03	1.633E+03	1.536E+03	1.449E+03	1.391E+03
XE135M	0.000E+00	6.749E+02	6.905E+02	6.942E+02	7.022E+02	7.138E+02	7.285E+02	7.466E+02
CS135	0.000E+00	3.003E-05	9.042E-05	1.486E-04	2.041E-04	2.570E-04	3.081E-04	3.448E-04
CS135M	0.000E+00	4.051E+00	2.176E+01	5.488E+01	1.071E+02	1.821E+02	2.815E+02	3.750E+02
BA135M	0.000E+00	4.878E-04	7.986E-03	3.542E-02	9.926E-02	1.175E+00	1.270E+00	1.360E+00
SN136	0.000E+00	1.021E+00	9.891E-01	1.020E+00	1.088E+00	1.175E+00	1.270E+00	1.360E+00
SB136	0.000E+00	2.659E+02	2.397E+02	2.307E+02	2.294E+02	2.310E+02	2.339E+02	2.392E+02
TE136	0.000E+00	5.531E+03	4.945E+03	4.633E+03	4.445E+03	4.296E+03	4.169E+03	4.125E+03
I136	0.000E+00	1.397E+04	1.328E+04	1.294E+04	1.282E+04	1.278E+04	1.277E+04	1.289E+04
I136M	0.000E+00	7.673E+03	7.272E+03	6.994E+03	6.833E+03	6.714E+03	6.631E+03	6.643E+03
CS136	0.000E+00	1.056E+02	2.516E+02	3.968E+02	5.645E+02	7.610E+02	9.873E+02	1.189E+03
BA136M	0.000E+00	1.544E+01	3.678E+01	5.800E+01	8.252E+01	1.112E+02	1.443E+02	1.738E+02
SB137	0.000E+00	2.918E+01	2.774E+01	2.811E+01	2.945E+01	3.124E+01	3.321E+01	3.513E+01
TE137	0.000E+00	2.139E+03	1.952E+03	1.879E+03	1.858E+03	1.854E+03	1.857E+03	1.880E+03
I137	0.000E+00	1.212E+04	1.123E+04	1.074E+04	1.048E+04	1.028E+04	1.014E+04	1.014E+04
XE137	0.000E+00	1.251E+04	1.208E+04	1.178E+04	1.166E+04	1.160E+04	1.159E+04	1.171E+04
CS137	0.000E+00	1.537E+01	4.575E+01	7.527E+01	1.041E+02	1.321E+02	1.594E+02	1.790E+02
BA137M	0.000E+00	5.188E+01	1.540E+02	2.532E+02	3.499E+02	4.441E+02	5.358E+02	6.017E+02
SB138	0.000E+00	4.268E+00	4.159E+00	4.309E+00	4.615E+00	5.002E+00	5.422E+00	5.817E+00
TE138	0.000E+00	4.343E+02	3.948E+02	3.821E+02	3.819E+02	3.865E+02	3.931E+02	4.034E+02
I138	0.000E+00	7.054E+03	6.409E+03	6.067E+03	5.876E+03	5.736E+03	5.625E+03	5.610E+03
XE138	0.000E+00	1.163E+04	1.089E+04	1.040E+04	1.011E+04	9.898E+03	9.735E+03	9.731E+03
CS138	0.000E+00	2.497E+04	2.361E+04	2.268E+04	2.214E+04	2.176E+04	2.150E+04	2.157E+04
CS138M	0.000E+00	2.576E+02	2.683E+02	2.699E+02	2.731E+02	2.774E+02	2.831E+02	2.903E+02
SB139	0.000E+00	2.648E-01	2.613E-01	2.733E-01	2.953E-01	3.227E-01	3.525E-01	3.802E-01
TE139	0.000E+00	1.161E+02	1.075E+02	1.056E+02	1.074E+02	1.108E+02	1.149E+02	1.197E+02

II139	0.000E+00	3.399E+03	3.053E+03	2.865E+03	2.756E+03	2.677E+03	2.616E+03	2.609E+03
XE139	0.000E+00	1.390E+04	1.283E+04	1.216E+04	1.174E+04	1.142E+04	1.116E+04	1.110E+04
CS139	0.000E+00	1.330E+04	1.256E+04	1.206E+04	1.177E+04	1.157E+04	1.142E+04	1.145E+04
BA139	0.000E+00	6.365E+03	6.049E+03	5.829E+03	5.710E+03	5.628E+03	5.578E+03	5.606E+03
TE140	0.000E+00	1.101E+01	1.028E+01	1.023E+01	1.055E+01	1.105E+01	1.163E+01	1.225E+01
II140	0.000E+00	1.212E+03	1.058E+03	9.752E+02	9.256E+02	8.890E+02	8.601E+02	8.529E+02
XE140	0.000E+00	8.090E+03	7.278E+03	6.786E+03	6.462E+03	6.198E+03	5.976E+03	5.892E+03
CS140	0.000E+00	2.448E+04	2.307E+04	2.212E+04	2.157E+04	2.117E+04	2.089E+04	2.093E+04
BA140	0.000E+00	3.069E+03	2.920E+03	2.813E+03	2.753E+03	2.712E+03	2.686E+03	2.699E+03
LA140	0.000E+00	1.851E+04	1.772E+04	1.719E+04	1.697E+04	1.689E+04	1.693E+04	1.719E+04

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
 FISSION PRODUCTS
 POWER= 2.16550E+01 MW, BURNUP= 5.40006E+04 MWD, FLUX= 2.35E+14 N/CM**2-SEC

9 SUMMARY TABLE: THERMAL POWER, WATTS

	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
PR140	0.000E+00	4.595E-03	1.671E-02	3.035E-02	4.685E-02	6.670E-02	8.981E-02	1.099E-01
TE141	0.000E+00	6.745E-01	6.379E-01	6.431E-01	6.721E-01	7.132E-01	7.597E-01	8.065E-01
I141	0.000E+00	1.850E+02	1.622E+02	1.513E+02	1.458E+02	1.427E+02	1.407E+02	1.417E+02
XE141	0.000E+00	4.778E+03	4.281E+03	4.020E+03	3.866E+03	3.747E+03	3.647E+03	3.618E+03
CS141	0.000E+00	1.474E+04	1.373E+04	1.306E+04	1.265E+04	1.234E+04	1.211E+04	1.209E+04
BA141	0.000E+00	1.069E+04	1.017E+04	9.776E+03	9.543E+03	9.380E+03	9.277E+03	9.316E+03
LA141	0.000E+00	6.151E+03	5.854E+03	5.627E+03	5.493E+03	5.401E+03	5.343E+03	5.366E+03
CE141	0.000E+00	1.511E+03	1.458E+03	1.402E+03	1.369E+03	1.347E+03	1.333E+03	1.348E+03
TE142	0.000E+00	4.724E-02	4.713E-02	4.975E-02	5.420E-02	5.967E-02	6.555E-02	7.095E-02
I142	0.000E+00	3.033E+01	2.818E+01	2.796E+01	2.874E+01	3.000E+01	3.146E+01	3.303E+01
XE142	0.000E+00	1.234E+03	1.090E+03	1.022E+03	9.855E+02	9.607E+02	9.415E+02	9.401E+02
CS142	0.000E+00	1.343E+04	1.220E+04	1.147E+04	1.100E+04	1.064E+04	1.034E+04	1.025E+04
BA142	0.000E+00	8.826E+03	8.303E+03	7.924E+03	7.690E+03	7.516E+03	7.393E+03	7.395E+03
LA142	0.000E+00	2.187E+04	2.062E+04	1.970E+04	1.914E+04	1.873E+04	1.844E+04	1.846E+04
PR142	0.000E+00	1.967E+01	7.155E+01	1.239E+02	2.006E+02	2.856E+02	3.845E+02	4.706E+02
PR142M	0.000E+00	1.073E+00	3.903E+00	7.089E+00	1.094E+01	1.558E+01	2.098E+01	2.567E+01
I143	0.000E+00	1.439E+00	1.383E+00	1.418E+00	1.503E+00	1.611E+00	1.728E+00	1.840E+00
XE143	0.000E+00	2.932E+02	2.658E+02	2.568E+02	2.556E+02	2.569E+02	2.590E+02	2.636E+02
CS143	0.000E+00	5.752E+03	5.082E+03	4.682E+03	4.413E+03	4.192E+03	4.003E+03	3.922E+03
BA143	0.000E+00	1.443E+04	1.339E+04	1.267E+04	1.221E+04	1.184E+04	1.156E+04	1.151E+04
LA143	0.000E+00	1.191E+04	1.108E+04	1.048E+04	1.009E+04	9.792E+03	9.561E+03	9.517E+03
CE143	0.000E+00	4.312E+03	4.011E+03	3.797E+03	3.659E+03	3.552E+03	3.472E+03	3.459E+03
PR143	0.000E+00	1.902E+03	1.769E+03	1.674E+03	1.613E+03	1.565E+03	1.529E+03	1.523E+03
I144	0.000E+00	1.428E-01	1.405E-01	1.469E-01	1.585E-01	1.730E-01	1.886E-01	2.030E-01
XE144	0.000E+00	3.401E+01	3.139E+01	3.096E+01	3.156E+01	3.257E+01	3.375E+01	3.506E+01
CS144	0.000E+00	1.999E+03	1.853E+03	1.798E+03	1.787E+03	1.791E+03	1.799E+03	1.825E+03
BA144	0.000E+00	7.302E+03	6.626E+03	6.187E+03	5.891E+03	5.652E+03	5.455E+03	5.386E+03
LA144	0.000E+00	1.883E+04	1.732E+04	1.629E+04	1.561E+04	1.506E+04	1.462E+04	1.450E+04
CE144	0.000E+00	2.421E+02	4.614E+02	5.247E+02	5.346E+02	5.260E+02	5.115E+02	5.011E+02
PR144	0.000E+00	2.706E+03	5.135E+03	5.836E+03	5.947E+03	5.854E+03	5.696E+03	5.583E+03
PR144M	0.000E+00	1.501E+00	2.859E+00	3.250E+00	3.312E+00	3.259E+00	3.169E+00	3.105E+00
XE145	0.000E+00	4.364E+00	4.430E+00	4.728E+00	5.1175E+00	5.694E+00	6.236E+00	6.717E+00
CS145	0.000E+00	3.663E+02	3.415E+02	3.331E+02	3.332E+02	3.366E+02	3.414E+02	3.490E+02
BA145	0.000E+00	6.722E+03	6.198E+03	5.875E+03	5.682E+03	5.538E+03	5.430E+03	5.419E+03
LA145	0.000E+00	9.845E+03	9.162E+03	8.698E+03	8.408E+03	8.189E+03	8.024E+03	8.006E+03
CE145	0.000E+00	6.038E+03	5.647E+03	5.374E+03	5.204E+03	5.077E+03	4.983E+03	4.979E+03
PR145	0.000E+00	2.812E+03	2.630E+03	2.503E+03	2.424E+03	2.365E+03	2.321E+03	2.319E+03
XE146	0.000E+00	2.398E-01	2.355E-01	2.453E-01	2.636E-01	2.864E-01	3.109E-01	3.337E-01
CS146	0.000E+00	7.219E+01	6.808E+01	6.777E+01	6.940E+01	7.177E+01	7.443E+01	7.729E+01
BA146	0.000E+00	1.462E+03	1.349E+03	1.292E+03	1.265E+03	1.250E+03	1.241E+03	1.250E+03
LA146	0.000E+00	1.003E+04	9.387E+03	8.983E+03	8.757E+03	8.599E+03	8.490E+03	8.512E+03

CE146	0.000E+00	1.380E+03	1.306E+03	1.255E+03	1.227E+03	1.208E+03	1.196E+03	1.201E+03
PR146	0.000E+00	8.078E+03	7.648E+03	7.352E+03	7.189E+03	7.077E+03	7.008E+03	7.040E+03
PM146	0.000E+00	4.075E-04	2.925E-03	6.455E-03	1.027E-02	1.403E-02	1.753E-02	1.990E-02
XE147	0.000E+00	2.880E-02	2.888E-02	3.059E-02	3.343E-02	3.691E-02	4.065E-02	4.407E-02
CS147	0.000E+00	8.934E+00	8.671E+00	8.910E+00	9.453E+00	1.015E+01	1.091E+01	1.163E+01
BA147	0.000E+00	6.045E+02	5.622E+02	5.466E+02	5.453E+02	5.495E+02	5.564E+02	5.684E+02
LA147	0.000E+00	3.335E+03	3.132E+03	3.020E+03	2.968E+03	2.938E+03	2.922E+03	2.943E+03
CE147	0.000E+00	5.035E+03	4.806E+03	4.651E+03	4.574E+03	4.527E+03	4.504E+03	4.538E+03
PR147	0.000E+00	3.810E+03	3.643E+03	3.528E+03	3.472E+03	3.438E+03	3.422E+03	3.449E+03
ND147	0.000E+00	9.852E+02	9.438E+02	9.160E+02	9.038E+02	8.981E+02	8.980E+02	9.086E+02

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
 FISSION PRODUCTS
 POWER= 2.16550E+01 MW, BURNUP= 5.40006E+04 MWD, FLUX= 2.35E+14 N/CM**2-SEC

9 SUMMARY TABLE: THERMAL POWER, WATTS

	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
PMI47	0.000E+00	1.605E+01	3.485E+01	4.132E+01	4.196E+01	3.997E+01	3.709E+01	3.491E+01
CS148	0.000E+00	7.246E-01	7.178E-01	7.519E-01	8.126E-01	8.876E-01	9.686E-01	1.043E+00
BA148	0.000E+00	6.851E+01	6.538E+01	6.556E+01	6.764E+01	7.054E+01	7.378E+01	7.714E+01
LA148	0.000E+00	1.913E+03	1.816E+03	1.775E+03	1.771E+03	1.780E+03	1.795E+03	1.826E+03
CE148	0.000E+00	1.641E+03	1.588E+03	1.556E+03	1.547E+03	1.548E+03	1.554E+03	1.575E+03
PR148	0.000E+00	5.187E+03	5.045E+03	4.952E+03	4.931E+03	4.937E+03	4.963E+03	5.034E+03
PMI48	0.000E+00	3.833E+02	8.452E+02	1.065E+03	1.177E+03	1.230E+03	1.247E+03	1.264E+03
PMI48M	0.000E+00	1.244E+02	2.742E+02	3.349E+02	3.517E+02	3.461E+02	3.307E+02	3.199E+02
BA149	0.000E+00	1.141E+01	1.122E+01	1.163E+01	1.240E+01	1.334E+01	1.435E+01	1.528E+01
LA149	0.000E+00	3.411E+02	3.303E+02	3.310E+02	3.388E+02	3.490E+02	3.600E+02	3.717E+02
CE149	0.000E+00	2.215E+03	2.173E+03	2.159E+03	2.178E+03	2.206E+03	2.239E+03	2.284E+03
PR149	0.000E+00	1.699E+03	1.694E+03	1.692E+03	1.712E+03	1.738E+03	1.769E+03	1.808E+03
ND149	0.000E+00	1.096E+03	1.102E+03	1.112E+03	1.138E+03	1.171E+03	1.209E+03	1.252E+03
PMI49	0.000E+00	5.192E+02	5.930E+02	6.380E+02	6.786E+02	7.159E+02	7.510E+02	7.865E+02
CS150	0.000E+00	7.177E-04	7.216E-04	7.662E-04	8.386E-04	9.266E-04	1.021E-03	1.107E-03
BA150	0.000E+00	6.461E-01	6.429E-01	6.750E-01	7.293E-01	7.948E-01	8.643E-01	9.279E-01
LA150	0.000E+00	8.807E+01	8.722E+01	8.971E+01	9.419E+01	9.937E+01	1.047E+02	1.097E+02
CE150	0.000E+00	5.563E+02	5.661E+02	5.802E+02	6.014E+02	6.239E+02	6.467E+02	6.681E+02
PR150	0.000E+00	2.309E+03	2.407E+03	2.483E+03	2.580E+03	2.681E+03	2.783E+03	2.878E+03
PMI50	0.000E+00	1.609E+01	1.869E+01	2.139E+01	2.491E+01	2.910E+01	3.378E+01	3.848E+01
LA151	0.000E+00	8.835E+00	8.845E+00	9.271E+00	9.935E+00	1.069E+01	1.146E+01	1.214E+01
CE151	0.000E+00	3.208E+02	3.307E+02	3.453E+02	3.643E+02	3.839E+02	4.030E+02	4.195E+02
PR151	0.000E+00	8.958E+02	9.545E+02	1.002E+03	1.056E+03	1.110E+03	1.163E+03	1.209E+03
ND151	0.000E+00	7.865E+02	8.613E+02	9.155E+02	9.750E+02	1.036E+03	1.100E+03	1.155E+03
PMI51	0.000E+00	3.302E+02	3.618E+02	3.846E+02	4.096E+02	4.353E+02	4.618E+02	4.849E+02
SM151	0.000E+00	2.435E-02	4.087E-02	4.891E-02	5.523E-02	6.073E-02	6.571E-02	6.888E-02
BA152	0.000E+00	2.009E-03	2.024E-03	2.154E-03	2.362E-03	2.613E-03	2.882E-03	3.126E-03
LA152	0.000E+00	1.313E+00	1.321E+00	1.402E+00	1.527E+00	1.671E+00	1.822E+00	1.956E+00
CE152	0.000E+00	4.949E+01	5.073E+01	5.361E+01	5.741E+01	6.138E+01	6.524E+01	6.850E+01
PR152	0.000E+00	6.367E+02	6.864E+02	7.317E+02	7.817E+02	8.305E+02	8.772E+02	9.156E+02
ND152	0.000E+00	1.954E+02	2.202E+02	2.374E+02	2.548E+02	2.716E+02	2.879E+02	3.013E+02
PMI52	0.000E+00	6.118E+02	6.910E+02	7.456E+02	8.008E+02	8.542E+02	9.063E+02	9.492E+02
PMI52M	0.000E+00	9.251E+00	1.191E+01	1.333E+01	1.459E+01	1.581E+01	1.703E+01	1.804E+01
EU152	0.000E+00	9.059E-03	5.713E-02	9.187E-02	1.085E-01	1.139E-01	1.189E-01	1.137E-01
EU152M	0.000E+00	1.827E-01	4.076E-01	5.004E-01	5.684E-01	6.265E-01	7.008E-01	7.130E-01
LA153	0.000E+00	1.136E+01	1.149E+01	1.166E+01	1.347E+01	1.490E+01	1.641E+01	1.777E+01
CE153	0.000E+00	1.404E+01	1.444E+01	1.533E+01	1.699E+01	1.858E+01	2.016E+01	2.151E+01
PR153	0.000E+00	1.531E+02	1.655E+02	1.794E+02	1.949E+02	2.101E+02	2.243E+02	2.357E+02
ND153	0.000E+00	4.169E+02	4.721E+02	5.147E+02	5.577E+02	5.988E+02	6.378E+02	6.687E+02
PMI53	0.000E+00	1.673E+02	1.917E+02	2.096E+02	2.274E+02	2.444E+02	2.607E+02	2.736E+02
SM153	0.000E+00	1.117E+02	2.252E+02	3.426E+02	4.674E+02	5.978E+02	7.299E+02	8.375E+02

GDI53	0.000E+00	6.433E-05	1.552E-03	5.241E-03	1.090E-02	1.839E-02	2.840E-02	3.637E-02
LA154	0.000E+00	6.865E-03	6.954E-03	7.429E-03	8.169E-03	9.054E-03	9.997E-03	1.085E-02
CE154	0.000E+00	1.210E+00	1.257E+00	1.366E+00	1.512E+00	1.673E+00	1.836E+00	1.975E+00
PR154	0.000E+00	4.938E+01	5.549E+01	6.222E+01	6.945E+01	7.645E+01	8.300E+01	8.803E+01
ND154	0.000E+00	9.393E+01	1.156E+02	1.323E+02	1.483E+02	1.633E+02	1.772E+02	1.877E+02
PM154	0.000E+00	2.761E+02	3.466E+02	3.981E+02	4.468E+02	4.924E+02	5.351E+02	5.673E+02
PM154M	0.000E+00	4.024E+01	5.549E+01	6.480E+01	7.314E+01	8.096E+01	8.850E+01	9.429E+01
EU154	0.000E+00	1.059E+00	1.077E+01	3.254E+01	6.622E+01	1.088E+02	1.551E+02	1.884E+02
CE155	0.000E+00	2.148E-01	2.226E-01	2.415E-01	2.677E-01	2.977E-01	3.288E-01	3.560E-01
PR155	0.000E+00	7.757E+00	8.793E+00	9.999E+00	1.132E+01	1.264E+01	1.389E+01	1.487E+01

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
 FISSION PRODUCTS
 POWER= 2.16550E+01 MW, BURNUP= 5.40006E+04 MWD, FLUX= 2.35E+14 N/CM**2-SEC

9 SUMMARY TABLE: THERMAL POWER, WATTS

	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
ND155	0.000E+00	8.010E+01	1.012E+02	1.195E+02	1.352E+02	1.508E+02	1.651E+02	1.756E+02
PM155	0.000E+00	1.161E+02	1.548E+02	1.826E+02	2.086E+02	2.327E+02	2.552E+02	2.720E+02
SM155	0.000E+00	6.447E+01	8.843E+01	1.061E+02	1.232E+02	1.403E+02	1.575E+02	1.712E+02
EU155	0.000E+00	3.765E+01	1.089E+00	2.163E+00	3.863E+00	6.169E+00	8.845E+00	1.085E+01
GD155M	0.000E+00	4.779E-07	1.429E-05	7.535E-05	2.354E-04	5.577E-04	1.099E-03	1.680E-03
CE156	0.000E+00	1.698E-02	1.759E-02	1.907E-02	2.116E-02	2.359E-02	2.612E-02	2.835E-02
PR156	0.000E+00	1.899E+00	2.216E+00	2.575E+00	2.968E+00	3.363E+00	3.743E+00	4.039E+00
ND156	0.000E+00	1.608E+01	2.224E+01	2.746E+01	3.245E+01	3.707E+01	4.127E+01	4.429E+01
PM156	0.000E+00	8.752E+01	1.292E+02	1.603E+02	1.889E+02	2.152E+02	2.395E+02	2.569E+02
SM156	0.000E+00	1.525E+01	2.302E+01	2.849E+01	3.347E+01	3.806E+01	4.234E+01	4.546E+01
EU156	0.000E+00	1.145E+02	2.497E+02	4.492E+02	7.935E+02	1.325E+03	2.036E+03	2.706E+03
CE157	0.000E+00	1.899E-03	1.939E-03	2.083E-03	2.299E-03	2.566E-03	2.829E-03	3.073E-03
PR157	0.000E+00	2.730E-01	3.033E-01	3.449E-01	3.938E-01	4.451E-01	4.957E-01	5.368E-01
ND157	0.000E+00	8.177E+00	1.130E+01	1.419E+01	1.701E+01	1.963E+01	2.202E+01	2.372E+01
PM157	0.000E+00	3.141E+01	4.840E+01	6.192E+01	7.444E+01	8.586E+01	9.623E+01	1.035E+02
SM157	0.000E+00	3.242E+01	5.158E+01	6.564E+01	7.843E+01	9.012E+01	1.009E+02	1.085E+02
EU157	0.000E+00	1.737E+01	2.832E+01	3.754E+01	4.821E+01	6.160E+01	7.835E+01	9.500E+01
PR158	0.000E+00	2.842E-02	3.046E-02	3.390E-02	3.826E-02	4.301E-02	4.781E-02	5.185E-02
ND158	0.000E+00	9.816E-01	1.336E+00	1.683E+00	2.026E+00	2.346E+00	2.637E+00	2.845E+00
PM158	0.000E+00	1.482E+01	2.370E+01	3.111E+01	3.798E+01	4.419E+01	4.975E+01	5.356E+01
SM158	0.000E+00	7.564E+00	1.252E+01	1.633E+01	1.979E+01	2.292E+01	2.575E+01	2.772E+01
EU158	0.000E+00	2.439E+01	4.045E+01	5.266E+01	6.377E+01	7.383E+01	8.297E+01	9.137E+01
PR159	0.000E+00	1.046E-03	1.099E-03	1.207E-03	1.351E-03	1.513E-03	1.680E-03	1.824E-03
ND159	0.000E+00	1.637E-01	2.105E-01	2.598E-01	3.1103E-01	3.587E-01	4.035E-01	4.365E-01
PM159	0.000E+00	2.656E+00	4.350E+00	5.820E+00	7.195E+00	8.439E+00	9.548E+00	1.031E+01
SM159	0.000E+00	8.897E+00	1.571E+01	2.108E+01	2.599E+01	3.040E+01	3.436E+01	3.709E+01
EU159	0.000E+00	8.668E+00	1.535E+01	2.032E+01	2.522E+01	2.946E+01	3.328E+01	3.591E+01
GD159	0.000E+00	3.100E+00	5.723E+00	8.023E+00	1.046E+01	1.325E+01	1.665E+01	1.986E+01
ND160	0.000E+00	1.424E-02	1.593E-02	1.796E-02	2.028E-02	2.266E-02	2.500E-02	2.688E-02
PM160	0.000E+00	7.866E-01	1.132E+00	1.421E+00	1.695E+00	1.948E+00	2.179E+00	2.344E+00
SM160	0.000E+00	3.109E+00	5.317E+00	7.005E+00	8.543E+00	9.941E+00	1.121E+01	1.210E+01
EU160	0.000E+00	5.760E+00	1.020E+01	1.351E+01	1.651E+01	1.924E+01	2.172E+01	2.347E+01
TB160	0.000E+00	1.283E-01	9.188E-01	2.314E+00	4.419E+00	7.371E+00	1.128E+01	1.498E+01
ND161	0.000E+00	1.530E-03	1.644E-03	1.819E-03	2.043E-03	2.291E-03	2.547E-03	2.765E-03
PM161	0.000E+00	8.196E-02	1.155E-01	1.445E-01	1.728E-01	1.999E-01	2.252E-01	2.440E-01
SM161	0.000E+00	1.266E+00	2.193E+00	2.906E+00	3.561E+00	4.161E+00	4.710E+00	5.098E+00
EU161	0.000E+00	2.233E+00	4.017E+00	5.339E+00	6.539E+00	7.635E+00	8.641E+00	9.352E+00
GD161	0.000E+00	1.510E+00	2.735E+00	3.647E+00	4.483E+00	5.260E+00	5.988E+00	6.516E+00
TB161	0.000E+00	4.202E-01	7.767E-01	1.064E+00	1.356E+00	1.672E+00	2.026E+00	2.342E+00
PM162	0.000E+00	6.386E-03	7.342E-03	8.639E-03	1.009E-02	1.155E-02	1.293E-02	1.400E-02
SM162	0.000E+00	1.780E-01	2.419E-01	3.018E-01	3.614E-01	4.180E-01	4.706E-01	5.091E-01

EU162	0.000E+00	1.280E+00	2.012E+00	2.560E+00	3.071E+00	3.550E+00	3.999E+00	4.329E+00
GD162	0.000E+00	4.026E-01	6.754E-01	8.601E-01	1.027E+00	1.185E+00	1.334E+00	1.445E+00
TB162	0.000E+00	1.093E+00	1.836E+00	2.338E+00	2.792E+00	3.219E+00	3.624E+00	3.925E+00
TB162M	0.000E+00	3.523E-02	6.185E-02	7.852E-02	9.331E-02	1.073E-01	1.207E-01	1.308E-01
SM163	0.000E+00	3.876E-02	4.718E-02	5.642E-02	6.627E-02	7.602E-02	8.529E-02	9.240E-02
EU163	0.000E+00	3.034E-01	4.345E-01	5.401E-01	6.423E-01	7.402E-01	8.328E-01	9.021E-01
GD163	0.000E+00	4.645E-01	7.478E-01	9.409E-01	1.118E+00	1.287E+00	1.448E+00	1.569E+00
TB163	0.000E+00	3.031E-01	4.932E-01	6.207E-01	7.373E-01	8.480E-01	9.542E-01	1.034E+00
SM164	0.000E+00	3.226E-03	3.608E-03	4.120E-03	4.719E-03	5.347E-03	5.968E-03	6.472E-03
EU164	0.000E+00	1.052E-01	1.349E-01	1.610E-01	1.878E-01	2.146E-01	2.404E-01	2.607E-01

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL
 FISSION PRODUCTS
 POWER= 2.16550E+01 MW, BURNUP= 5.40006E+04 MWD, FLUX= 2.35E+14 N/CM**2-SEC

9 SUMMARY TABLE: THERMAL POWER, WATTS

	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
GD164	0.000E+00	1.313E-01	1.968E-01	2.419E-01	2.843E-01	3.254E-01	3.653E-01	3.961E-01
TB164	0.000E+00	3.462E-01	5.354E-01	6.602E-01	7.759E-01	8.877E-01	9.968E-01	1.081E+00
SM165	0.000E+00	3.267E-04	3.485E-04	3.864E-04	4.351E-04	4.888E-04	5.434E-04	5.898E-04
EU165	0.000E+00	1.628E-02	1.906E-02	2.193E-02	2.513E-02	2.846E-02	3.177E-02	3.446E-02
GD165	0.000E+00	1.075E-01	1.475E-01	1.766E-01	2.052E-01	2.336E-01	2.615E-01	2.836E-01
TB165	0.000E+00	1.184E-01	1.739E-01	2.106E-01	2.453E-01	2.794E-01	3.131E-01	3.396E-01
DY165	0.000E+00	9.392E-02	2.527E-01	5.076E-01	9.503E-01	1.687E+00	2.825E+00	4.035E+00
DY165M	0.000E+00	8.484E-03	2.421E-02	4.992E-02	9.479E-02	1.695E-01	2.849E-01	4.075E-01
DY166	0.000E+00	8.231E-03	1.263E-02	1.579E-02	1.888E-02	2.206E-02	2.549E-02	2.848E-02
HO166	0.000E+00	3.362E-02	6.774E-02	1.214E-01	2.224E-01	4.129E-01	7.548E-01	1.166E+00
HO166M	0.000E+00	7.916E-08	1.161E-06	5.004E-06	1.495E-05	3.739E-05	8.352E-05	1.426E-04
ER167M	0.000E+00	3.955E-05	2.013E-04	5.354E-04	1.235E-03	2.703E-03	5.711E-03	9.806E-03
ER169	0.000E+00	2.453E-06	2.395E-05	7.437E-05	1.683E-04	3.288E-04	5.955E-04	9.151E-04
TMI70	0.000E+00	2.260E-08	1.408E-06	9.153E-06	3.202E-05	8.378E-05	1.849E-04	3.113E-04
SUMTOT	0.000E+00	1.310E+06	1.247E+06	1.206E+06	1.187E+06	1.177E+06	1.172E+06	1.183E+06
TOTAL	0.000E+00	1.310E+06	1.247E+06	1.206E+06	1.187E+06	1.177E+06	1.172E+06	1.183E+06

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* IRRADIATION OF ONE METRIC TON OF BWRU FUEL

FISSION PRODUCTS

POWER= 2.16550E+01 MW, BURNUP= 5.40006E+04 MWD, FLUX= 2.35E+14 N/CM**2-SEC

9 SUMMARY TABLE: THERMAL POWER, WATTS

	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
H	0.000E+00	2.243E-03	6.862E-03	1.147E-02	1.603E-02	2.053E-02	2.495E-02	2.815E-02
CO	0.000E+00	5.263E-02	5.199E-02	5.450E-02	5.896E-02	6.446E-02	7.038E-02	7.583E-02
NI	0.000E+00	1.071E+00	1.034E+00	1.060E+00	1.123E+00	1.205E+00	1.295E+00	1.381E+00
CU	0.000E+00	9.455E+00	8.620E+00	8.308E+00	8.282E+00	8.396E+00	8.585E+00	8.872E+00
ZN	0.000E+00	6.445E+01	5.642E+01	5.197E+01	4.933E+01	4.753E+01	4.626E+01	4.620E+01
GA	0.000E+00	4.360E+02	3.760E+02	3.395E+02	3.147E+02	2.952E+02	2.793E+02	2.731E+02
GE	0.000E+00	1.663E+03	1.424E+03	1.274E+03	1.169E+03	1.083E+03	1.011E+03	9.784E+02
AS	0.000E+00	7.257E+03	6.177E+03	5.481E+03	4.974E+03	4.550E+03	4.186E+03	4.005E+03
SE	0.000E+00	1.518E+04	1.289E+04	1.139E+04	1.027E+04	9.321E+03	8.505E+03	8.085E+03
BR	0.000E+00	4.540E+04	3.803E+04	3.313E+04	2.941E+04	2.624E+04	2.347E+04	2.197E+04
KR	0.000E+00	5.843E+04	4.947E+04	4.351E+04	3.903E+04	3.522E+04	3.190E+04	3.015E+04
RB	0.000E+00	1.120E+05	9.622E+04	8.563E+04	7.774E+04	7.106E+04	6.530E+04	6.237E+04
SR	0.000E+00	8.781E+04	7.844E+04	7.206E+04	6.757E+04	6.390E+04	6.084E+04	5.957E+04
Y	0.000E+00	1.297E+05	1.189E+05	1.115E+05	1.066E+05	1.027E+05	9.963E+04	9.877E+04
ZR	0.000E+00	5.761E+04	5.546E+04	5.308E+04	5.308E+04	5.268E+04	5.252E+04	5.295E+04
NB	0.000E+00	1.103E+05	1.105E+05	1.100E+05	1.109E+05	1.122E+05	1.138E+05	1.161E+05
MO	0.000E+00	3.542E+04	3.955E+04	4.258E+04	4.569E+04	4.870E+04	5.161E+04	5.400E+04
TC	0.000E+00	4.048E+04	4.978E+04	5.663E+04	6.331E+04	6.973E+04	7.593E+04	8.077E+04
RU	0.000E+00	7.088E+03	1.015E+04	1.223E+04	1.415E+04	1.595E+04	1.763E+04	1.888E+04
RH	0.000E+00	5.233E+03	9.760E+03	1.358E+04	1.719E+04	2.058E+04	2.371E+04	2.592E+04
PD	0.000E+00	9.244E+02	1.183E+03	1.412E+03	1.654E+03	1.905E+03	2.164E+03	2.376E+03
AG	0.000E+00	1.272E+03	1.551E+03	1.895E+03	2.331E+03	2.843E+03	3.414E+03	3.903E+03
CD	0.000E+00	8.552E+02	8.978E+02	9.572E+02	1.036E+03	1.125E+03	1.217E+03	1.298E+03
IN	0.000E+00	3.728E+03	3.893E+03	4.088E+03	4.346E+03	4.629E+03	4.923E+03	5.189E+03
SN	0.000E+00	1.026E+04	1.009E+04	1.006E+04	1.019E+04	1.039E+04	1.061E+04	1.089E+04
SB	0.000E+00	4.215E+04	4.104E+04	4.047E+04	4.053E+04	4.083E+04	4.128E+04	4.205E+04
TE	0.000E+00	4.946E+04	4.633E+04	4.449E+04	4.353E+04	4.287E+04	4.241E+04	4.256E+04
I	0.000E+00	1.080E+05	1.034E+05	1.006E+05	9.945E+04	9.893E+04	9.889E+04	9.995E+04
XE	0.000E+00	5.643E+04	5.267E+04	5.027E+04	4.888E+04	4.775E+04	4.692E+04	4.685E+04
CS	0.000E+00	9.954E+04	9.341E+04	8.981E+04	8.812E+04	8.726E+04	8.703E+04	8.795E+04
BA	0.000E+00	5.963E+04	5.584E+04	5.331E+04	5.180E+04	5.071E+04	4.995E+04	5.002E+04
LA	0.000E+00	1.028E+05	9.652E+04	9.221E+04	8.966E+04	8.784E+04	8.661E+04	8.681E+04
CE	0.000E+00	2.332E+04	2.241E+04	2.171E+04	2.133E+04	2.108E+04	2.093E+04	2.107E+04
PR	0.000E+00	3.027E+04	3.192E+04	3.215E+04	3.220E+04	3.220E+04	3.227E+04	3.260E+04
ND	0.000E+00	3.679E+03	3.852E+03	3.990E+03	4.165E+03	4.349E+03	4.542E+03	4.720E+03
PM	0.000E+00	2.747E+03	3.786E+03	4.60E+03	4.766E+03	5.073E+03	5.321E+03	5.530E+03
SM	0.000E+00	2.450E+02	4.243E+02	5.905E+02	7.609E+02	9.342E+02	1.107E+03	1.245E+03
EU	0.000E+00	1.762E+02	3.629E+02	6.173E+02	1.028E+03	1.637E+03	2.431E+03	3.164E+03
GD	0.000E+00	5.715E+00	1.023E+01	1.399E+01	1.759E+01	2.156E+01	2.608E+01	3.011E+01
TB	0.000E+00	2.444E+00	4.796E+00	7.285E+00	1.042E+01	1.438E+01	1.931E+01	2.383E+01
DY	0.000E+00	1.106E-01	2.896E-01	5.734E-01	1.064E+00	1.878E+00	3.136E+00	4.471E+00

HO	0.000E+00	3.362E-02	6.774E-02	1.214E-01	2.224E-01	4.129E-01	7.549E-01	1.166E+00
ER	0.000E+00	4.200E-05	2.252E-04	6.098E-04	1.403E-03	3.032E-03	6.307E-03	1.072E-02
TM	0.000E+00	2.261E-08	1.411E-06	9.184E-06	3.218E-05	8.441E-05	1.868E-04	3.153E-04
SUMTOT	0.000E+00	1.310E+06	1.247E+06	1.206E+06	1.187E+06	1.177E+06	1.172E+06	1.183E+06
TOTAL	0.000E+00	1.310E+06	1.247E+06	1.206E+06	1.187E+06	1.177E+06	1.172E+06	1.183E+06

CUMULATIVE TABLE TOTALS

AP+FP	0.000E+00	1.310E+06	1.247E+06	1.206E+06	1.187E+06	1.177E+06	1.172E+06	1.183E+06
ACT+FP	6.533E-02	1.358E+06	1.297E+06	1.260E+06	1.248E+06	1.246E+06	1.251E+06	1.270E+06
AP+ACT+FP	6.533E-02	1.358E+06	1.297E+06	1.260E+06	1.248E+06	1.246E+06	1.251E+06	1.270E+06

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15
 IRRADIATION OF ONE METRIC TON OF BWRU FUEL
 (ALPHA,N) NEUTRON SOURCE, NEUTRONS/SEC

BASIS=	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
U234	1.059E+03	9.985E+02	8.862E+02	7.805E+02	6.799E+02	5.857E+02	5.003E+02	4.444E+02
U235	3.107E+01	2.721E+01	2.080E+01	1.560E+01	1.135E+01	7.969E+00	5.374E+00	3.918E+00
U238	1.016E+02	1.013E+02	1.007E+02	1.001E+02	9.945E+01	9.871E+01	9.789E+01	9.723E+01
PU238	0.000E+00	1.530E+04	2.348E+05	9.090E+05	2.257E+06	4.386E+06	7.235E+06	9.659E+06
PU239	0.000E+00	8.450E+04	1.726E+05	2.152E+05	2.417E+05	2.630E+05	2.833E+05	2.997E+05
PU240	0.000E+00	2.592E+04	1.218E+05	2.143E+05	3.029E+05	3.965E+05	5.025E+05	5.948E+05
AM241	0.000E+00	7.573E+02	2.716E+04	9.748E+04	1.828E+05	2.538E+05	2.988E+05	3.163E+05
CM242	0.000E+00	4.225E+04	3.847E+06	2.027E+07	4.810E+07	7.891E+07	1.049E+08	1.188E+08
CM244	0.000E+00	5.382E+01	2.204E+04	3.066E+05	1.576E+06	5.017E+06	1.192E+07	1.973E+07

 TOTALS

TABLE	1.192E+03	1.700E+05	4.427E+06	2.203E+07	5.269E+07	8.930E+07	1.252E+08	1.496E+08
ACTUAL	1.192E+03	1.700E+05	4.427E+06	2.203E+07	5.269E+07	8.930E+07	1.252E+08	1.496E+08

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15
 IRRADIATION OF ONE METRIC TON OF BWRU FUEL
 SPONTANEOUS FISSION NEUTRON SOURCE, NEUTRONS/SEC

	BASIS=									
	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	2200.0D	2200.0D	2200.0D	EOC #1
U235	1.385E+01	1.213E+01	9.273E+00	6.955E+00	5.063E+00	3.553E+00	2.396E+00	1.747E+00	1.166E+00	1.747E+00
U238	1.219E+04	1.215E+04	1.208E+04	1.201E+04	1.193E+04	1.184E+04	1.174E+04	1.166E+04	1.166E+04	1.166E+04
Pu238	0.000E+00	2.495E+03	3.829E+04	1.482E+05	3.680E+05	7.153E+05	1.180E+06	1.575E+06	1.575E+06	1.575E+06
Pu240	0.000E+00	1.366E+05	6.421E+05	1.130E+06	1.597E+06	2.090E+06	2.649E+06	3.135E+06	3.135E+06	3.135E+06
Pu242	0.000E+00	1.563E+03	6.163E+04	2.525E+05	5.543E+05	9.090E+05	1.259E+06	1.488E+06	1.488E+06	1.488E+06
CM242	0.000E+00	2.050E+05	1.867E+07	9.837E+07	2.334E+08	3.829E+08	5.089E+08	5.766E+08	5.766E+08	5.766E+08
CM244	0.000E+00	6.480E+03	2.654E+06	3.691E+07	1.898E+08	6.041E+08	1.435E+09	2.375E+09	2.375E+09	2.375E+09
CM246	0.000E+00	2.276E-01	8.905E+02	3.782E+04	4.265E+05	2.510E+06	9.914E+06	2.271E+07	2.271E+07	2.271E+07
CF252	0.000E+00	9.620E-08	1.933E-01	1.415E+02	1.097E+04	2.822E+05	3.688E+06	1.797E+07	1.797E+07	1.797E+07

 TOTALS

TABLE	1.220E+04	3.644E+05	2.207E+07	1.369E+08	4.262E+08	9.935E+08	1.963E+09	3.000E+09	3.000E+09	3.000E+09
ACTUAL	1.220E+04	3.644E+05	2.207E+07	1.369E+08	4.262E+08	9.935E+08	1.963E+09	3.000E+09	3.000E+09	3.000E+09

 OVERALL

TOTALS	1.339E+04	5.343E+05	2.650E+07	1.589E+08	4.789E+08	1.083E+09	2.088E+09	3.149E+09	3.149E+09	3.149E+09
TABLE	1.339E+04	5.343E+05	2.650E+07	1.589E+08	4.789E+08	1.083E+09	2.088E+09	3.149E+09	3.149E+09	3.149E+09
ACTUAL	1.339E+04	5.343E+05	2.650E+07	1.589E+08	4.789E+08	1.083E+09	2.088E+09	3.149E+09	3.149E+09	3.149E+09

Calc. No. 2004-07600
Project No. 11163-013
Attachment B2

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OUTPUT UNIT = 6

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

PHOTON SPECTRUM FOR ACTINIDES + DAUGHTERS

IRRADIATION OF ONE METRIC TON OF BWRU FUEL

POWER= 21.66 MW, BURNUP= 54001. MWD, FLUX= 2.35E+14 N/CM**2-SEC

18 GROUP PHOTON RELEASE RATES, PHOTONS/SECOND

BASIS=

EMEAN	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
1.000E-02	1.283E+10	4.875E+17	4.981E+17	5.370E+17	5.967E+17	6.687E+17	7.458E+17	8.146E+17
2.500E-02	0.000E+00	2.147E+16	2.190E+16	2.359E+16	2.624E+16	2.949E+16	3.304E+16	3.624E+16
3.750E-02	2.870E+06	3.198E+16	3.233E+16	3.433E+16	3.809E+16	4.248E+16	4.725E+16	5.158E+16
5.750E-02	8.463E+07	2.521E+16	2.781E+16	3.159E+16	3.638E+16	4.172E+16	4.712E+16	5.166E+16
8.500E-02	2.452E+08	2.219E+17	2.251E+17	2.410E+17	2.660E+17	2.964E+17	3.291E+17	3.585E+17
1.250E-01	5.114E+08	1.745E+17	1.780E+17	1.911E+17	2.111E+17	2.350E+17	2.604E+17	2.832E+17
2.250E-01	1.713E+09	1.235E+17	1.260E+17	1.353E+17	1.495E+17	1.665E+17	1.845E+17	2.007E+17
3.750E-01	4.275E+06	1.347E+16	1.368E+16	1.466E+16	1.620E+16	1.806E+16	2.008E+16	2.189E+16
5.750E-01	2.424E+05	2.252E+15	2.279E+15	2.446E+15	2.718E+15	3.059E+15	3.438E+15	3.787E+15
8.500E-01	5.584E+04	3.326E+15	3.857E+15	4.929E+15	6.530E+15	8.595E+15	1.098E+16	1.300E+16
1.250E+00	1.183E+04	1.228E+14	1.378E+14	1.769E+14	1.764E+15	2.793E+15	3.996E+15	4.997E+15
1.750E+00	5.790E+03	3.806E+11	3.895E+11	4.440E+11	5.384E+11	6.664E+11	8.210E+11	9.762E+11
2.250E+00	3.350E+03	8.671E+04	4.689E+06	2.857E+07	8.766E+07	2.016E+08	3.939E+08	5.980E+08
2.750E+00	1.944E+03	3.212E+05	6.072E+06	3.024E+07	8.822E+07	1.972E+08	3.735E+08	5.525E+08
3.500E+00	1.736E+03	4.458E+04	2.432E+06	1.484E+07	4.588E+07	1.049E+08	2.052E+08	3.117E+08
5.000E+00	7.445E+02	1.896E+04	1.040E+06	6.348E+06	1.950E+07	4.489E+07	8.779E+07	1.333E+08
7.000E+00	8.556E+01	2.164E+03	1.195E+05	7.296E+05	2.243E+06	5.168E+06	1.011E+07	1.536E+07
9.500E+00	9.827E+00	2.483E+02	1.377E+04	8.410E+04	2.583E+05	5.948E+05	1.163E+06	1.767E+06
TOTAL	1.539E+10	1.105E+18	1.129E+18	1.217E+18	1.351E+18	1.513E+18	1.686E+18	1.840E+18
MEV/SEC	6.054E+08	8.585E+16	8.834E+16	9.620E+16	1.082E+17	1.228E+17	1.386E+17	1.527E+17

18 GROUP SPECIFIC ENERGY RELEASE RATES, MEV/WATT-SEC

BASIS=

EMEAN	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
1.000E-02	5.926E+00	2.251E+08	2.300E+08	2.480E+08	2.755E+08	3.088E+08	3.444E+08	3.762E+08
2.500E-02	0.000E+00	2.479E+07	2.528E+07	2.723E+07	3.029E+07	3.404E+07	3.815E+07	4.183E+07
3.750E-02	4.970E-03	5.538E+07	5.598E+07	5.980E+07	6.597E+07	7.356E+07	8.183E+07	8.933E+07
5.750E-02	2.247E-01	6.693E+07	7.384E+07	8.389E+07	9.661E+07	1.108E+08	1.251E+08	1.372E+08
8.500E-02	9.624E-01	8.710E+08	8.835E+08	9.458E+08	1.044E+09	1.163E+09	1.292E+09	1.407E+09
1.250E-01	2.952E+00	1.007E+09	1.027E+09	1.103E+09	1.218E+09	1.356E+09	1.503E+09	1.635E+09
2.250E-01	1.780E+01	1.283E+09	1.309E+09	1.406E+09	1.553E+09	1.730E+09	1.917E+09	2.086E+09
3.750E-01	7.403E-02	2.332E+08	2.369E+08	2.539E+08	2.805E+08	3.128E+08	3.477E+08	3.791E+08
5.750E-01	6.436E-03	5.979E+07	6.051E+07	6.495E+07	7.218E+07	8.123E+07	9.128E+07	1.005E+08
8.500E-01	2.192E-03	1.306E+08	1.514E+08	1.935E+08	2.563E+08	3.374E+08	4.308E+08	5.103E+08
1.250E+00	6.829E-04	7.088E+06	2.527E+07	5.639E+07	1.018E+08	1.612E+08	2.306E+08	2.884E+08
1.750E+00	4.679E-04	3.076E+04	3.148E+04	3.588E+04	4.351E+04	5.385E+04	6.634E+04	7.889E+04
2.250E+00	3.480E-04	9.009E-03	4.872E-01	2.969E+00	9.108E+00	2.095E+01	4.093E+01	6.213E+01

2.750E+00	2.469E-04	4.078E-02	7.711E-01	3.840E+00	1.120E+01	2.504E+01	4.743E+01	7.017E+01
3.500E+00	2.806E-04	7.205E-03	3.931E-01	2.399E+00	7.367E+00	1.696E+01	3.317E+01	5.037E+01
5.000E+00	1.719E-04	4.379E-03	2.402E-01	1.466E+00	4.502E+00	1.037E+01	2.027E+01	3.078E+01
7.000E+00	2.766E-05	6.995E-04	3.861E-02	2.359E-01	7.250E-01	1.670E+00	3.269E+00	4.966E+00
9.500E+00	4.311E-06	1.089E-04	6.043E-03	3.690E-02	1.133E-01	2.609E-01	5.103E-01	7.750E-01
TOTAL	2.796E+01	3.964E+09	4.079E+09	4.442E+09	4.995E+09	5.669E+09	6.402E+09	7.050E+09
GAM POW	9.704E-05	1.376E+04	1.416E+04	1.542E+04	1.734E+04	1.968E+04	2.222E+04	2.447E+04

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

PRINCIPAL PHOTON SOURCES IN GROUP 1, PHOTONS/SEC
 MEAN ENERGY= 0.010MEV

NUCLIDE	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
U234	9.591E+09	9.043E+09	8.026E+09	7.069E+09	6.158E+09	5.305E+09	4.531E+09	4.025E+09
U235	1.880E+09	1.646E+09	1.258E+09	9.439E+08	6.871E+08	4.822E+08	3.252E+08	2.371E+08
U237	0.000E+00	4.681E+15	9.689E+15	1.431E+16	1.892E+16	2.333E+16	2.717E+16	2.987E+16
U238	1.362E+09	1.358E+09	1.351E+09	1.342E+09	1.333E+09	1.323E+09	1.312E+09	1.304E+09
U239	0.000E+00	1.578E+17	1.591E+17	1.649E+17	1.859E+17	2.060E+17	2.277E+17	2.474E+17
NP238	0.000E+00	2.244E+14	1.231E+15	2.941E+15	5.436E+15	8.697E+15	1.251E+16	1.568E+16
NP239	0.000E+00	3.244E+17	3.272E+17	3.483E+17	3.822E+17	4.236E+17	4.681E+17	5.086E+17

PRINCIPAL PHOTON SOURCES IN GROUP 2, PHOTONS/SEC
 MEAN ENERGY= 0.025MEV

NUCLIDE	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
U237	0.000E+00	1.738E+14	3.597E+14	5.313E+14	7.023E+14	8.660E+14	1.009E+15	1.109E+15
U239	0.000E+00	1.704E+16	1.719E+16	1.829E+16	2.008E+16	2.225E+16	2.459E+16	2.672E+16
NP238	0.000E+00	8.756E+12	4.801E+13	1.147E+14	2.121E+14	3.393E+14	4.880E+14	6.116E+14
NP239	0.000E+00	4.239E+15	4.276E+15	4.551E+15	4.994E+15	5.535E+15	6.116E+15	6.646E+15
AM244M	0.000E+00	2.843E+10	3.617E+12	2.865E+13	1.029E+14	2.515E+14	4.825E+14	7.068E+14

PRINCIPAL PHOTON SOURCES IN GROUP 3, PHOTONS/SEC
 MEAN ENERGY= 0.038MEV

NUCLIDE	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
U235	2.870E+06	2.514E+06	1.921E+06	1.441E+06	1.049E+06	7.362E+05	4.965E+05	3.620E+05
U239	0.000E+00	2.906E+16	2.932E+16	3.120E+16	3.424E+16	3.795E+16	4.195E+16	4.558E+16
NP239	0.000E+00	2.880E+15	2.905E+15	3.092E+15	3.393E+15	3.760E+15	4.155E+15	4.515E+15

PRINCIPAL PHOTON SOURCES IN GROUP 4, PHOTONS/SEC
 MEAN ENERGY= 0.058MEV

NUCLIDE	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
U234	7.687E+07	7.248E+07	6.433E+07	5.666E+07	4.935E+07	4.251E+07	3.632E+07	3.226E+07
U237	0.000E+00	2.197E+15	4.548E+15	6.718E+15	8.881E+15	1.095E+16	1.275E+16	1.402E+16
U238	7.205E+06	7.184E+06	7.144E+06	7.100E+06	7.053E+06	7.000E+06	6.942E+06	6.896E+06
U239	0.000E+00	1.522E+16	1.535E+16	1.634E+16	1.793E+16	1.987E+16	2.196E+16	2.386E+16
NP238	0.000E+00	7.481E+12	4.102E+13	9.803E+13	1.812E+14	2.899E+14	4.169E+14	5.226E+14
NP239	0.000E+00	7.778E+15	7.845E+15	8.350E+15	9.163E+15	1.015E+16	1.122E+16	1.219E+16
AM244M	0.000E+00	2.610E+10	3.320E+12	2.630E+13	9.445E+13	2.308E+14	4.430E+14	6.489E+14

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

PRINCIPAL PHOTON SOURCES IN GROUP 5, PHOTONS/SEC
 MEAN ENERGY= 0.085MEV

NUCLIDE	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
U235	2.452E+08	2.148E+08	1.641E+08	1.231E+08	8.962E+07	6.290E+07	4.241E+07	3.093E+07
U237	0.000E+00	1.020E+15	2.112E+15	3.119E+15	4.123E+15	5.084E+15	5.921E+15	6.511E+15
U239	0.000E+00	1.630E+17	1.644E+17	1.750E+17	1.921E+17	2.129E+17	2.353E+17	2.557E+17
NP239	0.000E+00	5.781E+16	5.831E+16	6.206E+16	6.810E+16	7.547E+16	8.340E+16	9.063E+16
PU243	0.000E+00	3.397E+12	1.342E+14	5.740E+14	1.357E+15	2.423E+15	3.644E+15	4.598E+15

PRINCIPAL PHOTON SOURCES IN GROUP 6, PHOTONS/SEC
 MEAN ENERGY= 0.125MEV

NUCLIDE	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
U234	2.729E+07	2.573E+07	2.284E+07	2.012E+07	1.752E+07	1.509E+07	1.289E+07	1.145E+07
U235	4.841E+08	4.240E+08	3.241E+08	2.431E+08	1.769E+08	1.242E+08	8.374E+07	6.106E+07
U237	0.000E+00	1.777E+15	3.678E+15	5.433E+15	7.182E+15	8.856E+15	1.031E+16	1.134E+16
U239	0.000E+00	5.925E+15	5.976E+15	6.361E+15	6.981E+15	7.737E+15	8.551E+15	9.293E+15
NP239	0.000E+00	1.668E+17	1.682E+17	1.790E+17	1.965E+17	2.177E+17	2.406E+17	2.615E+17

PRINCIPAL PHOTON SOURCES IN GROUP 7, PHOTONS/SEC
 MEAN ENERGY= 0.225MEV

NUCLIDE	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
U235	1.713E+09	1.501E+09	1.147E+09	8.602E+08	6.262E+08	4.395E+08	2.964E+08	2.161E+08
U237	0.000E+00	1.340E+15	2.773E+15	4.096E+15	5.415E+15	6.677E+15	7.775E+15	8.550E+15
U239	0.000E+00	6.486E+15	6.542E+15	6.963E+15	7.642E+15	8.470E+15	9.361E+15	1.017E+16
NP239	0.000E+00	1.156E+17	1.166E+17	1.241E+17	1.362E+17	1.509E+17	1.668E+17	1.813E+17

PRINCIPAL PHOTON SOURCES IN GROUP 8, PHOTONS/SEC
 MEAN ENERGY= 0.375MEV

NUCLIDE	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
U235	4.275E+06	3.745E+06	2.862E+06	2.147E+06	1.563E+06	1.097E+06	7.395E+05	5.392E+05
U237	0.000E+00	7.904E+13	1.636E+14	2.416E+14	3.194E+14	3.939E+14	4.587E+14	5.044E+14
U239	0.000E+00	2.198E+15	2.217E+15	2.360E+15	2.590E+15	2.871E+15	3.173E+15	3.448E+15
NP239	0.000E+00	1.114E+16	1.124E+16	1.196E+16	1.313E+16	1.455E+16	1.607E+16	1.747E+16

PRINCIPAL PHOTON SOURCES IN GROUP 9, PHOTONS/SEC
 MEAN ENERGY= 0.575MEV

NUCLIDE	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
U234	3.209E+04	3.026E+04	2.685E+04	2.365E+04	2.060E+04	1.775E+04	1.516E+04	1.347E+04

U235	2.103E+05	1.842E+05	1.408E+05	1.056E+05	7.687E+04	5.394E+04	3.638E+04	2.653E+04
U239	0.000E+00	2.068E+15	2.086E+15	2.221E+15	2.437E+15	2.701E+15	2.985E+15	3.244E+15
NP238	0.000E+00	1.208E+12	6.622E+12	1.583E+13	2.925E+13	4.680E+13	6.731E+13	8.436E+13
NP239	0.000E+00	4.800E+13	4.841E+13	5.153E+13	5.655E+13	6.267E+13	6.925E+13	7.525E+13
NP240	0.000E+00	1.210E+14	1.239E+14	1.412E+14	1.712E+14	2.118E+14	2.609E+14	3.101E+14
AM244M	0.000E+00	1.568E+09	1.995E+11	1.580E+12	5.674E+12	1.387E+13	2.661E+13	3.898E+13

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

PRINCIPAL PHOTON SOURCES IN GROUP 10, PHOTONS/SEC
 MEAN ENERGY= 0.850MEV

NUCLIDE	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
U234	2.080E+03	1.962E+03	1.741E+03	1.533E+03	1.336E+03	1.151E+03	9.829E+02	8.731E+02
U235	2.867E+04	2.511E+04	1.919E+04	1.439E+04	1.048E+04	7.354E+03	4.959E+03	3.616E+03
U238	2.509E+04	2.502E+04	2.488E+04	2.473E+04	2.456E+04	2.438E+04	2.418E+04	2.401E+04
U239	0.000E+00	3.064E+15	3.091E+15	3.290E+15	3.610E+15	4.001E+15	4.422E+15	4.806E+15
NP238	0.000E+00	1.117E+14	6.125E+14	1.464E+15	2.706E+15	4.329E+15	6.226E+15	7.803E+15
NP240	0.000E+00	1.478E+14	1.513E+14	1.724E+14	2.091E+14	2.587E+14	3.186E+14	3.788E+14

PRINCIPAL PHOTON SOURCES IN GROUP 11, PHOTONS/SEC
 MEAN ENERGY= 1.250MEV

NUCLIDE	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
U234	1.354E+02	1.277E+02	1.133E+02	9.980E+01	8.693E+01	7.489E+01	6.397E+01	5.683E+01
U238	1.167E+04	1.164E+04	1.157E+04	1.150E+04	1.143E+04	1.134E+04	1.125E+04	1.117E+04
U239	0.000E+00	3.611E+13	3.642E+13	3.877E+13	4.255E+13	4.716E+13	5.212E+13	5.664E+13
NP238	0.000E+00	7.012E+13	3.844E+14	9.188E+14	1.698E+15	2.717E+15	3.908E+15	4.898E+15
NP240	0.000E+00	1.558E+13	1.594E+13	1.817E+13	2.203E+13	2.726E+13	3.357E+13	3.991E+13

PRINCIPAL PHOTON SOURCES IN GROUP 12, PHOTONS/SEC
 MEAN ENERGY= 1.750MEV

NUCLIDE	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
U234	6.777E+01	6.390E+01	5.672E+01	4.995E+01	4.351E+01	3.748E+01	3.202E+01	2.844E+01
U238	5.711E+03	5.695E+03	5.663E+03	5.629E+03	5.591E+03	5.549E+03	5.503E+03	5.466E+03
NP240M	0.000E+00	3.806E+11	3.895E+11	4.439E+11	5.382E+11	6.660E+11	8.202E+11	9.751E+11

PRINCIPAL PHOTON SOURCES IN GROUP 13, PHOTONS/SEC
 MEAN ENERGY= 2.250MEV

NUCLIDE	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
U234	3.406E+01	3.212E+01	2.851E+01	2.511E+01	2.187E+01	1.884E+01	1.609E+01	1.430E+01
U238	3.310E+03	3.300E+03	3.282E+03	3.262E+03	3.240E+03	3.216E+03	3.189E+03	3.168E+03
Pu238	0.000E+00	8.802E+02	1.351E+04	5.231E+04	1.299E+05	2.524E+05	4.163E+05	5.558E+05
Pu239	0.000E+00	2.060E+03	4.207E+03	5.245E+03	5.892E+03	6.411E+03	6.905E+03	7.306E+03
Pu240	0.000E+00	3.492E+04	1.641E+05	2.887E+05	4.082E+05	5.342E+05	6.770E+05	8.014E+05
CM242	0.000E+00	4.354E+04	3.964E+06	2.089E+07	4.957E+07	8.132E+07	1.081E+08	1.225E+08
CM244	0.000E+00	1.274E+03	5.216E+05	7.254E+06	3.730E+07	1.187E+08	2.820E+08	4.668E+08

U238	9.797E+00	9.770E+00	9.715E+00	9.656E+00	9.591E+00	9.519E+00	9.440E+00	9.377E+00
PU240	0.000E+00	1.020E+02	4.793E+02	8.432E+02	1.192E+03	1.560E+03	1.977E+03	2.340E+03
CM242	0.000E+00	1.281E+02	1.166E+04	6.144E+04	1.458E+05	2.392E+05	3.179E+05	3.602E+05
CM244	0.000E+00	3.768E+00	1.543E+03	2.146E+04	1.104E+05	3.513E+05	8.343E+05	1.381E+06

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15
 PHOTON SPECTRUM FOR FISSION PRODUCTS

IRRADIATION OF ONE METRIC TON OF BWRU FUEL
 POWER= 21.66 MW, BURNUP= 54001. MWD, FLUX= 2.35E+14 N/CM**2-SEC

18 GROUP PHOTON RELEASE RATES, PHOTONS/SECOND
 BASIS=

EMEAN	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
1.000E-02	0.000E+00	1.376E+18	1.319E+18	1.279E+18	1.259E+18	1.248E+18	1.245E+18	1.257E+18
2.500E-02	0.000E+00	3.494E+17	3.378E+17	3.297E+17	3.268E+17	3.262E+17	3.273E+17	3.320E+17
3.750E-02	0.000E+00	2.881E+17	2.780E+17	2.707E+17	2.677E+17	2.666E+17	2.671E+17	2.707E+17
5.750E-02	0.000E+00	2.964E+17	2.836E+17	2.749E+17	2.708E+17	2.687E+17	2.682E+17	2.710E+17
8.500E-02	0.000E+00	2.189E+17	2.092E+17	2.024E+17	1.991E+17	1.973E+17	1.967E+17	1.986E+17
1.250E-01	0.000E+00	2.294E+17	2.218E+17	2.160E+17	2.135E+17	2.125E+17	2.128E+17	2.156E+17
2.250E-01	0.000E+00	5.218E+17	4.959E+17	4.780E+17	4.680E+17	4.612E+17	4.571E+17	4.593E+17
3.750E-01	0.000E+00	3.380E+17	3.335E+17	3.306E+17	3.321E+17	3.352E+17	3.395E+17	3.460E+17
5.750E-01	0.000E+00	5.671E+17	5.570E+17	5.505E+17	5.525E+17	5.582E+17	5.670E+17	5.797E+17
8.500E-01	0.000E+00	6.214E+17	6.067E+17	5.875E+17	5.788E+17	5.749E+17	5.752E+17	5.823E+17
1.250E+00	0.000E+00	3.736E+17	3.507E+17	3.353E+17	3.264E+17	3.205E+17	3.171E+17	3.188E+17
1.750E+00	0.000E+00	1.352E+17	1.281E+17	1.234E+17	1.209E+17	1.194E+17	1.187E+17	1.197E+17
2.250E+00	0.000E+00	7.361E+16	6.806E+16	6.427E+16	6.188E+16	6.015E+16	5.896E+16	5.895E+16
2.750E+00	0.000E+00	3.164E+16	2.926E+16	2.762E+16	2.655E+16	2.572E+16	2.508E+16	2.495E+16
3.500E+00	0.000E+00	1.845E+16	1.636E+16	1.492E+16	1.388E+16	1.302E+16	1.229E+16	1.196E+16
5.000E+00	0.000E+00	9.598E+15	8.135E+15	7.140E+15	6.388E+15	5.734E+15	5.170E+15	4.869E+15
7.000E+00	0.000E+00	7.896E+13	6.823E+13	6.105E+13	5.573E+13	5.124E+13	4.736E+13	4.541E+13
9.500E+00	0.000E+00	1.592E+10	1.384E+10	1.256E+10	1.167E+10	1.093E+10	1.029E+10	9.983E+09
TOTAL	0.000E+00	5.449E+18	5.244E+18	5.092E+18	5.024E+18	4.994E+18	4.993E+18	5.052E+18
MEV/SEC	0.000E+00	2.265E+18	2.161E+18	2.083E+18	2.042E+18	2.019E+18	2.009E+18	2.028E+18

18 GROUP SPECIFIC ENERGY RELEASE RATES, MEV/WATT-SEC
 BASIS=

EMEAN	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
1.000E-02	0.000E+00	6.355E+08	6.092E+08	5.905E+08	5.814E+08	5.765E+08	5.748E+08	5.805E+08
2.500E-02	0.000E+00	4.034E+08	3.900E+08	3.807E+08	3.773E+08	3.766E+08	3.779E+08	3.832E+08
3.750E-02	0.000E+00	4.989E+08	4.815E+08	4.689E+08	4.636E+08	4.617E+08	4.625E+08	4.688E+08
5.750E-02	0.000E+00	7.870E+08	7.531E+08	7.299E+08	7.191E+08	7.135E+08	7.120E+08	7.195E+08
8.500E-02	0.000E+00	8.592E+08	8.210E+08	7.946E+08	7.816E+08	7.744E+08	7.720E+08	7.795E+08
1.250E-01	0.000E+00	1.324E+09	1.280E+09	1.247E+09	1.232E+09	1.227E+09	1.228E+09	1.245E+09
2.250E-01	0.000E+00	5.422E+09	5.153E+09	4.966E+09	4.862E+09	4.792E+09	4.749E+09	4.773E+09
3.750E-01	0.000E+00	5.853E+09	5.766E+09	5.726E+09	5.751E+09	5.804E+09	5.879E+09	5.992E+09
5.750E-01	0.000E+00	1.506E+10	1.479E+10	1.462E+10	1.467E+10	1.482E+10	1.505E+10	1.539E+10
8.500E-01	0.000E+00	2.439E+10	2.381E+10	2.306E+10	2.272E+10	2.257E+10	2.258E+10	2.286E+10
1.250E+00	0.000E+00	2.157E+10	2.025E+10	1.935E+10	1.884E+10	1.850E+10	1.830E+10	1.840E+10
1.750E+00	0.000E+00	1.093E+10	1.036E+10	9.969E+09	9.767E+09	9.647E+09	9.593E+09	9.677E+09
2.250E+00	0.000E+00	7.648E+09	7.072E+09	6.678E+09	6.429E+09	6.249E+09	6.126E+09	6.125E+09

2.750E+00	0.000E+00	4.019E+09	3.716E+09	3.507E+09	3.371E+09	3.266E+09	3.184E+09	3.168E+09
3.500E+00	0.000E+00	2.982E+09	2.644E+09	2.412E+09	2.244E+09	2.104E+09	1.986E+09	1.933E+09
5.000E+00	0.000E+00	2.216E+09	1.878E+09	1.649E+09	1.474E+09	1.324E+09	1.194E+09	1.124E+09
7.000E+00	0.000E+00	2.553E+07	2.205E+07	1.973E+07	1.802E+07	1.656E+07	1.531E+07	1.468E+07
9.500E+00	0.000E+00	6.985E+03	6.070E+03	5.511E+03	5.119E+03	4.794E+03	4.513E+03	4.380E+03
TOTAL	0.000E+00	1.046E+11	9.980E+10	9.617E+10	9.430E+10	9.322E+10	9.278E+10	9.364E+10
GAM POW	0.000E+00	3.631E+05	3.464E+05	3.338E+05	3.274E+05	3.236E+05	3.221E+05	3.250E+05

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

PRINCIPAL PHOTON SOURCES IN GROUP 1, PHOTONS/SEC
 MEAN ENERGY= 0.010MEV

NUCLIDE	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
BR 88	0.000E+00	2.064E+16	1.725E+16	1.498E+16	1.324E+16	1.175E+16	1.045E+16	9.736E+15
RB 88	0.000E+00	2.650E+16	2.271E+16	2.008E+16	1.810E+16	1.641E+16	1.495E+16	1.421E+16
KR 89	0.000E+00	2.250E+16	1.902E+16	1.663E+16	1.481E+16	1.325E+16	1.189E+16	1.116E+16
RB 89	0.000E+00	1.744E+16	1.488E+16	1.310E+16	1.175E+16	1.059E+16	9.593E+15	9.069E+15
KR 90	0.000E+00	2.311E+16	1.946E+16	1.700E+16	1.513E+16	1.352E+16	1.211E+16	1.135E+16
RB 90	0.000E+00	3.057E+16	2.591E+16	2.271E+16	2.027E+16	1.818E+16	1.636E+16	1.538E+16
SR 91	0.000E+00	1.385E+16	1.200E+16	1.072E+16	9.751E+15	8.935E+15	8.238E+15	7.892E+15
RB 92	0.000E+00	5.673E+16	4.899E+16	4.380E+16	3.995E+16	3.668E+16	3.387E+16	3.245E+16
Y 92	0.000E+00	3.182E+16	2.805E+16	2.539E+16	2.342E+16	2.178E+16	2.040E+16	1.976E+16
Y 93	0.000E+00	2.856E+16	2.568E+16	2.363E+16	2.215E+16	2.094E+16	1.994E+16	1.955E+16
RB 94	0.000E+00	2.399E+16	2.085E+16	1.893E+16	1.758E+16	1.647E+16	1.550E+16	1.504E+16
Y 94	0.000E+00	3.940E+16	3.598E+16	3.345E+16	3.167E+16	3.023E+16	2.907E+16	2.867E+16
Y 96	0.000E+00	6.170E+16	5.710E+16	5.384E+16	5.169E+16	5.001E+16	4.871E+16	4.844E+16
ZR 97	0.000E+00	1.608E+16	1.535E+16	1.479E+16	1.449E+16	1.430E+16	1.420E+16	1.432E+16
NB 98	0.000E+00	4.506E+16	4.345E+16	4.216E+16	4.153E+16	4.117E+16	4.105E+16	4.143E+16
NB 99	0.000E+00	3.595E+16	3.470E+16	3.378E+16	3.339E+16	3.320E+16	3.317E+16	3.351E+16
TC100	0.000E+00	8.967E+14	2.702E+15	4.690E+15	7.027E+15	9.728E+15	1.272E+16	1.527E+16
ZR101	0.000E+00	3.709E+16	3.475E+16	3.353E+16	3.298E+16	3.264E+16	3.243E+16	3.262E+16
MO101	0.000E+00	6.250E+16	6.232E+16	6.207E+16	6.259E+16	6.341E+16	6.449E+16	6.593E+16
TC102	0.000E+00	2.859E+16	2.954E+16	3.013E+16	3.098E+16	3.189E+16	3.287E+16	3.386E+16
TC104	0.000E+00	1.757E+16	2.155E+16	2.422E+16	2.676E+16	2.916E+16	3.147E+16	3.327E+16
RH104	0.000E+00	1.141E+15	4.360E+15	7.696E+15	1.120E+16	1.471E+16	1.801E+16	2.033E+16
RH106	0.000E+00	1.706E+15	5.271E+15	8.536E+15	1.144E+16	1.404E+16	1.638E+16	1.797E+16
RH108	0.000E+00	2.977E+15	5.536E+15	7.414E+15	9.099E+15	1.062E+16	1.201E+16	1.297E+16
I134	0.000E+00	1.869E+16	1.798E+16	1.748E+16	1.725E+16	1.713E+16	1.708E+16	1.724E+16
TE135	0.000E+00	3.021E+16	2.782E+16	2.660E+16	2.596E+16	2.549E+16	2.511E+16	2.509E+16
I136	0.000E+00	2.499E+16	2.376E+16	2.314E+16	2.294E+16	2.285E+16	2.284E+16	2.305E+16
TC104	0.000E+00	1.615E+16	1.531E+16	1.472E+16	1.438E+16	1.413E+16	1.396E+16	1.398E+16
XE137	0.000E+00	4.176E+16	4.033E+16	3.932E+16	3.890E+16	3.870E+16	3.868E+16	3.908E+16
I138	0.000E+00	2.014E+16	1.830E+16	1.732E+16	1.678E+16	1.638E+16	1.606E+16	1.602E+16
XE138	0.000E+00	1.712E+16	1.604E+16	1.532E+16	1.489E+16	1.457E+16	1.434E+16	1.433E+16
CS138	0.000E+00	3.118E+16	2.948E+16	2.832E+16	2.765E+16	2.717E+16	2.685E+16	2.693E+16
XE139	0.000E+00	3.344E+16	3.085E+16	2.924E+16	2.825E+16	2.747E+16	2.684E+16	2.670E+16
CS139	0.000E+00	4.149E+16	3.917E+16	3.760E+16	3.671E+16	3.607E+16	3.562E+16	3.571E+16
BA139	0.000E+00	2.254E+16	2.142E+16	2.064E+16	2.022E+16	1.993E+16	1.975E+16	1.985E+16
BA141	0.000E+00	2.030E+16	1.931E+16	1.856E+16	1.812E+16	1.781E+16	1.761E+16	1.769E+16
LA141	0.000E+00	2.189E+16	2.083E+16	2.002E+16	1.955E+16	1.922E+16	1.901E+16	1.910E+16
LA142	0.000E+00	1.925E+16	1.815E+16	1.735E+16	1.685E+16	1.649E+16	1.623E+16	1.625E+16
PR144	0.000E+00	9.776E+15	1.855E+16	2.109E+16	2.1149E+16	2.115E+16	2.058E+16	2.017E+16

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

PRINCIPAL PHOTON SOURCES IN GROUP 2, PHOTONS/SEC
 MEAN ENERGY= 0.025MEV

NUCLIDE	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
BR 88	0.000E+00	4.647E+15	3.883E+15	3.372E+15	2.982E+15	2.647E+15	2.353E+15	2.192E+15
RB 88	0.000E+00	5.941E+15	5.090E+15	4.502E+15	4.056E+15	3.678E+15	3.352E+15	3.185E+15
KR 89	0.000E+00	4.903E+15	4.143E+15	3.624E+15	3.226E+15	2.886E+15	2.590E+15	2.431E+15
RB 89	0.000E+00	3.793E+15	3.235E+15	2.849E+15	2.555E+15	2.303E+15	2.086E+15	1.972E+15
KR 90	0.000E+00	4.567E+15	3.846E+15	3.360E+15	2.989E+15	2.671E+15	2.394E+15	2.243E+15
RB 90	0.000E+00	6.822E+15	5.781E+15	5.068E+15	4.523E+15	4.056E+15	3.650E+15	3.433E+15
RB 92	0.000E+00	1.291E+16	1.115E+16	9.968E+15	9.090E+15	8.347E+15	7.706E+15	7.383E+15
Y 92	0.000E+00	7.014E+15	6.182E+15	5.596E+15	5.163E+15	4.801E+15	4.496E+15	4.355E+15
Y 93	0.000E+00	6.197E+15	5.574E+15	5.128E+15	4.807E+15	4.544E+15	4.328E+15	4.242E+15
RB 94	0.000E+00	5.495E+15	4.776E+15	4.336E+15	4.027E+15	3.771E+15	3.550E+15	3.446E+15
Y 94	0.000E+00	8.747E+15	7.987E+15	7.427E+15	7.030E+15	6.710E+15	6.454E+15	6.365E+15
Y 96	0.000E+00	1.388E+16	1.285E+16	1.211E+16	1.163E+16	1.125E+16	1.096E+16	1.090E+16
NB 98	0.000E+00	9.984E+15	9.626E+15	9.341E+15	9.201E+15	9.121E+15	9.094E+15	9.180E+15
NB 99	0.000E+00	7.925E+15	7.648E+15	7.446E+15	7.360E+15	7.318E+15	7.311E+15	7.387E+15
TC100	0.000E+00	1.966E+14	5.924E+14	1.029E+15	1.541E+15	2.133E+15	2.789E+15	3.348E+15
ZR101	0.000E+00	8.369E+15	7.841E+15	7.565E+15	7.441E+15	7.365E+15	7.317E+15	7.359E+15
TC102	0.000E+00	6.315E+15	6.526E+15	6.657E+15	6.843E+15	7.045E+15	7.261E+15	7.479E+15
TC104	0.000E+00	3.844E+15	4.714E+15	5.300E+15	5.855E+15	6.381E+15	6.886E+15	7.281E+15
RH104	0.000E+00	2.451E+14	9.370E+14	1.694E+15	2.406E+15	3.162E+15	3.870E+15	4.369E+15
RH106	0.000E+00	3.751E+14	1.159E+15	1.876E+15	2.515E+15	3.086E+15	3.601E+15	3.951E+15
PD109	0.000E+00	6.550E+14	1.277E+15	1.789E+15	2.318E+15	2.883E+15	3.495E+15	4.002E+15
AG109M	0.000E+00	5.739E+14	1.119E+15	1.568E+15	2.031E+15	2.526E+15	3.063E+15	3.507E+15
SN130	0.000E+00	3.834E+15	3.887E+15	3.921E+15	4.000E+15	4.097E+15	4.208E+15	4.331E+15
TE131	0.000E+00	3.799E+15	3.812E+15	3.802E+15	3.836E+15	3.887E+15	3.954E+15	4.044E+15
SB132M	0.000E+00	3.533E+15	3.426E+15	3.356E+15	3.336E+15	3.334E+15	3.344E+15	3.387E+15
TE132	0.000E+00	1.947E+16	1.939E+16	1.924E+16	1.933E+16	1.950E+16	1.976E+16	2.016E+16
TE134	0.000E+00	1.322E+16	1.205E+16	1.136E+16	1.091E+16	1.056E+16	1.026E+16	1.017E+16
II134	0.000E+00	4.471E+15	4.300E+15	4.180E+15	4.127E+15	4.097E+15	4.086E+15	4.123E+15
II134M	0.000E+00	2.430E+15	2.770E+15	2.938E+15	3.099E+15	3.261E+15	3.431E+15	3.582E+15
TE135	0.000E+00	6.771E+15	6.235E+15	5.961E+15	5.818E+15	5.713E+15	5.628E+15	5.623E+15
II136	0.000E+00	5.571E+15	5.298E+15	5.160E+15	5.114E+15	5.095E+15	5.092E+15	5.139E+15
II136M	0.000E+00	4.633E+15	4.391E+15	4.223E+15	4.125E+15	4.054E+15	4.003E+15	4.011E+15
XE137	0.000E+00	9.227E+15	8.912E+15	8.688E+15	8.596E+15	8.552E+15	8.547E+15	8.635E+15
II138	0.000E+00	4.589E+15	4.170E+15	3.947E+15	3.823E+15	3.732E+15	3.659E+15	3.650E+15
CS138	0.000E+00	6.787E+15	6.418E+15	6.164E+15	6.019E+15	5.916E+15	5.845E+15	5.862E+15
XE139	0.000E+00	7.402E+15	6.829E+15	6.473E+15	6.253E+15	6.080E+15	5.942E+15	5.911E+15
CS139	0.000E+00	9.187E+15	8.674E+15	8.327E+15	8.129E+15	7.987E+15	7.888E+15	7.908E+15
BA139	0.000E+00	4.778E+15	4.541E+15	4.376E+15	4.286E+15	4.225E+15	4.187E+15	4.208E+15
BA140	0.000E+00	8.342E+15	7.935E+15	7.645E+15	7.483E+15	7.371E+15	7.300E+15	7.336E+15
BA141	0.000E+00	4.323E+15	4.113E+15	3.952E+15	3.857E+15	3.792E+15	3.750E+15	3.766E+15
LA141	0.000E+00	4.688E+15	4.462E+15	4.288E+15	4.187E+15	4.116E+15	4.072E+15	4.090E+15
LA142	0.000E+00	4.126E+15	3.890E+15	3.717E+15	3.611E+15	3.534E+15	3.479E+15	3.483E+15
PR144	0.000E+00	2.124E+15	4.031E+15	4.582E+15	4.669E+15	4.596E+15	4.471E+15	4.383E+15

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

PRINCIPAL PHOTON SOURCES IN GROUP 3, PHOTONS/SEC
 MEAN ENERGY= 0.038MEV

NUCLIDE	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
BR 88	0.000E+00	3.177E+15	2.655E+15	2.306E+15	2.039E+15	1.809E+15	1.609E+15	1.499E+15
RB 88	0.000E+00	4.041E+15	3.463E+15	3.063E+15	2.760E+15	2.502E+15	2.280E+15	2.166E+15
KR 89	0.000E+00	3.278E+15	2.770E+15	2.422E+15	2.157E+15	1.929E+15	1.732E+15	1.625E+15
KR 90	0.000E+00	3.063E+15	2.579E+15	2.253E+15	2.008E+15	1.792E+15	1.605E+15	1.505E+15
RB 90	0.000E+00	4.642E+15	3.934E+15	3.449E+15	3.078E+15	2.760E+15	2.484E+15	2.336E+15
RB 92	0.000E+00	8.856E+15	7.649E+15	6.839E+15	6.236E+15	5.727E+15	5.287E+15	5.066E+15
Y 92	0.000E+00	4.688E+15	4.132E+15	3.741E+15	3.451E+15	3.209E+15	3.005E+15	2.911E+15
Y 93	0.000E+00	4.132E+15	3.716E+15	3.419E+15	3.205E+15	3.029E+15	2.886E+15	2.828E+15
RB 94	0.000E+00	3.781E+15	3.286E+15	2.983E+15	2.771E+15	2.595E+15	2.443E+15	2.371E+15
Y 94	0.000E+00	5.910E+15	5.396E+15	5.018E+15	4.750E+15	4.534E+15	4.360E+15	4.301E+15
Y 96	0.000E+00	9.487E+15	8.779E+15	8.278E+15	7.947E+15	7.689E+15	7.490E+15	7.447E+15
RB 98	0.000E+00	6.759E+15	6.517E+15	6.324E+15	6.229E+15	6.176E+15	6.157E+15	6.215E+15
NB 99	0.000E+00	5.348E+15	5.161E+15	5.025E+15	4.967E+15	4.939E+15	4.934E+15	4.985E+15
ZR101	0.000E+00	5.726E+15	5.365E+15	5.176E+15	5.091E+15	5.039E+15	5.007E+15	5.035E+15
TC102	0.000E+00	4.251E+15	4.393E+15	4.481E+15	4.607E+15	4.743E+15	4.888E+15	5.035E+15
TC104	0.000E+00	2.575E+15	3.157E+15	3.549E+15	3.921E+15	4.273E+15	4.611E+15	4.876E+15
RH104	0.000E+00	1.617E+14	6.183E+14	1.091E+15	1.588E+15	2.086E+15	2.554E+15	2.883E+15
TE132	0.000E+00	3.388E+15	3.375E+15	3.349E+15	3.364E+15	3.394E+15	3.439E+15	3.509E+15
XE133	0.000E+00	1.806E+16	1.757E+16	1.717E+16	1.702E+16	1.698E+16	1.702E+16	1.724E+16
TE135	0.000E+00	4.607E+15	4.242E+15	4.056E+15	3.959E+15	3.887E+15	3.829E+15	3.826E+15
II136	0.000E+00	3.789E+15	3.603E+15	3.509E+15	3.478E+15	3.466E+15	3.464E+15	3.495E+15
XE137	0.000E+00	6.363E+15	6.146E+15	5.992E+15	5.928E+15	5.898E+15	5.895E+15	5.955E+15
II138	0.000E+00	3.136E+15	2.850E+15	2.698E+15	2.613E+15	2.550E+15	2.501E+15	2.494E+15
XE138	0.000E+00	3.417E+15	3.200E+15	3.057E+15	2.972E+15	2.908E+15	2.860E+15	2.859E+15
CS138	0.000E+00	4.554E+15	4.307E+15	4.136E+15	4.039E+15	3.969E+15	3.922E+15	3.933E+15
XE139	0.000E+00	5.000E+15	4.613E+15	4.372E+15	4.223E+15	4.107E+15	4.013E+15	3.993E+15
CS139	0.000E+00	6.194E+15	5.848E+15	5.614E+15	5.481E+15	5.385E+15	5.318E+15	5.332E+15
BA139	0.000E+00	4.820E+15	4.581E+15	4.414E+15	4.324E+15	4.262E+15	4.224E+15	4.245E+15
BA141	0.000E+00	5.134E+15	4.884E+15	4.693E+15	4.581E+15	4.503E+15	4.453E+15	4.472E+15
LA141	0.000E+00	3.119E+15	2.968E+15	2.853E+15	2.785E+15	2.738E+15	2.709E+15	2.721E+15
CE141	0.000E+00	6.757E+15	6.521E+15	6.299E+15	6.123E+15	6.022E+15	5.961E+15	6.029E+15
BA142	0.000E+00	7.911E+15	7.442E+15	7.102E+15	6.893E+15	6.737E+15	6.626E+15	6.628E+15
CE143	0.000E+00	2.416E+16	2.248E+16	2.128E+16	2.050E+16	1.990E+16	1.945E+16	1.938E+16
CE144	0.000E+00	1.458E+15	2.779E+15	3.160E+15	3.220E+15	3.168E+15	3.081E+15	3.018E+15
PR144	0.000E+00	1.416E+15	2.687E+15	3.054E+15	3.113E+15	3.064E+15	2.981E+15	2.922E+15
CE145	0.000E+00	1.436E+16	1.343E+16	1.278E+16	1.238E+16	1.207E+16	1.185E+16	1.184E+16
ND147	0.000E+00	7.417E+15	7.105E+15	6.896E+15	6.804E+15	6.761E+15	6.760E+15	6.840E+15
ND149	0.000E+00	2.880E+15	2.899E+15	2.924E+15	2.992E+15	3.078E+15	3.180E+15	3.291E+15
SM153	0.000E+00	1.161E+15	2.339E+15	3.558E+15	4.855E+15	6.209E+15	7.582E+15	8.700E+15

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

PRINCIPAL PHOTON SOURCES IN GROUP 4, PHOTONS/SEC
 MEAN ENERGY= 0.058MEV

NUCLIDE	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
BR 88	0.000E+00	4.870E+15	4.069E+15	3.534E+15	3.125E+15	2.773E+15	2.466E+15	2.297E+15
RB 88	0.000E+00	6.139E+15	5.261E+15	4.653E+15	4.192E+15	3.801E+15	3.464E+15	3.291E+15
KR 89	0.000E+00	4.931E+15	4.166E+15	3.644E+15	3.245E+15	2.902E+15	2.605E+15	2.445E+15
RB 89	0.000E+00	3.736E+15	3.186E+15	2.806E+15	2.516E+15	2.268E+15	2.055E+15	1.942E+15
KR 90	0.000E+00	4.567E+15	3.846E+15	3.360E+15	2.989E+15	2.671E+15	2.394E+15	2.243E+15
RB 90	0.000E+00	7.048E+15	5.973E+15	5.236E+15	4.673E+15	4.191E+15	3.771E+15	3.547E+15
KR 92	0.000E+00	3.001E+15	2.553E+15	2.280E+15	2.087E+15	1.926E+15	1.787E+15	1.718E+15
RB 92	0.000E+00	1.369E+16	1.182E+16	1.057E+16	9.640E+15	8.852E+15	8.173E+15	7.830E+15
Y 92	0.000E+00	7.051E+15	6.215E+15	5.626E+15	5.190E+15	4.826E+15	4.520E+15	4.378E+15
Y 93	0.000E+00	6.157E+15	5.537E+15	5.095E+15	4.776E+15	4.514E+15	4.300E+15	4.214E+15
RB 94	0.000E+00	5.871E+15	5.103E+15	4.632E+15	4.303E+15	4.029E+15	3.793E+15	3.681E+15
Y 94	0.000E+00	8.905E+15	8.130E+15	7.561E+15	7.157E+15	6.831E+15	6.570E+15	6.480E+15
Y 96	0.000E+00	1.454E+16	1.345E+16	1.269E+16	1.218E+16	1.178E+16	1.148E+16	1.141E+16
ZR 97	0.000E+00	3.215E+15	3.070E+15	2.958E+15	2.897E+15	2.859E+15	2.841E+15	2.863E+15
NB 98	0.000E+00	1.026E+16	9.888E+15	9.595E+15	9.451E+15	9.370E+15	9.342E+15	9.430E+15
NB 99	0.000E+00	8.003E+15	7.723E+15	7.520E+15	7.432E+15	7.390E+15	7.383E+15	7.460E+15
TC100	0.000E+00	1.966E+14	5.924E+14	1.029E+15	1.541E+15	2.133E+15	2.789E+15	3.348E+15
ZR101	0.000E+00	8.763E+15	8.210E+15	7.921E+15	7.792E+15	7.712E+15	7.662E+15	7.705E+15
TC102	0.000E+00	6.377E+15	6.590E+15	6.722E+15	6.910E+15	7.114E+15	7.332E+15	7.552E+15
TC104	0.000E+00	3.879E+15	4.757E+15	5.348E+15	5.908E+15	6.439E+15	6.948E+15	7.346E+15
RH104	0.000E+00	2.374E+14	9.075E+14	1.602E+15	2.330E+15	3.062E+15	3.748E+15	4.231E+15
RH106	0.000E+00	3.751E+14	1.159E+15	1.876E+15	2.515E+15	3.086E+15	3.601E+15	3.951E+15
RH108	0.000E+00	6.741E+14	1.253E+15	1.679E+15	2.060E+15	2.405E+15	2.719E+15	2.937E+15
SNI30	0.000E+00	3.334E+15	3.380E+15	3.409E+15	3.478E+15	3.562E+15	3.659E+15	3.766E+15
TE132	0.000E+00	3.775E+15	3.760E+15	3.731E+15	3.747E+15	3.781E+15	3.831E+15	3.909E+15
II34	0.000E+00	3.678E+15	3.537E+15	3.439E+15	3.395E+15	3.370E+15	3.361E+15	3.391E+15
TE135	0.000E+00	7.050E+15	6.492E+15	6.206E+15	6.058E+15	5.948E+15	5.859E+15	5.854E+15
II36	0.000E+00	5.735E+15	5.453E+15	5.312E+15	5.265E+15	5.245E+15	5.242E+15	5.290E+15
II36M	0.000E+00	3.731E+15	3.536E+15	3.401E+15	3.323E+15	3.265E+15	3.224E+15	3.230E+15
XE137	0.000E+00	9.426E+15	9.104E+15	8.875E+15	8.781E+15	8.736E+15	8.731E+15	8.821E+15
II38	0.000E+00	4.842E+15	4.399E+15	4.165E+15	4.034E+15	3.937E+15	3.861E+15	3.851E+15
XE138	0.000E+00	3.207E+15	3.003E+15	2.869E+15	2.790E+15	2.730E+15	2.685E+15	2.684E+15
CS138	0.000E+00	6.743E+15	6.377E+15	6.125E+15	5.980E+15	5.877E+15	5.808E+15	5.825E+15
XE139	0.000E+00	7.565E+15	6.979E+15	6.615E+15	6.390E+15	6.214E+15	6.072E+15	6.041E+15
CS139	0.000E+00	9.353E+15	8.831E+15	8.478E+15	8.276E+15	8.131E+15	8.031E+15	8.051E+15
BA139	0.000E+00	4.651E+15	4.420E+15	4.260E+15	4.172E+15	4.113E+15	4.076E+15	4.096E+15
BA141	0.000E+00	4.169E+15	3.966E+15	3.811E+15	3.720E+15	3.656E+15	3.616E+15	3.631E+15
LA141	0.000E+00	4.572E+15	4.351E+15	4.182E+15	4.083E+15	4.014E+15	3.971E+15	3.988E+15
LA142	0.000E+00	4.011E+15	3.782E+15	3.614E+15	3.511E+15	3.435E+15	3.382E+15	3.386E+15
CE143	0.000E+00	6.059E+15	5.637E+15	5.336E+15	5.141E+15	4.992E+15	4.879E+15	4.861E+15
PR144	0.000E+00	2.111E+15	4.005E+15	4.552E+15	4.639E+15	4.566E+15	4.443E+15	4.355E+15
CE145	0.000E+00	5.582E+15	5.220E+15	4.968E+15	4.811E+15	4.693E+15	4.607E+15	4.603E+15
SNI53	0.000E+00	3.897E+14	7.854E+14	1.195E+15	1.630E+15	2.085E+15	2.546E+15	2.921E+15

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

PRINCIPAL PHOTON SOURCES IN GROUP 5, PHOTONS/SEC
 MEAN ENERGY= 0.085MEV

NUCLIDE	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
BR 88	0.000E+00	3.222E+15	2.692E+15	2.338E+15	2.067E+15	1.835E+15	1.631E+15	1.520E+15
RB 88	0.000E+00	4.019E+15	3.444E+15	3.046E+15	2.745E+15	2.488E+15	2.268E+15	2.155E+15
KR 89	0.000E+00	3.168E+15	2.677E+15	2.341E+15	2.085E+15	1.865E+15	1.673E+15	1.571E+15
RB 89	0.000E+00	2.362E+15	2.015E+15	1.774E+15	1.591E+15	1.434E+15	1.299E+15	1.228E+15
KR 90	0.000E+00	2.899E+15	2.441E+15	2.133E+15	1.897E+15	1.696E+15	1.519E+15	1.424E+15
RB 90	0.000E+00	4.614E+15	3.910E+15	3.428E+15	3.059E+15	2.743E+15	2.469E+15	2.322E+15
RB 92	0.000E+00	9.175E+15	7.924E+15	7.085E+15	6.461E+15	5.932E+15	5.477E+15	5.248E+15
Y 92	0.000E+00	4.541E+15	4.002E+15	3.623E+15	3.342E+15	3.108E+15	2.911E+15	2.819E+15
Y 93	0.000E+00	3.893E+15	3.501E+15	3.221E+15	3.019E+15	2.854E+15	2.719E+15	2.664E+15
RB 94	0.000E+00	3.958E+15	3.440E+15	3.123E+15	2.901E+15	2.717E+15	2.557E+15	2.482E+15
Y 94	0.000E+00	5.753E+15	5.252E+15	4.884E+15	4.624E+15	4.413E+15	4.244E+15	4.186E+15
Y 96	0.000E+00	9.641E+15	8.922E+15	8.413E+15	8.076E+15	7.814E+15	7.612E+15	7.568E+15
NB 98	0.000E+00	6.682E+15	6.442E+15	6.252E+15	6.158E+15	6.105E+15	6.086E+15	6.144E+15
NB 99	0.000E+00	5.153E+15	4.973E+15	4.842E+15	4.786E+15	4.758E+15	4.754E+15	4.803E+15
TC100	0.000E+00	1.264E+14	3.808E+14	6.612E+14	9.906E+14	1.371E+15	1.793E+15	2.152E+15
ZR101	0.000E+00	5.819E+15	5.451E+15	5.260E+15	5.174E+15	5.121E+15	5.088E+15	5.116E+15
MO101	0.000E+00	2.567E+15	2.560E+15	2.550E+15	2.571E+15	2.605E+15	2.649E+15	2.708E+15
TC102	0.000E+00	4.097E+15	4.234E+15	4.319E+15	4.440E+15	4.571E+15	4.711E+15	4.852E+15
TC104	0.000E+00	2.505E+15	3.072E+15	3.453E+15	3.815E+15	4.158E+15	4.487E+15	4.744E+15
RH104	0.000E+00	1.486E+14	5.681E+14	1.003E+15	1.459E+15	1.917E+15	2.346E+15	2.649E+15
RH106	0.000E+00	2.406E+14	7.432E+14	1.203E+15	1.613E+15	1.979E+15	2.309E+15	2.534E+15
SN132	0.000E+00	2.251E+15	2.047E+15	1.954E+15	1.913E+15	1.888E+15	1.871E+15	1.881E+15
TE133M	0.000E+00	2.588E+15	2.406E+15	2.269E+15	2.176E+15	2.102E+15	2.044E+15	2.029E+15
XE133	0.000E+00	1.617E+16	1.572E+16	1.537E+16	1.524E+16	1.520E+16	1.523E+16	1.543E+16
TE134	0.000E+00	9.000E+15	8.205E+15	7.729E+15	7.428E+15	7.186E+15	6.985E+15	6.920E+15
II134	0.000E+00	2.218E+15	2.133E+15	2.074E+15	2.047E+15	2.032E+15	2.027E+15	2.045E+15
TE135	0.000E+00	4.650E+15	4.282E+15	4.093E+15	3.995E+15	3.923E+15	3.865E+15	3.861E+15
II136	0.000E+00	3.769E+15	3.584E+15	3.490E+15	3.460E+15	3.447E+15	3.445E+15	3.477E+15
II136M	0.000E+00	2.441E+15	2.314E+15	2.225E+15	2.174E+15	2.137E+15	2.110E+15	2.114E+15
XE137	0.000E+00	6.125E+15	5.916E+15	5.767E+15	5.706E+15	5.677E+15	5.674E+15	5.732E+15
II138	0.000E+00	3.235E+15	2.940E+15	2.783E+15	2.695E+15	2.631E+15	2.580E+15	2.573E+15
CS138	0.000E+00	4.269E+15	4.037E+15	3.878E+15	3.786E+15	3.721E+15	3.677E+15	3.688E+15
XE139	0.000E+00	4.967E+15	4.583E+15	4.344E+15	4.196E+15	4.080E+15	3.987E+15	3.967E+15
CS139	0.000E+00	6.069E+15	5.730E+15	5.501E+15	5.370E+15	5.276E+15	5.211E+15	5.224E+15
BA139	0.000E+00	2.879E+15	2.736E+15	2.637E+15	2.583E+15	2.546E+15	2.523E+15	2.536E+15
BA141	0.000E+00	2.590E+15	2.464E+15	2.368E+15	2.311E+15	2.272E+15	2.247E+15	2.256E+15
LA141	0.000E+00	2.855E+15	2.718E+15	2.612E+15	2.550E+15	2.507E+15	2.480E+15	2.491E+15
BA142	0.000E+00	5.136E+15	4.832E+15	4.611E+15	4.475E+15	4.374E+15	4.302E+15	4.304E+15
LA142	0.000E+00	2.498E+15	2.356E+15	2.251E+15	2.187E+15	2.140E+15	2.107E+15	2.109E+15
PR144	0.000E+00	1.338E+15	2.540E+15	2.887E+15	2.942E+15	2.896E+15	2.818E+15	2.762E+15
ND147	0.000E+00	4.698E+15	4.500E+15	4.368E+15	4.310E+15	4.283E+15	4.282E+15	4.333E+15

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

PRINCIPAL PHOTON SOURCES IN GROUP 6, PHOTONS/SEC
 MEAN ENERGY= 0.125MEV

NUCLIDE	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
BR 88	0.000E+00	2.316E+15	1.935E+15	1.681E+15	1.486E+15	1.319E+15	1.173E+15	1.093E+15
RB 88	0.000E+00	2.849E+15	2.441E+15	2.159E+15	1.945E+15	1.764E+15	1.608E+15	1.527E+15
KR 90	0.000E+00	1.160E+16	9.765E+15	8.531E+15	7.590E+15	6.782E+15	6.078E+15	5.696E+15
RB 90	0.000E+00	3.255E+15	2.759E+15	2.418E+15	2.158E+15	1.935E+15	1.742E+15	1.638E+15
KR 92	0.000E+00	5.014E+15	4.266E+15	3.810E+15	3.487E+15	3.218E+15	2.985E+15	2.870E+15
RB 92	0.000E+00	6.599E+15	5.699E+15	5.096E+15	4.647E+15	4.267E+15	3.940E+15	3.774E+15
Y 92	0.000E+00	3.134E+15	2.762E+15	2.501E+15	2.307E+15	2.145E+15	2.009E+15	1.946E+15
Y 93	0.000E+00	2.653E+15	2.386E+15	2.195E+15	2.058E+15	1.945E+15	1.853E+15	1.816E+15
RB 94	0.000E+00	2.864E+15	2.489E+15	2.259E+15	2.099E+15	1.965E+15	1.850E+15	1.796E+15
Y 94	0.000E+00	4.019E+15	3.670E+15	3.412E+15	3.230E+15	3.083E+15	2.965E+15	2.925E+15
Y 96	0.000E+00	6.865E+15	6.352E+15	5.990E+15	5.750E+15	5.563E+15	5.419E+15	5.389E+15
NB 98	0.000E+00	4.701E+15	4.532E+15	4.398E+15	4.332E+15	4.294E+15	4.282E+15	4.322E+15
NB 99	0.000E+00	3.568E+15	3.443E+15	3.353E+15	3.314E+15	3.295E+15	3.292E+15	3.326E+15
MO 99	0.000E+00	2.842E+15	2.782E+15	2.743E+15	2.750E+15	2.780E+15	2.829E+15	2.902E+15
TC 99M	0.000E+00	3.535E+16	3.459E+16	3.411E+16	3.420E+16	3.457E+16	3.519E+16	3.609E+16
ZR101	0.000E+00	4.150E+15	3.888E+15	3.751E+15	3.690E+15	3.652E+15	3.628E+15	3.649E+15
TC102	0.000E+00	2.846E+15	2.941E+15	3.000E+15	3.084E+15	3.176E+15	3.273E+15	3.371E+15
TC104	0.000E+00	1.774E+15	2.176E+15	2.446E+15	2.702E+15	2.945E+15	3.178E+15	3.360E+15
TE131	0.000E+00	1.569E+16	1.574E+16	1.570E+16	1.584E+16	1.605E+16	1.633E+16	1.670E+16
SB132M	0.000E+00	2.612E+15	2.533E+15	2.481E+15	2.466E+15	2.465E+15	2.473E+15	2.504E+15
II134	0.000E+00	3.880E+15	3.731E+15	3.628E+15	3.581E+15	3.555E+15	3.546E+15	3.578E+15
TE135	0.000E+00	3.279E+15	3.019E+15	2.886E+15	2.817E+15	2.766E+15	2.725E+15	2.722E+15
II136	0.000E+00	2.642E+15	2.512E+15	2.447E+15	2.426E+15	2.417E+15	2.415E+15	2.437E+15
XE137	0.000E+00	4.255E+15	4.110E+15	4.007E+15	3.964E+15	3.944E+15	3.942E+15	3.982E+15
II138	0.000E+00	2.322E+15	2.110E+15	1.997E+15	1.934E+15	1.888E+15	1.852E+15	1.847E+15
CS138	0.000E+00	3.682E+15	3.482E+15	3.345E+15	3.266E+15	3.210E+15	3.172E+15	3.181E+15
XE139	0.000E+00	3.636E+15	3.355E+15	3.180E+15	3.071E+15	2.987E+15	2.919E+15	2.904E+15
CS139	0.000E+00	4.198E+15	3.964E+15	3.806E+15	3.715E+15	3.650E+15	3.605E+15	3.614E+15
CE141	0.000E+00	2.142E+16	2.067E+16	1.987E+16	1.941E+16	1.909E+16	1.889E+16	1.911E+16
CE144	0.000E+00	1.566E+15	2.985E+15	3.394E+15	3.458E+15	3.403E+15	3.309E+15	3.241E+15
SM153	0.000E+00	5.056E+14	1.019E+15	1.550E+15	2.115E+15	2.705E+15	3.302E+15	3.790E+15

PRINCIPAL PHOTON SOURCES IN GROUP 7, PHOTONS/SEC
 MEAN ENERGY= 0.225MEV

NUCLIDE	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
KR 88	0.000E+00	5.947E+15	5.085E+15	4.489E+15	4.037E+15	3.652E+15	3.319E+15	3.146E+15
KR 89	0.000E+00	9.448E+15	7.983E+15	6.982E+15	6.217E+15	5.561E+15	4.991E+15	4.684E+15
KR 90	0.000E+00	7.028E+15	5.919E+15	5.171E+15	4.600E+15	4.111E+15	3.684E+15	3.453E+15
RB 92	0.000E+00	1.074E+16	9.274E+15	8.291E+15	7.561E+15	6.943E+15	6.410E+15	6.142E+15
Y 93	0.000E+00	7.129E+15	6.412E+15	5.899E+15	5.530E+15	5.227E+15	4.979E+15	4.880E+15
Y 94	0.000E+00	6.147E+15	5.612E+15	5.219E+15	4.940E+15	4.715E+15	4.535E+15	4.473E+15

Y 96	0.000E+00	1.099E+16	1.017E+16	9.590E+15	9.206E+15	8.908E+15	8.677E+15	8.628E+15
NB 98	0.000E+00	7.264E+15	7.004E+15	6.797E+15	6.695E+15	6.637E+15	6.617E+15	6.680E+15
NB 99	0.000E+00	5.387E+15	5.199E+15	5.062E+15	5.003E+15	4.975E+15	4.970E+15	5.022E+15

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04	at 15:12:15			
	200.0D	600.0D	1000.0D	1400.0D
ZR101	0.000E+00	3.686E+16	3.453E+16	3.332E+16
MO101	0.000E+00	7.769E+15	7.746E+15	7.715E+15
TC102	0.000E+00	4.313E+15	4.457E+15	4.546E+15
TC104	0.000E+00	3.705E+15	4.544E+15	5.108E+15
SN130	0.000E+00	6.076E+15	6.160E+15	6.213E+15
TE132	0.000E+00	2.657E+16	2.647E+16	2.638E+16
TE133M	0.000E+00	6.765E+15	6.289E+15	5.932E+15
TE134	0.000E+00	3.092E+16	2.819E+16	2.656E+16
I134M	0.000E+00	3.412E+15	3.890E+15	4.125E+15
TE135	0.000E+00	8.293E+15	7.636E+15	7.300E+15
XE135	0.000E+00	2.071E+16	2.030E+16	1.931E+16
I136M	0.000E+00	1.053E+16	9.980E+15	9.598E+15
XE137	0.000E+00	6.602E+15	6.377E+15	6.216E+15
XE138	0.000E+00	1.974E+16	1.849E+16	1.766E+16
CS138	0.000E+00	5.298E+15	5.010E+15	4.812E+15
XE139	0.000E+00	4.091E+16	3.774E+16	3.577E+16
CS139	0.000E+00	6.485E+15	6.123E+15	5.878E+15
BA139	0.000E+00	9.555E+15	9.081E+15	8.752E+15
BA141	0.000E+00	2.887E+16	2.747E+16	2.639E+16
BA142	0.000E+00	1.597E+16	1.502E+16	1.434E+16
CE143	0.000E+00	2.291E+16	2.131E+16	2.018E+16
ND149	0.000E+00	5.292E+15	5.326E+15	5.373E+15

PRINCIPAL PHOTON SOURCES IN GROUP 8, PHOTONS/SEC
 MEAN ENERGY= 0.375MEV

NUCLIDE	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
KR 87	0.000E+00	9.126E+15	7.809E+15	6.905E+15	6.220E+15	5.636E+15	5.132E+15	4.869E+15
KR 89	0.000E+00	4.986E+15	4.213E+15	3.685E+15	3.281E+15	2.935E+15	2.634E+15	2.472E+15
RB 92	0.000E+00	6.454E+15	5.574E+15	4.984E+15	4.545E+15	4.173E+15	3.853E+15	3.692E+15
Y 92	0.000E+00	3.478E+15	3.065E+15	2.775E+15	2.560E+15	2.380E+15	2.229E+15	2.159E+15
Y 94	0.000E+00	4.177E+15	3.813E+15	3.546E+15	3.357E+15	3.204E+15	3.081E+15	3.039E+15
Y 96	0.000E+00	6.325E+15	5.853E+15	5.519E+15	5.298E+15	5.126E+15	4.993E+15	4.965E+15
NB 98	0.000E+00	4.001E+15	3.858E+15	3.744E+15	3.687E+15	3.656E+15	3.645E+15	3.679E+15
ZR101	0.000E+00	7.535E+15	7.059E+15	6.811E+15	6.699E+15	6.631E+15	6.588E+15	6.625E+15
TC101	0.000E+00	2.585E+16	2.578E+16	2.568E+16	2.589E+16	2.623E+16	2.668E+16	2.728E+16
TC104	0.000E+00	1.675E+16	2.054E+16	2.309E+16	2.551E+16	2.781E+16	3.001E+16	3.172E+16
RU105	0.000E+00	2.469E+15	3.376E+15	3.987E+15	4.553E+15	5.087E+15	5.600E+15	5.992E+15
RH105	0.000E+00	2.352E+15	3.210E+15	3.780E+15	4.229E+15	4.777E+15	5.229E+15	5.567E+15
RH107	0.000E+00	3.656E+15	6.429E+15	8.430E+15	1.023E+16	1.186E+16	1.336E+16	1.441E+16
RH108	0.000E+00	1.649E+15	3.066E+15	4.106E+15	5.039E+15	5.882E+15	6.650E+15	7.185E+15
SB128M	0.000E+00	2.650E+15	2.840E+15	2.937E+15	3.054E+15	3.184E+15	3.329E+15	3.471E+15
I131	0.000E+00	1.620E+16	1.635E+16	1.635E+16	1.653E+16	1.678E+16	1.710E+16	1.751E+16
TE133	0.000E+00	2.510E+16	2.426E+16	2.377E+16	2.366E+16	2.366E+16	2.375E+16	2.406E+16
TE133M	0.000E+00	3.752E+15	3.488E+15	3.230E+15	3.155E+15	3.048E+15	2.963E+15	2.942E+15
TE134	0.000E+00	9.469E+15	8.633E+15	8.132E+15	7.815E+15	7.561E+15	7.349E+15	7.281E+15
I134	0.000E+00	7.982E+15	7.676E+15	7.463E+15	7.367E+15	7.314E+15	7.295E+15	7.360E+15
I136M	0.000E+00	1.628E+16	1.543E+16	1.484E+16	1.449E+16	1.424E+16	1.407E+16	1.409E+16

XE137	0.000E+00	3.571E+15	3.449E+15	3.363E+15	3.327E+15	3.310E+15	3.308E+15	3.342E+15
XE138	0.000E+00	1.414E+16	1.324E+16	1.265E+16	1.230E+16	1.204E+16	1.184E+16	1.183E+16

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CS138	0.000E+00	4.860E+15	4.596E+15	4.414E+15	4.310E+15	4.236E+15	4.186E+15	4.198E+15
XE139	0.000E+00	5.519E+15	5.092E+15	4.826E+15	4.662E+15	4.533E+15	4.430E+15	4.408E+15
CS139	0.000E+00	3.529E+15	3.332E+15	3.199E+15	3.123E+15	3.068E+15	3.030E+15	3.038E+15
LA140	0.000E+00	8.456E+15	8.094E+15	7.833E+15	7.753E+15	7.717E+15	7.735E+15	7.852E+15
BA141	0.000E+00	1.494E+16	1.421E+16	1.365E+16	1.333E+16	1.310E+16	1.296E+16	1.301E+16
BA142	0.000E+00	6.899E+15	6.489E+15	6.193E+15	6.011E+15	5.875E+15	5.778E+15	5.780E+15
CE145	0.000E+00	5.531E+15	5.173E+15	4.923E+15	4.767E+15	4.651E+15	4.565E+15	4.561E+15
CE146	0.000E+00	5.255E+15	4.973E+15	4.739E+15	4.672E+15	4.599E+15	4.553E+15	4.574E+15
PR148	0.000E+00	9.305E+15	9.051E+15	8.833E+15	8.846E+15	8.857E+15	8.904E+15	9.031E+15

PRINCIPAL PHOTON SOURCES IN GROUP 9, PHOTONS/SEC
 MEAN ENERGY= 0.575MEV

NUCLIDE	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
KR 89	0.000E+00	1.058E+16	8.938E+15	7.817E+15	6.960E+15	6.226E+15	5.587E+15	5.244E+15
KR 90	0.000E+00	1.143E+16	9.627E+15	8.410E+15	7.483E+15	6.686E+15	5.992E+15	5.615E+15
SR 91	0.000E+00	5.753E+15	4.986E+15	4.452E+15	4.050E+15	3.711E+15	3.422E+15	3.278E+15
Y 91M	0.000E+00	1.900E+16	1.647E+16	1.470E+16	1.338E+16	1.226E+16	1.131E+16	1.083E+16
NB 97	0.000E+00	4.401E+16	4.209E+16	4.060E+16	3.979E+16	3.929E+16	3.906E+16	3.940E+16
MO101	0.000E+00	1.614E+16	1.609E+16	1.603E+16	1.616E+16	1.637E+16	1.665E+16	1.702E+16
TC102	0.000E+00	2.246E+16	2.321E+16	2.367E+16	2.433E+16	2.505E+16	2.582E+16	2.660E+16
RU103	0.000E+00	2.017E+16	2.404E+16	2.565E+16	2.729E+16	2.894E+16	3.061E+16	3.204E+16
TC104	0.000E+00	7.724E+15	9.471E+15	1.065E+16	1.176E+16	1.282E+16	1.383E+16	1.463E+16
RU105	0.000E+00	5.175E+15	7.075E+15	8.356E+15	9.541E+15	1.066E+16	1.174E+16	1.256E+16
RH106	0.000E+00	6.850E+14	2.116E+15	3.427E+15	4.593E+15	5.635E+15	6.575E+15	7.215E+15
SB131	0.000E+00	7.625E+15	7.516E+15	7.428E+15	7.439E+15	7.489E+15	7.571E+15	7.709E+15
SB132	0.000E+00	1.390E+16	1.317E+16	1.277E+16	1.262E+16	1.255E+16	1.253E+16	1.266E+16
SB132M	0.000E+00	9.785E+15	9.491E+15	9.296E+15	9.241E+15	9.234E+15	9.264E+15	9.381E+15
II132	0.000E+00	5.037E+16	5.034E+16	5.006E+16	5.035E+16	5.087E+16	5.161E+16	5.271E+16
TE133M	0.000E+00	8.502E+15	7.904E+15	7.456E+15	7.150E+15	6.906E+15	6.715E+15	6.667E+15
II133	0.000E+00	3.747E+16	3.639E+16	3.553E+16	3.519E+16	3.505E+16	3.509E+16	3.551E+16
TE134	0.000E+00	1.523E+16	1.388E+16	1.308E+16	1.257E+16	1.216E+16	1.182E+16	1.171E+16
II134	0.000E+00	2.501E+16	2.405E+16	2.338E+16	2.308E+16	2.292E+16	2.286E+16	2.306E+16
CS134	0.000E+00	1.648E+14	1.326E+15	3.323E+15	5.994E+15	9.218E+15	1.285E+16	1.568E+16
TE135	0.000E+00	2.038E+16	1.876E+16	1.794E+16	1.751E+16	1.719E+16	1.694E+16	1.692E+16
XE135M	0.000E+00	5.949E+15	6.086E+15	6.112E+15	6.189E+15	6.292E+15	6.421E+15	6.581E+15
XE137	0.000E+00	1.185E+16	1.145E+16	1.116E+16	1.104E+16	1.098E+16	1.098E+16	1.109E+16
BA137M	0.000E+00	5.034E+14	1.494E+15	2.457E+15	3.395E+15	4.309E+15	5.199E+15	5.838E+15
II138	0.000E+00	1.662E+16	1.510E+16	1.429E+16	1.384E+16	1.351E+16	1.325E+16	1.322E+16
CS138	0.000E+00	1.681E+16	1.590E+16	1.527E+16	1.491E+16	1.466E+16	1.448E+16	1.452E+16
XE139	0.000E+00	6.039E+15	5.571E+15	5.280E+15	5.101E+15	4.960E+15	4.847E+15	4.822E+15
BA140	0.000E+00	7.609E+15	7.239E+15	6.974E+15	6.826E+15	6.724E+15	6.659E+15	6.692E+15
LA140	0.000E+00	1.507E+16	1.443E+16	1.400E+16	1.382E+16	1.376E+16	1.379E+16	1.400E+16
BA141	0.000E+00	1.073E+16	1.021E+16	9.809E+15	9.575E+15	9.412E+15	9.308E+15	9.347E+15
LA142	0.000E+00	2.369E+16	2.233E+16	2.134E+16	2.073E+16	2.029E+16	1.997E+16	1.999E+16

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PRINCIPAL PHOTON SOURCES IN GROUP 10, PHOTONS/SEC
 MEAN ENERGY= 0.850MEV

NUCLIDE	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
BR 88	0.000E+00	1.430E+16	1.195E+16	1.037E+16	9.174E+15	8.143E+15	7.240E+15	6.745E+15
KR 89	0.000E+00	7.850E+15	6.634E+15	5.802E+15	5.166E+15	4.621E+15	4.147E+15	3.892E+15
RB 90	0.000E+00	1.045E+16	8.852E+15	7.760E+15	6.926E+15	6.210E+15	5.589E+15	5.256E+15
SR 91	0.000E+00	9.234E+15	8.002E+15	7.145E+15	6.500E+15	5.956E+15	5.492E+15	5.262E+15
Y 92	0.000E+00	7.014E+15	6.182E+15	5.596E+15	5.163E+15	4.801E+15	4.496E+15	4.355E+15
RB 94	0.000E+00	1.205E+16	1.047E+16	9.508E+15	8.833E+15	8.271E+15	7.786E+15	7.557E+15
Y 94	0.000E+00	3.322E+16	3.033E+16	2.820E+16	2.670E+16	2.548E+16	2.451E+16	2.417E+16
ZR 95	0.000E+00	3.199E+16	3.390E+16	3.210E+16	3.078E+16	2.970E+16	2.880E+16	2.850E+16
NB 95	0.000E+00	2.891E+16	3.566E+16	3.383E+16	3.243E+16	3.129E+16	3.034E+16	2.977E+16
NB 97M	0.000E+00	3.146E+16	3.005E+16	2.896E+16	2.837E+16	2.800E+16	2.782E+16	2.805E+16
MO 99	0.000E+00	5.975E+15	5.848E+15	5.767E+15	5.782E+15	5.844E+15	5.948E+15	6.101E+15
MO101	0.000E+00	5.791E+15	5.774E+15	5.751E+15	5.800E+15	5.875E+15	5.975E+15	6.109E+15
TC104	0.000E+00	5.027E+15	6.165E+15	6.931E+15	7.657E+15	8.345E+15	9.005E+15	9.521E+15
RU105	0.000E+00	5.872E+15	8.028E+15	9.482E+15	1.083E+16	1.210E+16	1.332E+16	1.425E+16
SB128M	0.000E+00	6.023E+15	6.456E+15	6.677E+15	6.942E+15	7.239E+15	7.568E+15	7.890E+15
SB129	0.000E+00	4.699E+15	5.130E+15	5.350E+15	5.591E+15	5.849E+15	6.127E+15	6.389E+15
SB130	0.000E+00	4.167E+15	4.719E+15	4.975E+15	5.222E+15	5.484E+15	5.761E+15	6.017E+15
SB130M	0.000E+00	1.902E+16	1.949E+16	1.969E+16	2.009E+16	2.057E+16	2.114E+16	2.176E+16
SB131	0.000E+00	1.571E+16	1.549E+16	1.531E+16	1.533E+16	1.543E+16	1.560E+16	1.589E+16
SB132	0.000E+00	1.709E+16	1.619E+16	1.570E+16	1.552E+16	1.543E+16	1.541E+16	1.556E+16
SB132M	0.000E+00	8.778E+15	8.514E+15	8.339E+15	8.290E+15	8.283E+15	8.310E+15	8.415E+15
I132	0.000E+00	3.268E+16	3.266E+16	3.248E+16	3.266E+16	3.301E+16	3.349E+16	3.420E+16
TE133M	0.000E+00	3.142E+16	2.921E+16	2.755E+16	2.642E+16	2.552E+16	2.482E+16	2.464E+16
TE134	0.000E+00	2.030E+16	1.851E+16	1.744E+16	1.676E+16	1.621E+16	1.576E+16	1.561E+16
I134	0.000E+00	9.497E+16	9.133E+16	8.880E+16	8.766E+16	8.703E+16	8.681E+16	8.758E+16
CS134	0.000E+00	1.145E+14	9.209E+14	2.308E+15	4.1163E+15	6.402E+15	8.922E+15	1.089E+16
LA140	0.000E+00	1.699E+16	1.627E+16	1.578E+16	1.558E+16	1.551E+16	1.554E+16	1.578E+16
BA142	0.000E+00	1.121E+16	1.055E+16	1.006E+16	9.767E+15	9.547E+15	9.389E+15	9.393E+15
CE145	0.000E+00	1.626E+16	1.521E+16	1.447E+16	1.402E+16	1.367E+16	1.342E+16	1.341E+16

PRINCIPAL PHOTON SOURCES IN GROUP 11, PHOTONS/SEC
 MEAN ENERGY= 1.250MEV

NUCLIDE	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
KR 89	0.000E+00	6.831E+15	5.772E+15	5.049E+15	4.495E+15	4.021E+15	3.609E+15	3.387E+15
RB 89	0.000E+00	2.646E+16	2.257E+16	1.988E+16	1.782E+16	1.607E+16	1.456E+16	1.376E+16
KR 90	0.000E+00	1.116E+16	9.397E+15	8.209E+15	7.303E+15	6.526E+15	5.848E+15	5.481E+15
SR 91	0.000E+00	1.069E+16	9.264E+15	8.271E+15	7.526E+15	6.896E+15	6.358E+15	6.091E+15
KR 92	0.000E+00	4.110E+15	3.496E+15	3.123E+15	2.858E+15	2.638E+15	2.447E+15	2.352E+15
SR 92	0.000E+00	3.757E+16	3.308E+16	2.993E+16	2.760E+16	2.565E+16	2.401E+16	2.324E+16
Y 94	0.000E+00	5.910E+15	5.396E+15	5.018E+15	4.750E+15	4.534E+15	4.360E+15	4.301E+15
MO101	0.000E+00	1.285E+16	1.282E+16	1.277E+16	1.287E+16	1.304E+16	1.326E+16	1.356E+16

TC102	0.000E+00	3.543E+15	3.661E+15	3.734E+15	3.839E+15	3.952E+15	4.073E+15	4.196E+15
TC104	0.000E+00	3.514E+15	4.309E+15	4.844E+15	5.352E+15	5.833E+15	6.294E+15	6.655E+15
SB130M	0.000E+00	4.516E+15	4.626E+15	4.674E+15	4.768E+15	4.884E+15	5.018E+15	5.166E+15

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0.000E+00	4.685E+15	4.619E+15	4.564E+15	4.571E+15	4.602E+15	4.652E+15	4.737E+15
0.000E+00	7.016E+15	7.012E+15	6.972E+15	7.012E+15	7.086E+15	7.189E+15	7.342E+15
0.000E+00	6.051E+15	5.849E+15	5.730E+15	5.703E+15	5.725E+15	5.800E+15	5.800E+15
0.000E+00	1.612E+16	1.550E+16	1.507E+16	1.487E+16	1.477E+16	1.473E+16	1.486E+16
0.000E+00	3.110E+16	3.021E+16	2.957E+16	2.935E+16	2.929E+16	2.936E+16	2.971E+16
0.000E+00	2.069E+16	1.967E+16	1.916E+16	1.899E+16	1.892E+16	1.891E+16	1.908E+16
0.000E+00	1.352E+16	1.282E+16	1.233E+16	1.204E+16	1.183E+16	1.169E+16	1.171E+16
0.000E+00	5.123E+16	4.845E+16	4.653E+16	4.543E+16	4.465E+16	4.412E+16	4.425E+16
0.000E+00	3.961E+15	3.654E+15	3.404E+15	3.346E+15	3.253E+15	3.179E+15	3.163E+15
0.000E+00	4.697E+15	4.435E+15	4.258E+15	4.156E+15	4.084E+15	4.033E+15	4.043E+15
0.000E+00	5.404E+15	5.141E+15	4.940E+15	4.822E+15	4.740E+15	4.688E+15	4.707E+15
0.000E+00	1.770E+16	1.665E+16	1.589E+16	1.542E+16	1.507E+16	1.482E+16	1.483E+16
0.000E+00	6.915E+15	6.520E+15	6.230E+15	6.053E+15	5.922E+15	5.830E+15	5.837E+15
0.000E+00	3.339E+15	3.248E+15	3.187E+15	3.174E+15	3.178E+15	3.195E+15	3.240E+15
0.000E+00	1.752E+14	3.821E+14	6.874E+14	1.214E+15	2.028E+15	3.117E+15	4.141E+15

PRINCIPAL PHOTON SOURCES IN GROUP 12, PHOTONS/SEC
 MEAN ENERGY= 1.750MEV

NUCLIDE	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
BR 88	0.000E+00	1.707E+15	1.427E+15	1.239E+15	1.096E+15	9.724E+14	8.646E+14	8.055E+14
KR 88	0.000E+00	2.842E+15	2.430E+15	2.146E+15	1.929E+15	1.745E+15	1.586E+15	1.504E+15
RB 88	0.000E+00	5.300E+15	4.541E+15	4.017E+15	3.619E+15	3.281E+15	2.991E+15	2.841E+15
KR 89	0.000E+00	5.647E+15	4.771E+15	4.173E+15	3.716E+15	3.324E+15	2.983E+15	2.800E+15
KR 90	0.000E+00	5.305E+15	4.468E+15	3.903E+15	3.473E+15	3.103E+15	2.781E+15	2.606E+15
RB 92	0.000E+00	1.383E+15	1.195E+15	1.068E+15	9.742E+14	8.945E+14	8.259E+14	7.913E+14
Y 94	0.000E+00	2.703E+15	2.468E+15	2.295E+15	2.172E+15	2.073E+15	1.994E+15	1.967E+15
MO101	0.000E+00	4.626E+15	4.612E+15	4.594E+15	4.633E+15	4.693E+15	4.773E+15	4.880E+15
TC104	0.000E+00	4.888E+15	5.994E+15	6.739E+15	7.445E+15	8.114E+15	8.756E+15	9.257E+15
SB131	0.000E+00	3.100E+15	3.056E+15	3.020E+15	3.024E+15	3.045E+15	3.078E+15	3.134E+15
SB132	0.000E+00	1.413E+15	1.338E+15	1.298E+15	1.283E+15	1.276E+15	1.274E+15	1.286E+15
TE133	0.000E+00	1.625E+15	1.571E+15	1.539E+15	1.531E+15	1.531E+15	1.538E+15	1.558E+15
TE133M	0.000E+00	2.052E+15	1.907E+15	1.799E+15	1.725E+15	1.666E+15	1.620E+15	1.609E+15
II134	0.000E+00	7.274E+15	6.996E+15	6.802E+15	6.715E+15	6.666E+15	6.649E+15	6.708E+15
II135	0.000E+00	1.014E+16	9.852E+15	9.642E+15	9.572E+15	9.552E+15	9.574E+15	9.690E+15
XE138	0.000E+00	8.059E+15	7.546E+15	7.210E+15	7.009E+15	6.859E+15	6.746E+15	6.743E+15
XE139	0.000E+00	2.575E+15	2.375E+15	2.251E+15	2.175E+15	2.115E+15	2.067E+15	2.056E+15
CS139	0.000E+00	1.380E+15	1.303E+15	1.251E+15	1.221E+15	1.200E+15	1.185E+15	1.188E+15
LA140	0.000E+00	3.562E+16	3.409E+16	3.308E+16	3.266E+16	3.251E+16	3.258E+16	3.308E+16
BA141	0.000E+00	1.884E+15	1.792E+15	1.722E+15	1.681E+15	1.652E+15	1.634E+15	1.641E+15
LA142	0.000E+00	8.404E+15	7.924E+15	7.573E+15	7.357E+15	7.198E+15	7.087E+15	7.094E+15

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PRINCIPAL PHOTON SOURCES IN GROUP 13, PHOTONS/SEC
 MEAN ENERGY= 2.250MEV

NUCLIDE	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
KR 88	0.000E+00	1.349E+16	1.153E+16	1.018E+16	9.157E+15	8.283E+15	7.529E+15	7.136E+15
KR 89	0.000E+00	1.622E+15	1.371E+15	1.199E+15	1.068E+15	9.550E+14	8.570E+14	8.044E+14
RB 89	0.000E+00	4.511E+15	3.848E+15	3.389E+15	3.038E+15	2.739E+15	2.481E+15	2.346E+15
KR 90	0.000E+00	8.013E+14	6.748E+14	5.895E+14	5.245E+14	4.687E+14	4.200E+14	3.936E+14
RB 90	0.000E+00	9.766E+14	8.276E+14	7.255E+14	6.475E+14	5.806E+14	5.225E+14	4.914E+14
Y 94	0.000E+00	9.811E+14	8.958E+14	8.330E+14	7.885E+14	7.526E+14	7.238E+14	7.140E+14
MO101	0.000E+00	3.122E+15	3.113E+15	3.100E+15	3.126E+15	3.167E+15	3.221E+15	3.293E+15
TC104	0.000E+00	1.298E+15	1.591E+15	1.789E+15	1.976E+15	2.154E+15	2.324E+15	2.458E+15
SB131	0.000E+00	1.493E+15	1.472E+15	1.454E+15	1.457E+15	1.466E+15	1.482E+15	1.509E+15
TE133M	0.000E+00	1.225E+15	1.139E+15	1.075E+15	1.030E+15	9.953E+14	9.679E+14	9.609E+14
II135	0.000E+00	1.098E+15	1.067E+15	1.044E+15	1.037E+15	1.034E+15	1.037E+15	1.049E+15
II136	0.000E+00	3.892E+15	3.701E+15	3.604E+15	3.572E+15	3.559E+15	3.557E+15	3.590E+15
XE138	0.000E+00	8.341E+15	7.811E+15	7.462E+15	7.254E+15	7.099E+15	6.982E+15	6.979E+15
CS138	0.000E+00	6.875E+15	6.501E+15	6.244E+15	6.097E+15	5.992E+15	5.921E+15	5.938E+15
XE139	0.000E+00	1.698E+15	1.566E+15	1.485E+15	1.434E+15	1.395E+15	1.363E+15	1.356E+15
CS139	0.000E+00	1.031E+15	9.734E+14	9.344E+14	9.122E+14	8.963E+14	8.852E+14	8.874E+14
LA142	0.000E+00	1.356E+16	1.279E+16	1.222E+16	1.187E+16	1.161E+16	1.144E+16	1.145E+16
EUI56	0.000E+00	6.482E+13	1.414E+14	2.544E+14	4.494E+14	7.502E+14	1.153E+15	1.532E+15

PRINCIPAL PHOTON SOURCES IN GROUP 14, PHOTONS/SEC
 MEAN ENERGY= 2.750MEV

NUCLIDE	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
KR 87	0.000E+00	1.964E+15	1.681E+15	1.486E+15	1.339E+15	1.213E+15	1.105E+15	1.048E+15
BR 88	0.000E+00	1.137E+15	9.504E+14	8.252E+14	7.298E+14	6.477E+14	5.759E+14	5.365E+14
RB 88	0.000E+00	5.190E+14	4.447E+14	3.933E+14	3.544E+14	3.213E+14	2.928E+14	2.782E+14
KR 89	0.000E+00	1.548E+15	1.308E+15	1.144E+15	1.019E+15	9.112E+14	8.177E+14	7.675E+14
RB 89	0.000E+00	3.247E+15	2.770E+15	2.439E+15	2.187E+15	1.972E+15	1.786E+15	1.688E+15
KR 90	0.000E+00	4.075E+14	3.432E+14	2.998E+14	2.667E+14	2.383E+14	2.136E+14	2.002E+14
RB 90M	0.000E+00	9.812E+14	8.650E+14	7.793E+14	7.144E+14	6.598E+14	6.139E+14	5.922E+14
RB 92	0.000E+00	5.181E+14	4.475E+14	4.000E+14	3.648E+14	3.350E+14	3.093E+14	2.963E+14
Y 94	0.000E+00	5.319E+14	4.857E+14	4.516E+14	4.275E+14	4.080E+14	3.924E+14	3.871E+14
NB 99M	0.000E+00	2.051E+14	2.342E+14	2.460E+14	2.570E+14	2.685E+14	2.812E+14	2.932E+14
TC104	0.000E+00	1.155E+15	1.416E+15	1.592E+15	1.759E+15	1.917E+15	2.069E+15	2.187E+15
SB132	0.000E+00	2.769E+14	2.622E+14	2.544E+14	2.514E+14	2.500E+14	2.497E+14	2.521E+14
SB132M	0.000E+00	2.792E+14	2.708E+14	2.652E+14	2.636E+14	2.634E+14	2.643E+14	2.676E+14
II136	0.000E+00	2.396E+15	2.279E+15	2.219E+15	2.200E+15	2.192E+15	2.190E+15	2.211E+15
CS138	0.000E+00	3.433E+15	3.246E+15	3.118E+15	3.044E+15	2.992E+15	2.957E+15	2.965E+15
XE139	0.000E+00	9.578E+14	8.836E+14	8.375E+14	8.090E+14	7.867E+14	7.688E+14	7.648E+14
CS139	0.000E+00	5.071E+14	4.788E+14	4.597E+14	4.487E+14	4.409E+14	4.355E+14	4.365E+14
LA140	0.000E+00	1.356E+15	1.298E+15	1.260E+15	1.243E+15	1.238E+15	1.241E+15	1.259E+15
LA142	0.000E+00	8.175E+15	7.708E+15	7.366E+15	7.156E+15	7.002E+15	6.893E+15	6.901E+15

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

PRINCIPAL PHOTON SOURCES IN GROUP 15, PHOTONS/SEC
 MEAN ENERGY= 3.500MEV

NUCLIDE	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
BR 84	0.000E+00	9.251E+14	8.071E+14	7.260E+14	6.660E+14	6.159E+14	5.735E+14	5.533E+14
BR 88	0.000E+00	1.811E+15	1.514E+15	1.314E+15	1.162E+15	1.032E+15	9.172E+14	8.545E+14
KR 89	0.000E+00	2.647E+15	2.237E+15	1.956E+15	1.742E+15	1.558E+15	1.398E+15	1.312E+15
RB 89	0.000E+00	4.052E+14	3.456E+14	3.043E+14	2.729E+14	2.460E+14	2.228E+14	2.107E+14
RB 90	0.000E+00	5.039E+15	4.270E+15	3.743E+15	3.341E+15	2.996E+15	2.696E+15	2.535E+15
RB 90M	0.000E+00	1.421E+15	1.252E+15	1.128E+15	1.034E+15	9.553E+14	8.888E+14	8.574E+14
RB 92	0.000E+00	3.936E+14	3.400E+14	3.039E+14	2.772E+14	2.545E+14	2.350E+14	2.251E+14
RB 94	0.000E+00	2.267E+14	1.970E+14	1.788E+14	1.661E+14	1.556E+14	1.464E+14	1.421E+14
TC104	0.000E+00	6.175E+14	7.573E+14	8.513E+14	9.405E+14	1.025E+15	1.106E+15	1.170E+15
I136	0.000E+00	4.199E+14	3.993E+14	3.889E+14	3.855E+14	3.840E+14	3.838E+14	3.873E+14
CS138	0.000E+00	2.277E+14	2.153E+14	2.068E+14	2.019E+14	1.985E+14	1.961E+14	1.967E+14
XE139	0.000E+00	2.075E+14	1.914E+14	1.814E+14	1.752E+14	1.704E+14	1.665E+14	1.657E+14
CS139	0.000E+00	2.768E+14	2.614E+14	2.509E+14	2.450E+14	2.407E+14	2.377E+14	2.383E+14
LA142	0.000E+00	2.953E+15	2.784E+15	2.661E+15	2.585E+15	2.529E+15	2.490E+15	2.493E+15

PRINCIPAL PHOTON SOURCES IN GROUP 16, PHOTONS/SEC
 MEAN ENERGY= 5.000MEV

NUCLIDE	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
BR 88	0.000E+00	2.227E+15	1.861E+15	1.616E+15	1.429E+15	1.268E+15	1.128E+15	1.051E+15
KR 89	0.000E+00	1.953E+14	1.650E+14	1.443E+14	1.285E+14	1.150E+14	1.032E+14	9.683E+13
RB 90	0.000E+00	5.831E+15	4.942E+15	4.332E+15	3.866E+15	3.467E+15	3.120E+15	2.934E+15
RB 90M	0.000E+00	2.257E+14	1.990E+14	1.793E+14	1.644E+14	1.518E+14	1.412E+14	1.362E+14
RB 92	0.000E+00	9.435E+14	8.149E+14	7.286E+14	6.644E+14	6.101E+14	5.633E+14	5.397E+14

PRINCIPAL PHOTON SOURCES IN GROUP 17, PHOTONS/SEC
 MEAN ENERGY= 7.000MEV

NUCLIDE	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
RB 92	0.000E+00	7.438E+13	6.424E+13	5.744E+13	5.238E+13	4.810E+13	4.441E+13	4.254E+13
RB 94	0.000E+00	4.412E+12	3.834E+12	3.481E+12	3.233E+12	3.028E+12	2.850E+12	2.766E+12

PRINCIPAL PHOTON SOURCES IN GROUP 18, PHOTONS/SEC
 MEAN ENERGY= 9.500MEV

NUCLIDE	BOC #1	200.0D	600.0D	1000.0D	1400.0D	1800.0D	2200.0D	EOC #1
RB 94	0.000E+00	1.592E+10	1.384E+10	1.256E+10	1.167E+10	1.093E+10	1.029E+10	9.983E+09

PU246	0.000E+00	6.633E-04	6.633E-04	6.632E-04	6.615E-04	6.528E-04	6.222E-04	5.137E-04	4.241E-04	2.712E-04	1.734E-04	9.758E-05
AM239	0.000E+00	2.224E-03	2.224E-03	2.222E-03	2.100E-03	1.570E-03	5.501E-04	8.300E-06	1.252E-07	7.045E-12	3.963E-16	1.361E-21
AM240	0.000E+00	5.544E-01	5.543E-01	5.541E-01	5.469E-01	5.108E-01	3.996E-01	1.496E-01	5.603E-02	5.662E-03	5.722E-04	3.004E-05
AM241	0.000E+00	3.297E+02	3.297E+02	3.297E+02	3.298E+02	3.299E+02	3.305E+02	3.328E+02	3.351E+02	3.405E+02	3.459E+02	3.528E+02
AM242M	0.000E+00	4.863E+01	4.863E+01	4.863E+01	4.863E+01	4.863E+01	4.863E+01	4.862E+01	4.862E+01	4.862E+01	4.861E+01	4.861E+01
AM242	0.000E+00	1.185E+05	1.184E+05	1.184E+05	1.135E+05	9.146E+04	4.200E+04	1.909E+03	1.309E+02	4.847E+01	4.840E+01	4.837E+01
AM243	0.000E+00	6.370E+01	6.370E+01	6.370E+01	6.370E+01	6.372E+01	6.374E+01	6.374E+01	6.374E+01	6.374E+01	6.374E+01	6.374E+01
AM244M	0.000E+00	3.072E+05	2.991E+05	2.913E+05	6.205E+04	2.086E+01	6.531E-12	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AM244	0.000E+00	1.614E+04	1.612E+04	1.610E+04	1.507E+04	1.069E+04	3.108E+03	2.222E+01	1.588E-01	1.561E-06	1.536E-11	5.603E-18
AM245	0.000E+00	3.170E+00	3.170E+00	3.170E+00	3.139E+00	2.557E+00	8.197E-01	7.399E-03	6.845E-05	1.690E-06	1.664E-06	1.632E-06

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* 1 MTIHM, E=3.93%, 54000 MWD/MT (BWRUE)
 ACTINIDES+DAUGHTERS
 POWER= 1.00000E+00 MW, BURNUP= 1.00000E+00 MWD, FLUX= 1.00E+00 N/CM**2-SEC

7 SUMMARY TABLE: RADIOACTIVITY, CURIES

BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
AM246	0.000E+00	6.633E-04	6.633E-04	6.624E-04	6.540E-04	6.232E-04	5.145E-04	4.248E-04	2.718E-04	1.737E-04	9.774E-05
CM241	0.000E+00	2.503E-02	2.503E-02	2.501E-02	2.491E-02	2.456E-02	2.318E-02	2.188E-02	1.912E-02	1.671E-02	1.405E-02
CM242	0.000E+00	8.851E+04	8.851E+04	8.852E+04	8.851E+04	8.840E+04	8.741E+04	8.631E+04	8.379E+04	8.133E+04	7.828E+04
CM243	0.000E+00	7.700E+01	7.700E+01	7.700E+01	7.700E+01	7.700E+01	7.698E+01	7.697E+01	7.693E+01	7.689E+01	7.685E+01
CM244	0.000E+00	1.729E+04	1.729E+04	1.729E+04	1.729E+04	1.729E+04	1.728E+04	1.728E+04	1.726E+04	1.725E+04	1.723E+04
CM245	0.000E+00	2.373E+00	2.373E+00	2.373E+00	2.373E+00	2.373E+00	2.373E+00	2.373E+00	2.373E+00	2.373E+00	2.373E+00
CM246	0.000E+00	7.842E-01	7.842E-01	7.842E-01	7.842E-01	7.842E-01	7.842E-01	7.842E-01	7.842E-01	7.842E-01	7.842E-01
CM249	0.000E+00	6.496E-01	6.426E-01	6.357E-01	6.328E-01	6.266E-01	6.212E-01	6.159E-01	6.107E-01	6.050E-01	5.997E-01
BK249	0.000E+00	1.200E-01	1.200E-01	1.200E-01	1.200E-01	1.198E-01	1.190E-01	1.183E-01	1.175E-01	1.167E-01	1.159E-01
BK250	0.000E+00	2.698E-01	2.689E-01	2.679E-01	2.670E-01	2.660E-01	2.650E-01	2.640E-01	2.630E-01	2.620E-01	2.610E-01
CF249	0.000E+00	7.835E-05	7.835E-05	7.838E-05	7.851E-05	7.900E-05	8.094E-05	8.286E-05	8.731E-05	9.169E-05	9.722E-05
CF250	0.000E+00	1.861E-03	1.861E-03	1.863E-03	1.867E-03	1.869E-03	1.868E-03	1.867E-03	1.865E-03	1.863E-03	1.861E-03
CF252	0.000E+00	4.208E-03	4.208E-03	4.208E-03	4.208E-03	4.205E-03	4.196E-03	4.187E-03	4.166E-03	4.145E-03	4.118E-03
CF253	0.000E+00	3.388E-04	3.388E-04	3.388E-04	3.355E-04	3.259E-04	2.900E-04	2.580E-04	1.965E-04	1.496E-04	1.054E-04
ES253	0.000E+00	2.918E-04	2.918E-04	2.918E-04	2.922E-04	2.931E-04	2.944E-04	2.923E-04	2.779E-04	2.552E-04	2.209E-04
SUMTOT	2.315E+00	3.260E+07	3.216E+07	3.173E+07	3.160E+07	3.128E+07	3.055E+07	2.944E+07	2.733E+07	2.528E+07	2.298E+07
TOTAL	2.315E+00	3.260E+07	3.216E+07	3.173E+07	3.160E+07	3.128E+07	3.055E+07	2.944E+07	2.733E+07	2.528E+07	2.298E+07

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* 1 MTIHM, E=3.93%, 54000 MWD/MT (BWRUE)

ACTINIDES+DAUGHTERS

POWER= 1.00000E+00 MW, BURNUP= 1.00000E+00 MWD, FLUX= 1.00E+00 N/CM**2-SEC

7 SUMMARY TABLE: RADIOACTIVITY, CURIES

BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
TL	0.000E+00	5.879E-03	5.879E-03	6.042E-03	5.890E-03	6.066E-03	5.882E-03	5.897E-03	5.959E-03	6.032E-03	6.131E-03
PB	0.000E+00	1.636E-02	1.636E-02	1.636E-02	1.636E-02	1.635E-02	1.636E-02	1.640E-02	1.658E-02	1.679E-02	1.706E-02
BI	0.000E+00	1.636E-02	1.636E-02	1.637E-02	1.636E-02	1.688E-02	1.637E-02	1.641E-02	1.658E-02	1.679E-02	1.706E-02
PO	0.000E+00	2.684E-02	2.686E-02	2.685E-02	2.684E-02	2.717E-02	2.685E-02	2.692E-02	2.720E-02	2.754E-02	2.799E-02
RN	0.000E+00	1.636E-02	1.636E-02	1.636E-02	1.636E-02	1.635E-02	1.636E-02	1.641E-02	1.658E-02	1.678E-02	1.706E-02
RA	0.000E+00	1.636E-02	1.636E-02	1.636E-02	1.636E-02	1.635E-02	1.636E-02	1.641E-02	1.658E-02	1.679E-02	1.706E-02
TH	0.000E+00	1.403E+00	1.401E+00	1.399E+00	1.341E+00	8.708E-01	4.122E-01	3.474E-01	3.369E-01	3.370E-01	3.373E-01
PA	0.000E+00	2.049E+00	2.044E+00	2.042E+00	2.018E+00	1.916E+00	1.179E+00	1.084E+00	1.056E+00	1.052E+00	1.048E+00
U	2.315E+00	1.583E+07	1.540E+07	1.498E+07	3.502E+06	9.430E+05	8.728E+05	6.414E+05	4.713E+05	2.297E+05	1.119E+05
NP	0.000E+00	1.550E+07	1.550E+07	1.550E+07	1.539E+07	1.448E+07	1.160E+07	4.779E+06	1.970E+06	2.494E+05	3.168E+04
PU	0.000E+00	7.186E+05	7.174E+05	7.162E+05	6.493E+05	4.169E+05	2.059E+05	1.873E+05	1.871E+05	1.870E+05	1.868E+05
AM	0.000E+00	4.423E+05	4.342E+05	4.262E+05	1.911E+05	1.026E+05	4.555E+04	2.377E+03	5.787E+02	5.014E+02	5.136E+02
CM	0.000E+00	1.059E+05	1.059E+05	1.059E+05	1.059E+05	1.059E+05	1.058E+05	1.048E+05	1.037E+05	1.011E+05	9.866E+04
BK	0.000E+00	3.899E-01	3.889E-01	3.879E-01	3.376E-01	1.942E-01	1.213E-01	1.190E-01	1.183E-01	1.165E-01	1.147E-01
CF	0.000E+00	6.507E-03	6.507E-03	6.507E-03	6.507E-03	6.508E-03	6.454E-03	6.414E-03	6.334E-03	6.268E-03	6.200E-03
ES	0.000E+00	3.155E-04	3.155E-04	3.152E-04	3.140E-04	3.103E-04	3.028E-04	2.981E-04	2.827E-04	2.599E-04	2.254E-04
SUMTOT	2.315E+00	3.260E+07	3.216E+07	3.173E+07	1.983E+07	1.605E+07	1.283E+07	5.715E+06	2.733E+06	7.679E+05	4.298E+05
TOTAL	2.315E+00	3.260E+07	3.216E+07	3.173E+07	1.983E+07	1.605E+07	1.283E+07	5.715E+06	2.733E+06	7.679E+05	4.298E+05

CUMULATIVE TABLE TOTALS

AP+FP	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ACT+FP	2.315E+00	3.260E+07	3.216E+07	3.173E+07	1.983E+07	1.605E+07	1.283E+07	5.715E+06	2.733E+06	7.679E+05	4.298E+05
AP+ACT+FP	2.315E+00	3.260E+07	3.216E+07	3.173E+07	1.983E+07	1.605E+07	1.283E+07	5.715E+06	2.733E+06	7.679E+05	4.298E+05

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* 1 MTHM, E=3.93%, 54000 MWD/MT (BWRUE)

ACTINIDES+DAUGHTERS

POWER= 1.00000E+00 MW, BURNUP= 1.00000E+00 MWD, FLUX= 1.00E+00 N/CM**2-SEC

9 SUMMARY TABLE: THERMAL POWER, WATTS

BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
TL208	0.000E+00	1.383E-04	1.383E-04	1.421E-04	1.386E-04	1.427E-04	1.384E-04	1.387E-04	1.402E-04	1.419E-04	1.442E-04
PB212	0.000E+00	3.114E-05	3.114E-05	3.114E-05	3.113E-05	3.112E-05	3.113E-05	3.121E-05	3.156E-05	3.195E-05	3.247E-05
BI212	0.000E+00	2.781E-04	2.781E-04	2.782E-04	2.782E-04	2.782E-04	2.783E-04	2.790E-04	2.819E-04	2.854E-04	2.901E-04
PO212	0.000E+00	5.553E-04	5.553E-04	5.555E-04	5.554E-04	5.730E-04	5.557E-04	5.570E-04	5.628E-04	5.698E-04	5.791E-04
PO216	0.000E+00	6.695E-04	6.704E-04	6.704E-04	6.696E-04	6.693E-04	6.697E-04	6.716E-04	6.786E-04	6.870E-04	6.982E-04
RN220	0.000E+00	6.210E-04	6.210E-04	6.210E-04	6.210E-04	6.207E-04	6.211E-04	6.229E-04	6.294E-04	6.371E-04	6.476E-04
RA224	0.000E+00	5.613E-04	5.613E-04	5.613E-04	5.612E-04	5.610E-04	5.614E-04	5.630E-04	5.689E-04	5.759E-04	5.854E-04
TH228	0.000E+00	5.328E-04	5.328E-04	5.328E-04	5.328E-04	5.338E-04	5.368E-04	5.398E-04	5.469E-04	5.540E-04	5.631E-04
TH230	0.000E+00	1.158E-06	1.158E-06	1.158E-06	1.158E-06	1.158E-06	1.160E-06	1.161E-06	1.165E-06	1.169E-06	1.174E-06
TH231	0.000E+00	5.813E-04	5.810E-04	5.808E-04	5.659E-04	4.948E-04	4.842E-05	1.201E-05	6.077E-06	6.015E-06	6.015E-06
TH233	0.000E+00	1.032E-04	9.999E-05	9.690E-05	1.571E-05	1.288E-09	2.506E-24	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TH234	0.000E+00	1.255E-04	1.255E-04	1.255E-04	1.255E-04	1.255E-04	1.254E-04	1.254E-04	1.254E-04	1.254E-04	1.254E-04
PA231	0.000E+00	1.059E-06	1.059E-06	1.059E-06	1.059E-06	1.060E-06	1.062E-06	1.062E-06	1.062E-06	1.062E-06	1.062E-06
PA232	0.000E+00	6.302E-03	6.299E-03	6.297E-03	6.164E-03	5.521E-03	3.713E-03	3.753E-03	3.826E-06	9.429E-08	8.065E-10
PA233	0.000E+00	1.717E-03	1.717E-03	1.717E-03	1.717E-03	1.715E-03	1.708E-03	1.703E-03	1.692E-03	1.684E-03	1.676E-03
PA234M	0.000E+00	1.575E-03	1.555E-03	1.543E-03	1.529E-03	1.529E-03	1.529E-03	1.529E-03	1.529E-03	1.529E-03	1.529E-03
PA234	0.000E+00	1.398E-04	1.396E-04	1.396E-04	1.266E-04	7.783E-05	1.696E-05	5.787E-06	5.776E-06	5.775E-06	5.775E-06
U232	0.000E+00	1.514E-03	1.514E-03	1.514E-03	1.514E-03	1.515E-03	1.515E-03	1.526E-03	1.536E-03	1.546E-03	1.559E-03
U233	0.000E+00	5.067E-07	5.067E-07	5.067E-07	5.067E-07	5.067E-07	5.077E-07	5.085E-07	5.104E-07	5.122E-07	5.145E-07
U234	5.491E-02	2.305E-02	2.305E-02	2.305E-02	2.305E-02	2.305E-02	2.306E-02	2.306E-02	2.308E-02	2.309E-02	2.312E-02
U235	2.226E-03	2.807E-04	2.807E-04	2.807E-04	2.807E-04	2.807E-04	2.807E-04	2.807E-04	2.807E-04	2.807E-04	2.807E-04
U236	0.000E+00	9.156E-03	9.156E-03	9.156E-03	9.156E-03	9.156E-03	9.156E-03	9.156E-03	9.156E-03	9.156E-03	9.156E-03
U237	0.000E+00	1.830E+03	1.830E+03	1.822E+03	1.784E+03	1.651E+03	1.214E+03	8.918E+02	4.346E+02	2.118E+02	8.406E+01
U238	8.193E-03	7.841E-03	7.841E-03	7.841E-03	7.841E-03	7.841E-03	7.841E-03	7.841E-03	7.841E-03	7.841E-03	7.841E-03
U239	0.000E+00	4.001E+04	3.885E+04	3.772E+04	6.835E+03	9.936E-01	1.521E-14	0.000E+00	0.000E+00	0.000E+00	0.000E+00
U240	0.000E+00	9.914E-03	9.906E-03	9.988E-03	9.438E-03	7.382E-03	3.047E-03	8.845E-05	2.570E-06	2.755E-09	2.090E-09
NP235	0.000E+00	9.118E-07	9.118E-07	9.118E-07	9.117E-07	9.114E-07	9.102E-07	9.055E-07	8.897E-07	8.789E-07	8.652E-07
NP236M	0.000E+00	9.741E-03	9.736E-03	9.731E-03	9.446E-03	8.097E-03	4.651E-03	5.507E-05	3.113E-07	1.760E-09	2.277E-12
NP237	0.000E+00	2.189E-02	2.189E-02	2.189E-02	2.189E-02	2.190E-02	2.192E-02	2.198E-02	2.202E-02	2.209E-02	2.214E-02
NP238	0.000E+00	3.034E+03	3.034E+03	3.033E+03	2.993E+03	2.796E+03	2.187E+03	3.066E+02	3.099E+01	3.133E+00	1.656E-01
NP239	0.000E+00	3.590E+04	3.590E+04	3.590E+04	3.566E+04	3.358E+04	3.407E+04	4.607E+03	5.873E+02	7.499E+01	5.448E+00
NP240M	0.000E+00	1.428E+01	1.301E+01	1.285E+01	1.188E+01	5.260E-02	2.171E-02	6.303E-04	1.950E-08	1.476E-08	1.476E-08
NP240	0.000E+00	1.457E+02	1.441E+02	1.426E+02	7.683E+01	3.134E+00	3.122E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PU236	0.000E+00	6.163E-02	6.163E-02	6.163E-02	6.164E-02	6.165E-02	6.169E-02	6.164E-02	6.153E-02	6.124E-02	6.060E-02
PU237	0.000E+00	2.976E-03	2.976E-03	2.976E-03	2.974E-03	2.971E-03	2.801E-03	2.765E-03	2.740E-03	2.716E-03	2.693E-03
PU238	0.000E+00	3.365E+02	3.365E+02	3.365E+02	3.365E+02	3.366E+02	3.377E+02	3.381E+02	3.386E+02	3.390E+02	3.394E+02
PU239	0.000E+00	1.268E+01	1.268E+01	1.268E+01	1.268E+01	1.269E+01	1.271E+01	1.271E+01	1.280E+01	1.280E+01	1.280E+01
PU240	0.000E+00	2.444E+01	2.444E+01	2.444E+01	2.444E+01	2.444E+01	2.444E+01	2.444E+01	2.444E+01	2.444E+01	2.444E+01
PU241	0.000E+00	5.457E+00	5.457E+00	5.457E+00	5.457E+00	5.456E+00	5.454E+00	5.452E+00	5.447E+00	5.442E+00	5.435E+00
PU242	0.000E+00	9.955E-02	9.955E-02	9.955E-02	9.955E-02	9.955E-02	9.955E-02	9.955E-02	9.955E-02	9.955E-02	9.955E-02
PU243	0.000E+00	6.131E+02	6.117E+02	6.103E+02	5.331E+02	2.649E+02	2.136E+01	9.035E-04	4.346E-08	5.249E-09	5.249E-09

PU245	0.000E+00	7.516E-03	7.507E-03	7.499E-03	7.040E-03	5.077E-03	1.565E-03	1.412E-05	1.273E-07	2.1157E-12	3.655E-17	2.683E-23
AM240	0.000E+00	3.628E-03	3.627E-03	3.626E-03	3.579E-03	3.343E-03	2.615E-03	9.792E-04	3.666E-04	3.705E-05	3.745E-06	1.966E-07
AM241	0.000E+00	1.095E+01	1.095E+01	1.095E+01	1.095E+01	1.096E+01	1.098E+01	1.106E+01	1.113E+01	1.131E+01	1.149E+01	1.172E+01
AM242M	0.000E+00	1.921E-02	1.921E-02	1.921E-02	1.921E-02	1.921E-02	1.921E-02	1.921E-02	1.921E-02	1.920E-02	1.920E-02	1.920E-02
AM242	0.000E+00	1.346E+02	1.345E+02	1.344E+02	1.289E+02	1.038E+02	4.768E+01	2.168E+00	1.486E-01	5.502E-02	5.495E-02	5.491E-02
AM243	0.000E+00	2.048E+00	2.048E+00	2.048E+00	2.048E+00	2.048E+00	2.049E+00	2.049E+00	2.049E+00	2.049E+00	2.049E+00	2.049E+00
AM244M	0.000E+00	9.293E+02	9.048E+02	8.810E+02	1.877E+02	6.310E-02	1.976E-14	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AM244	0.000E+00	8.456E+01	8.446E+01	8.437E+01	7.895E+01	5.602E+01	1.629E+01	1.164E-01	8.319E-04	8.182E-09	8.047E-14	2.936E-20
AM245	0.000E+00	5.881E-03	5.881E-03	5.881E-03	5.824E-03	4.745E-03	1.521E-03	1.373E-05	1.270E-07	3.1136E-09	3.087E-09	3.028E-09
AM246	0.000E+00	5.355E-06	5.355E-06	5.355E-06	5.348E-06	5.280E-06	5.032E-06	4.154E-06	3.430E-06	2.193E-06	1.402E-06	7.891E-07

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* 1 MTIHM, E=3.93%, 54000 MWD/MT (BWRUE)

ACTINIDES+DAUGHTERS

POWER= 1.00000E+00 MW, BURNUP= 1.00000E+00 MWD, FLUX= 1.00E+00 N/CM**2-SEC

9 SUMMARY TABLE: THERMAL POWER, WATTS

BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
CM241	0.000E+00	1.029E-04	1.029E-04	1.028E-04	1.024E-04	1.009E-04	9.526E-05	8.992E-05	7.858E-05	6.867E-05	5.774E-05
CM242	0.000E+00	3.261E+03	3.261E+03	3.261E+03	3.261E+03	3.257E+03	3.221E+03	3.180E+03	3.087E+03	2.997E+03	2.884E+03
CM243	0.000E+00	2.825E+00	2.825E+00	2.825E+00	2.825E+00	2.825E+00	2.824E+00	2.824E+00	2.822E+00	2.821E+00	2.819E+00
CM244	0.000E+00	6.047E+02	6.047E+02	6.047E+02	6.047E+02	6.047E+02	6.045E+02	6.043E+02	6.039E+02	6.034E+02	6.029E+02
CM245	0.000E+00	7.876E-02	7.876E-02	7.876E-02	7.876E-02	7.876E-02	7.876E-02	7.876E-02	7.876E-02	7.876E-02	7.876E-02
CM246	0.000E+00	2.567E-02	2.567E-02	2.567E-02	2.567E-02	2.567E-02	2.567E-02	2.567E-02	2.567E-02	2.567E-02	2.567E-02
CM248	0.000E+00	2.808E-06	2.808E-06	2.808E-06	2.808E-06	2.808E-06	2.808E-06	2.808E-06	2.808E-06	2.808E-06	2.808E-06
CM249	0.000E+00	1.130E-03	1.118E-03	1.106E-03	1.092E-03	1.080E-03	1.068E-03	1.056E-03	1.044E-03	1.032E-03	1.020E-03
BK249	0.000E+00	8.889E-05	8.889E-05	8.891E-05	8.890E-05	8.876E-05	8.819E-05	8.762E-05	8.630E-05	8.501E-05	8.337E-05
BK250	0.000E+00	1.875E-03	1.868E-03	1.861E-03	1.854E-03	1.847E-03	1.840E-03	1.833E-03	1.826E-03	1.819E-03	1.812E-03
CF249	0.000E+00	3.625E-06	3.625E-06	3.627E-06	3.633E-06	3.655E-06	3.745E-06	3.834E-06	4.040E-06	4.242E-06	4.498E-06
CF250	0.000E+00	6.914E-05	6.914E-05	6.915E-05	6.920E-05	6.935E-05	6.941E-05	6.935E-05	6.928E-05	6.921E-05	6.912E-05
CF251	0.000E+00	5.501E-07	5.501E-07	5.501E-07	5.501E-07	5.501E-07	5.501E-07	5.501E-07	5.501E-07	5.501E-07	5.500E-07
CF252	0.000E+00	3.003E-04	3.003E-04	3.003E-04	3.003E-04	3.001E-04	2.995E-04	2.988E-04	2.973E-04	2.958E-04	2.939E-04
CF254	0.000E+00	4.886E-06	4.886E-06	4.884E-06	4.872E-06	4.831E-06	4.668E-06	4.510E-06	4.163E-06	3.842E-06	3.465E-06
SUMTOT	6.533E-02	8.696E+04	8.577E+04	8.461E+04	8.285E+04	8.111E+04	7.740E+04	7.387E+04	7.042E+04	6.706E+04	6.379E+04
TOTAL	6.533E-02	8.696E+04	8.577E+04	8.461E+04	8.285E+04	8.111E+04	7.740E+04	7.387E+04	7.042E+04	6.706E+04	6.379E+04

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* 1 MTIHM, E=3.93%, 54000 MWD/MT (BWRUE)

ACTINIDES+DAUGHTERS

POWER= 1.00000E+00 MW, BURNUP= 1.00000E+00 MWD, FLUX= 1.00E+00 N/CM**2-SEC

9 SUMMARY TABLE: THERMAL POWER, WATTS

BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
TL	0.000E+00	1.383E-04	1.383E-04	1.421E-04	1.386E-04	1.427E-04	1.384E-04	1.387E-04	1.402E-04	1.419E-04	1.442E-04
PB	0.000E+00	3.115E-05	3.115E-05	3.115E-05	3.114E-05	3.113E-05	3.114E-05	3.122E-05	3.157E-05	3.196E-05	3.248E-05
BI	0.000E+00	2.783E-04	2.783E-04	2.783E-04	2.783E-04	2.781E-04	2.784E-04	2.791E-04	2.820E-04	2.855E-04	2.902E-04
PO	0.000E+00	1.225E-03	1.226E-03	1.225E-03	1.225E-03	1.243E-03	1.226E-03	1.229E-03	1.242E-03	1.257E-03	1.278E-03
RN	0.000E+00	6.211E-04	6.211E-04	6.212E-04	6.211E-04	6.209E-04	6.212E-04	6.230E-04	6.295E-04	6.372E-04	6.477E-04
RA	0.000E+00	5.614E-04	5.614E-04	5.614E-04	5.613E-04	5.611E-04	5.615E-04	5.631E-04	5.690E-04	5.760E-04	5.855E-04
TH	0.000E+00	1.344E-03	1.341E-03	1.241E-03	1.155E-03	9.663E-04	7.120E-04	6.786E-04	6.797E-04	6.867E-04	6.958E-04
PA	0.000E+00	9.735E-03	9.712E-03	9.698E-03	8.846E-03	6.975E-03	4.004E-03	3.394E-03	3.232E-03	3.220E-03	3.211E-03
U	6.533E-02	4.184E+04	4.068E+04	4.657E+03	1.785E+03	1.651E+03	1.214E+03	8.919E+02	4.347E+02	2.118E+02	8.410E+01
NP	0.000E+00	3.909E+04	3.909E+04	3.873E+04	3.638E+04	2.912E+04	1.196E+04	4.914E+03	6.183E+02	7.814E+01	5.636E+00
PU	0.000E+00	9.924E+02	9.909E+02	9.124E+02	6.443E+02	4.011E+02	3.805E+02	3.810E+02	3.815E+02	3.818E+02	3.823E+02
AM	0.000E+00	1.161E+03	1.137E+03	1.113E+03	4.086E+02	1.729E+02	7.702E+01	1.541E+01	1.335E+01	1.344E+01	1.361E+01
CM	0.000E+00	3.869E+03	3.869E+03	3.869E+03	3.869E+03	3.865E+03	3.828E+03	3.788E+03	3.694E+03	3.603E+03	3.490E+03
BK	0.000E+00	1.964E-03	1.957E-03	1.951E-03	1.601E-03	6.046E-04	9.953E-05	8.822E-05	8.765E-05	8.633E-05	8.504E-05
CF	0.000E+00	3.787E-04	3.787E-04	3.788E-04	3.788E-04	3.789E-04	3.780E-04	3.772E-04	3.755E-04	3.738E-04	3.716E-04
SUMTOT	6.533E-02	8.696E+04	8.577E+04	8.461E+04	5.258E+04	4.285E+04	3.511E+04	1.740E+04	9.987E+03	5.142E+03	4.289E+03
TOTAL	6.533E-02	8.696E+04	8.577E+04	8.461E+04	5.258E+04	4.285E+04	3.511E+04	1.740E+04	9.987E+03	5.142E+03	4.289E+03

CUMULATIVE TABLE TOTALS

AP+FP	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ACT+FP	6.533E-02	8.696E+04	8.577E+04	8.461E+04	5.258E+04	4.285E+04	3.511E+04	1.740E+04	9.987E+03	5.142E+03	4.289E+03
AP+ACT+FP	6.533E-02	8.696E+04	8.577E+04	8.461E+04	5.258E+04	4.285E+04	3.511E+04	1.740E+04	9.987E+03	5.142E+03	4.289E+03

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* 1 MTIHM, E=3.93%, 54000 MWD/MT (BWRUE)
FISSION PRODUCTS
POWER= 1.00000E+00 MW, BURNUP= 1.00000E+00 MWD, FLUX= 1.00E+00 N/CM**2-SEC

5 SUMMARY TABLE: CONCENTRATIONS, GRAMS

BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
BR 83	0.000E+00	3.875E-03	3.872E-03	3.866E-03	3.866E-03	3.972E-06	3.391E-15	2.895E-24	0.000E+00	0.000E+00	0.000E+00
BR 83	0.000E+00	5.554E+01	5.554E+01	5.554E+01	5.554E+01	5.555E+01	5.555E+01	5.555E+01	5.555E+01	5.555E+01	5.555E+01
KR 83M	0.000E+00	2.991E-03	2.991E-03	2.990E-03	2.990E-03	1.175E-05	1.108E-14	9.457E-24	0.000E+00	0.000E+00	0.000E+00
AS 84	0.000E+00	1.288E-06	1.016E-09	7.809E-13	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SE 84	0.000E+00	1.424E-04	1.165E-04	9.445E-05	4.834E-10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR 84	0.000E+00	1.435E-03	1.431E-03	1.422E-03	1.431E-04	6.260E-07	3.740E-17	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR 84M	0.000E+00	1.233E-05	1.099E-05	9.790E-06	1.204E-08	1.069E-23	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
KR 84	0.000E+00	1.827E+02	1.827E+02	1.827E+02	1.827E+02	1.827E+02	1.827E+02	1.827E+02	1.827E+02	1.827E+02	1.827E+02
SE 85	0.000E+00	1.562E-05	5.451E-06	1.876E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SE 85M	0.000E+00	5.683E-06	6.367E-07	7.133E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR 85	0.000E+00	1.541E-04	1.344E-04	1.091E-04	9.057E-11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
KR 85	0.000E+00	3.207E+01	3.207E+01	3.207E+01	3.207E+01	3.207E+01	3.207E+01	3.207E+01	3.207E+01	3.207E+01	3.207E+01
KR 85M	0.000E+00	1.469E-02	1.469E-02	1.468E-02	1.274E-02	5.877E-03	3.629E-04	5.278E-09	7.675E-14	3.961E-25	2.045E-36
RB 85	0.000E+00	1.532E+02	1.532E+02	1.532E+02	1.532E+02	1.532E+02	1.532E+02	1.532E+02	1.532E+02	1.532E+02	1.532E+02
SE 86	0.000E+00	1.260E-05	1.034E-06	8.444E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR 86	0.000E+00	3.455E-05	1.974E-05	9.555E-06	6.627E-25	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR 86M	0.000E+00	2.834E-06	1.926E-07	1.572E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
KR 86	0.000E+00	2.888E+02	2.888E+02	2.888E+02	2.888E+02	2.888E+02	2.888E+02	2.888E+02	2.888E+02	2.888E+02	2.888E+02
RB 86	0.000E+00	3.171E-02	3.171E-02	3.171E-02	3.167E-02	3.142E-02	3.056E-02	2.734E-02	2.445E-02	1.885E-02	1.454E-02
SE 87	0.000E+00	1.318E+00	1.318E+00	1.318E+00	1.318E+00	1.319E+00	1.320E+00	1.322E+00	1.326E+00	1.331E+00	1.336E+00
SE 87	0.000E+00	3.641E-06	2.171E-09	1.292E-12	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR 87	0.000E+00	8.084E-05	4.028E-05	1.912E-05	3.217E-24	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
KR 87	0.000E+00	7.874E-03	7.847E-03	7.797E-03	4.615E-03	3.024E-04	1.659E-08	1.498E-25	1.341E-42	0.000E+00	0.000E+00
RB 87	0.000E+00	3.693E+02	3.693E+02	3.693E+02	3.693E+02	3.693E+02	3.693E+02	3.693E+02	3.693E+02	3.693E+02	3.693E+02
SR 87	0.000E+00	1.303E-02	1.303E-02	1.303E-02	1.303E-02	1.303E-02	1.303E-02	1.303E-02	1.303E-02	1.303E-02	1.303E-02
SR 87M	0.000E+00	9.091E-07	9.054E-07	9.016E-07	7.101E-07	2.065E-07	2.418E-09	4.550E-17	8.562E-25	8.534E-43	0.000E+00
BR 88	0.000E+00	2.407E-05	1.909E-06	1.488E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
KR 88	0.000E+00	2.492E-02	2.484E-02	2.474E-02	1.954E-02	5.763E-03	7.112E-05	1.649E-12	3.824E-20	5.863E-38	0.000E+00
RB 88	0.000E+00	2.665E-03	2.663E-03	2.660E-03	2.256E-03	6.725E-04	8.299E-06	1.924E-13	4.462E-21	6.842E-39	0.000E+00
SR 88	0.000E+00	5.302E+02	5.302E+02	5.302E+02	5.302E+02	5.302E+02	5.302E+02	5.302E+02	5.302E+02	5.302E+02	5.302E+02
BR 89	0.000E+00	4.398E-06	4.294E-10	4.159E-14	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
KR 89	0.000E+00	5.537E-04	4.484E-04	3.603E-04	1.119E-09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB 89	0.000E+00	2.905E-02	2.882E-03	2.840E-03	2.340E-04	2.678E-10	1.094E-31	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SR 89	0.000E+00	1.433E+01	1.433E+01	1.433E+01	1.433E+01	1.429E+01	1.414E+01	1.357E+01	1.302E+01	1.183E+01	1.075E+01
Y 89	0.000E+00	6.749E+02	6.749E+02	6.749E+02	6.749E+02	6.750E+02	6.750E+02	6.750E+02	6.750E+02	6.750E+02	6.750E+02
BR 90	0.000E+00	9.552E-07	5.012E-18	2.777E-29	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
KR 90	0.000E+00	9.360E-05	2.610E-05	7.207E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB 90	0.000E+00	4.698E-04	4.102E-04	3.277E-04	8.964E-10	8.460E-31	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB 90M	0.000E+00	2.021E-04	1.796E-04	1.549E-04	1.350E-29	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SR 90	0.000E+00	7.641E+02	7.641E+02	7.641E+02	7.641E+02	7.641E+02	7.641E+02	7.641E+02	7.641E+02	7.641E+02	7.641E+02
Y 90	0.000E+00	1.983E-01	1.983E-01	1.983E-01	1.982E-01	1.979E-01	1.968E-01	1.939E-01	1.926E-01	1.916E-01	1.912E-01

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* 1 MTIHM, E=3.93%, 54000 MWD/MT (BWRUE)

FISSION PRODUCTS

POWER= 1.00000E+00 MW, BURNUP= 1.00000E+00 MWD, FLUX= 1.00E+00 N/CM**2-SEC

5 SUMMARY TABLE: CONCENTRATIONS, GRAMS

BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
TC100	0.000E+00	6.962E-05	5.007E-06	3.601E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RU100	0.000E+00	2.967E+02	2.967E+02	2.967E+02	2.967E+02	2.967E+02	2.967E+02	2.967E+02	2.967E+02	2.967E+02	2.967E+02
ZR101	0.000E+00	1.627E-05	5.657E-11	1.902E-16	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
NB101	0.000E+00	5.801E-05	2.357E-07	6.205E-10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
MO101	0.000E+00	7.905E-03	7.625E-03	7.272E-03	4.650E-04	3.093E-10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TC101	0.000E+00	7.681E-03	7.675E-03	7.654E-03	1.679E-03	4.324E-09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RU101	0.000E+00	1.219E+03	1.219E+03	1.219E+03	1.219E+03	1.219E+03	1.219E+03	1.219E+03	1.219E+03	1.219E+03	1.219E+03
ZR102	0.000E+00	8.297E-05	1.941E-05	4.538E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
NB102	0.000E+00	2.185E-05	2.273E-06	5.314E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
MO102	0.000E+00	5.928E-03	5.649E-03	5.323E-03	1.424E-04	1.042E-12	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TC102	0.000E+00	4.707E-05	4.516E-05	4.256E-05	1.138E-06	8.324E-15	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TC102M	0.000E+00	3.131E-06	2.669E-06	2.276E-06	2.205E-10	3.827E-31	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RU102	0.000E+00	1.344E+03	1.344E+03	1.344E+03	1.344E+03	1.344E+03	1.344E+03	1.344E+03	1.344E+03	1.344E+03	1.344E+03
RH102	0.000E+00	1.829E-03	1.829E-03	1.829E-03	1.829E-03	1.829E-03	1.829E-03	1.829E-03	1.829E-03	1.829E-03	1.829E-03
ZR103	0.000E+00	2.015E-06	1.264E-16	7.888E-27	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
NB103	0.000E+00	8.304E-05	6.004E-06	4.224E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
MO103	0.000E+00	5.441E-04	3.216E-04	1.643E-04	5.719E-22	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TC103	0.000E+00	4.612E-04	3.981E-04	2.789E-04	2.859E-21	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RU103	0.000E+00	3.168E+01	3.168E+01	3.168E+01	3.156E+01	3.113E+01	2.952E+01	2.800E+01	2.475E+01	2.187E+01	1.866E+01
RH103	0.000E+00	5.214E+02	5.214E+02	5.214E+02	5.216E+02	5.220E+02	5.236E+02	5.251E+02	5.284E+02	5.313E+02	5.345E+02
ZR104	0.000E+00	1.105E-06	1.858E-11	3.123E-16	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
NB104	0.000E+00	2.699E-06	6.677E-12	1.122E-16	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
MO104	0.000E+00	7.343E-04	4.787E-04	3.194E-04	3.797E-15	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TC104	0.000E+00	8.962E-03	8.881E-03	8.714E-03	9.943E-04	1.085E-08	1.487E-26	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RU104	0.000E+00	9.603E+02	9.603E+02	9.603E+02	9.603E+02	9.603E+02	9.603E+02	9.603E+02	9.603E+02	9.603E+02	9.603E+02
RH104	0.000E+00	3.625E-04	1.491E-04	6.728E-05	1.944E-09	3.021E-30	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RH104M	0.000E+00	1.456E-04	1.241E-04	1.058E-04	1.004E-08	1.560E-29	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PD104	0.000E+00	6.613E+02	6.613E+02	6.613E+02	6.613E+02	6.613E+02	6.613E+02	6.613E+02	6.613E+02	6.613E+02	6.613E+02
NB105	0.000E+00	1.714E-06	1.614E-16	1.491E-26	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
MO105	0.000E+00	3.058E-04	1.424E-04	6.591E-05	2.625E-24	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TC105	0.000E+00	3.371E-03	3.249E-03	3.052E-03	2.054E-05	1.057E-16	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RU105	0.000E+00	1.152E-01	1.152E-01	1.152E-01	1.018E-01	4.664E-02	2.806E-03	3.675E-08	4.814E-13	1.947E-24	7.873E-36
RH105	0.000E+00	8.653E-01	8.653E-01	8.653E-01	8.654E-01	8.369E-01	6.224E-01	5.125E-01	3.719E-02	1.381E-03	5.129E-05
RH105M	0.000E+00	9.086E-05	9.086E-05	9.085E-05	8.049E-05	3.688E-05	2.219E-06	2.906E-11	3.806E-16	1.539E-27	6.225E-39
PD105	0.000E+00	6.928E+02	6.928E+02	6.928E+02	6.929E+02	6.932E+02	6.937E+02	6.938E+02	6.938E+02	6.938E+02	6.938E+02
MO106	0.000E+00	2.850E-05	2.820E-07	2.775E-09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TC106	0.000E+00	1.908E-04	7.394E-05	2.414E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RU106	0.000E+00	1.642E+02	1.642E+02	1.642E+02	1.642E+02	1.641E+02	1.639E+02	1.630E+02	1.599E+02	1.578E+02	1.552E+02
RH106	0.000E+00	1.630E-04	1.565E-04	1.549E-04	1.543E-04	1.540E-04	1.532E-04	1.523E-04	1.503E-04	1.484E-04	1.459E-04
RH106M	0.000E+00	1.034E-03	1.028E-03	1.023E-03	7.544E-04	1.561E-04	5.381E-07	7.567E-17	1.064E-26	0.000E+00	0.000E+00

PD106	0.000E+00	5.208E+02	5.208E+02	5.208E+02	5.208E+02	5.209E+02	5.211E+02	5.220E+02	5.229E+02	5.251E+02	5.272E+02	5.298E+02
MO107	0.000E+00	7.606E-06	1.138E-08	1.701E-11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TC107	0.000E+00	8.507E-05	2.260E-05	5.388E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RU107	0.000E+00	1.125E-03	1.018E-03	8.785E-04	6.160E-08	1.939E-29	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RH107	0.000E+00	5.844E-03	5.836E-03	5.806E-03	1.082E-03	7.459E-08	7.772E-23	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PD107	0.000E+00	4.145E+02	4.145E+02	4.145E+02	4.146E+02	4.146E+02	4.146E+02	4.146E+02	4.146E+02	4.146E+02	4.146E+02	4.146E+02
AG107	0.000E+00	1.097E-04	1.097E-04	1.097E-04	1.097E-04	1.097E-04	1.098E-04	1.102E-04	1.106E-04	1.114E-04	1.123E-04	1.133E-04
TC108	0.000E+00	8.947E-06	3.248E-09	1.092E-12	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RU108	0.000E+00	8.469E-04	7.342E-04	6.294E-04	8.298E-08	7.085E-28	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RH108	0.000E+00	5.319E-05	4.841E-05	4.174E-05	5.506E-09	4.701E-29	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

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OUTPUT UNIT = 6

* 1 MTIHM, E=3.93%, 54000 MWD/MT (BWRUE)

FISSION PRODUCTS

POWER= 1.00000E+00 MW, BURNUP= 1.00000E+00 MWD, FLUX= 1.00E+00 N/CM**2-SEC

5 SUMMARY TABLE: CONCENTRATIONS, GRAMS

BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
RH108M	0.000E+00	1.052E-05	9.355E-06	8.318E-06	9.085E-09	4.485E-24	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PD108	0.000E+00	2.843E+02	2.843E+02	2.843E+02	2.843E+02	2.843E+02	2.843E+02	2.843E+02	2.843E+02	2.843E+02	2.843E+02
AG108M	0.000E+00	2.558E-06	2.558E-06	2.558E-06	2.558E-06	2.558E-06	2.558E-06	2.558E-06	2.557E-06	2.557E-06	2.557E-06
CD108	0.000E+00	1.079E-03	1.079E-03	1.079E-03	1.079E-03	1.079E-03	1.079E-03	1.079E-03	1.079E-03	1.079E-03	1.079E-03
TC109	0.000E+00	4.049E-05	1.796E-05	7.948E-06	2.287E-26	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RU109	0.000E+00	6.819E-05	3.301E-05	1.547E-05	5.002E-26	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RH109	0.000E+00	1.828E-04	1.686E-04	1.389E-04	6.615E-16	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RH109M	0.000E+00	5.078E-05	4.077E-05	2.662E-05	1.141E-24	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PD109	0.000E+00	1.418E-01	1.418E-01	1.418E-01	1.353E-01	1.046E-01	4.140E-02	1.016E-03	2.493E-05	4.363E-09	7.635E-13
PD109M	0.000E+00	2.896E-04	2.879E-04	2.815E-04	8.156E-08	4.527E-27	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AG109	0.000E+00	1.220E+02	1.220E+02	1.220E+02	1.220E+02	1.220E+02	1.221E+02	1.221E+02	1.221E+02	1.221E+02	1.221E+02
AG109M	0.000E+00	1.158E-04	1.158E-04	1.158E-04	1.106E-04	8.551E-05	3.384E-05	8.305E-07	2.038E-08	5.348E-12	1.763E-12
CD109	0.000E+00	1.841E-06	1.841E-06	1.841E-06	1.840E-06	1.838E-06	1.830E-06	1.822E-06	1.803E-06	1.784E-06	1.760E-06
RU110	0.000E+00	1.369E-05	1.034E-06	7.686E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RH110	0.000E+00	2.677E-05	1.147E-05	3.112E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PD110	0.000E+00	9.585E+01	9.585E+01	9.585E+01	9.585E+01	9.585E+01	9.585E+01	9.585E+01	9.585E+01	9.585E+01	9.585E+01
AG110	0.000E+00	4.862E-05	8.986E-06	1.677E-06	2.459E-08	2.458E-08	2.453E-08	2.412E-08	2.366E-08	2.321E-08	2.263E-08
AG110M	0.000E+00	1.623E+00	1.623E+00	1.623E+00	1.623E+00	1.622E+00	1.619E+00	1.605E+00	1.592E+00	1.561E+00	1.531E+00
CD110	0.000E+00	1.129E+02	1.129E+02	1.129E+02	1.129E+02	1.129E+02	1.130E+02	1.130E+02	1.130E+02	1.130E+02	1.131E+02
RU111	0.000E+00	5.742E-06	3.934E-07	2.651E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RH111	0.000E+00	3.211E-05	2.007E-05	1.060E-05	2.503E-22	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PD111	0.000E+00	7.006E-04	6.963E-04	6.846E-04	1.180E-04	3.981E-06	4.110E-07	4.711E-11	5.399E-15	3.445E-24	2.199E-33
PD111M	0.000E+00	1.740E-04	1.738E-04	1.734E-04	1.536E-04	8.178E-05	8.462E-06	9.699E-10	1.112E-13	7.093E-23	4.526E-32
AG111	0.000E+00	3.477E-01	3.477E-01	3.477E-01	3.405E-01	3.177E-01	2.403E-01	1.818E-01	9.478E-02	4.942E-02	2.139E-02
AG111M	0.000E+00	3.464E-05	3.449E-05	3.421E-05	6.209E-06	2.807E-07	2.900E-08	3.331E-12	2.436E-25	1.555E-34	0.000E+00
CD111	0.000E+00	5.365E+01	5.365E+01	5.365E+01	5.365E+01	5.368E+01	5.375E+01	5.381E+01	5.390E+01	5.395E+01	5.397E+01
CD111M	0.000E+00	1.960E-06	1.932E-06	1.905E-06	8.343E-07	1.167E-08	2.461E-15	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RH112	0.000E+00	1.194E-06	1.918E-10	2.753E-14	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PD112	0.000E+00	1.970E-02	1.969E-02	1.968E-02	1.904E-02	1.602E-02	8.612E-03	7.191E-04	6.004E-05	1.829E-07	5.573E-10
AG112	0.000E+00	3.077E-03	3.077E-03	3.077E-03	3.064E-03	2.808E-03	1.586E-03	1.327E-04	1.108E-05	3.376E-08	1.028E-10
CD112	0.000E+00	3.168E+01	3.168E+01	3.168E+01	3.168E+01	3.169E+01	3.170E+01	3.170E+01	3.170E+01	3.170E+01	3.170E+01
PD113	0.000E+00	1.923E-05	1.237E-05	7.795E-06	1.786E-17	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AG113	0.000E+00	3.676E-03	3.674E-03	3.670E-03	3.241E-03	1.685E-03	1.601E-04	1.303E-08	1.060E-12	3.043E-22	8.733E-32
AG113M	0.000E+00	1.430E-06	1.288E-06	1.017E-06	4.911E-18	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CD113	0.000E+00	1.895E-01	1.895E-01	1.895E-01	1.900E-01	1.915E-01	1.930E-01	1.932E-01	1.932E-01	1.932E-01	1.932E-01
CD113M	0.000E+00	5.437E-01	5.437E-01	5.437E-01	5.437E-01	5.437E-01	5.437E-01	5.437E-01	5.427E-01	5.422E-01	5.416E-01
IN113	0.000E+00	5.576E-02	5.576E-02	5.576E-02	5.578E-02	5.578E-02	5.583E-02	5.604E-02	5.626E-02	5.675E-02	5.724E-02
PD114	0.000E+00	2.086E-05	1.591E-05	1.192E-05	6.328E-14	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AG114	0.000E+00	6.641E-07	5.156E-07	3.863E-07	2.051E-14	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CD114	0.000E+00	3.986E+01	3.986E+01	3.986E+01	3.986E+01	3.986E+01	3.986E+01	3.986E+01	3.986E+01	3.986E+01	3.986E+01
IN114M	0.000E+00	4.629E-04	4.629E-04	4.629E-04	4.626E-04	4.613E-04	4.565E-04	4.377E-04	4.197E-04	3.805E-04	3.450E-04

SN114	0.000E+00	1.063E-02	1.063E-02	1.063E-02	1.063E-02	1.065E-02	1.067E-02	1.071E-02	1.074E-02	1.078E-02
PD115	0.000E+00	5.255E-06	1.947E-06	6.520E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AG115	0.000E+00	1.243E-04	1.228E-04	1.195E-04	1.608E-05	4.908E-10	2.724E-26	0.000E+00	0.000E+00	0.000E+00
AG115M	0.000E+00	6.788E-07	3.712E-07	1.378E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CD115	0.000E+00	2.745E-02	2.745E-02	2.745E-02	2.721E-02	2.552E-02	2.021E-02	7.946E-03	3.125E-03	3.540E-04
CD115M	0.000E+00	5.256E-02	5.256E-02	5.255E-02	5.252E-02	5.235E-02	5.175E-02	4.939E-02	4.714E-02	4.228E-02
INI15	0.000E+00	2.117E+00	2.117E+00	2.117E+00	2.117E+00	2.119E+00	2.125E+00	2.141E+00	2.148E+00	2.156E+00
INI15M	0.000E+00	2.212E-03	2.212E-03	2.212E-03	2.210E-03	2.155E-03	1.763E-03	6.949E-04	2.733E-04	3.097E-05
SN115	0.000E+00	5.503E-01	5.503E-01	5.503E-01	5.503E-01	5.506E-01	5.511E-01	5.512E-01	5.514E-01	5.514E-01
PD116	0.000E+00	1.451E-06	7.640E-08	3.917E-09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* 1 MTIHM, E=3.93%, 54000 MWD/MT (BWRUE)

FISSION PRODUCTS

POWER= 1.00000E+00 MW, BURNUP= 1.00000E+00 MWD, FLUX= 1.00E+00 N/CM**2-SEC

5 SUMMARY TABLE: CONCENTRATIONS, GRAMS

BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1d	FUEL 4d	FUEL 7d	FUEL 14d	FUEL 21d	FUEL 30d
AG116	0.000E+00	9.296E-06	7.766E-06	6.026E-06	1.842E-12	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AG116M	0.000E+00	6.014E-07	8.192E-08	5.136E-09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CD116	0.000E+00	1.400E+01	1.400E+01	1.400E+01	1.400E+01	1.400E+01	1.400E+01	1.400E+01	1.400E+01	1.400E+01	1.400E+01
IN116	0.000E+00	1.241E-06	6.498E-08	3.402E-09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
IN116M	0.000E+00	2.056E-04	2.030E-04	2.004E-04	9.540E-05	2.032E-12	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SN116	0.000E+00	1.478E+01	1.478E+01	1.478E+01	1.478E+01	1.478E+01	1.478E+01	1.478E+01	1.478E+01	1.478E+01	1.478E+01
AG117	0.000E+00	4.182E-06	2.514E-06	1.424E-06	6.953E-21	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CD117	0.000E+00	7.132E-04	7.119E-04	7.096E-04	5.493E-04	1.448E-04	1.194E-06	5.504E-15	5.388E-23	8.198E-33	0.000E+00
CD117M	0.000E+00	5.046E-04	5.035E-04	5.020E-04	4.1225E-04	1.488E-04	3.793E-06	1.601E-12	6.753E-19	9.1017E-34	0.000E+00
IN117	0.000E+00	1.855E-04	1.855E-04	1.855E-04	1.793E-04	8.988E-05	1.587E-06	4.623E-13	1.935E-19	2.583E-34	0.000E+00
IN117M	0.000E+00	6.216E-04	6.216E-04	6.216E-04	5.994E-04	2.914E-04	5.172E-06	9.508E-13	3.949E-19	5.272E-34	0.000E+00
SN117	0.000E+00	1.414E+01	1.414E+01	1.414E+01	1.414E+01	1.414E+01	1.414E+01	1.414E+01	1.414E+01	1.414E+01	1.414E+01
SN117M	0.000E+00	2.034E-03	2.034E-03	2.029E-03	2.009E-03	1.935E-03	1.668E-03	1.438E-03	1.017E-03	7.193E-04	4.607E-04
CD118	0.000E+00	3.487E-04	3.446E-04	3.399E-04	1.528E-04	2.448E-06	8.421E-13	0.000E+00	0.000E+00	0.000E+00	0.000E+00
IN118	0.000E+00	5.779E-07	5.720E-07	5.642E-07	2.536E-07	4.062E-09	1.397E-15	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SN118	0.000E+00	1.429E+01	1.429E+01	1.429E+01	1.429E+01	1.429E+01	1.429E+01	1.429E+01	1.429E+01	1.429E+01	1.429E+01
AG119	0.000E+00	6.449E-07	7.678E-10	7.497E-13	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CD119	0.000E+00	3.278E-05	3.080E-05	2.861E-05	3.972E-07	9.811E-17	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CD119M	0.000E+00	1.116E-05	9.295E-06	7.485E-06	2.618E-11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
IN119	0.000E+00	5.018E-06	4.938E-06	4.686E-06	1.236E-07	1.312E-12	1.138E-30	0.000E+00	0.000E+00	0.000E+00	0.000E+00
IN119M	0.000E+00	9.418E-05	9.404E-05	9.352E-05	1.609E-05	1.411E-28	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SN119	0.000E+00	1.417E+01	1.417E+01	1.417E+01	1.417E+01	1.417E+01	1.417E+01	1.417E+01	1.417E+01	1.417E+01	1.417E+01
SN119M	0.000E+00	5.157E-02	5.157E-02	5.157E-02	5.154E-02	5.143E-02	5.099E-02	5.056E-02	4.957E-02	4.860E-02	4.738E-02
CD120	0.000E+00	5.853E-06	2.667E-06	1.176E-06	2.809E-27	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
IN120	0.000E+00	2.612E-06	2.053E-06	1.259E-06	9.745E-27	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SN120	0.000E+00	1.447E+01	1.447E+01	1.447E+01	1.447E+01	1.447E+01	1.447E+01	1.447E+01	1.447E+01	1.447E+01	1.447E+01
CD121	0.000E+00	1.469E-06	6.530E-08	2.534E-09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
IN121	0.000E+00	2.735E-06	1.096E-06	2.667E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
IN121M	0.000E+00	4.791E-06	4.133E-06	3.606E-06	1.720E-11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SN121	0.000E+00	1.180E-02	1.180E-02	1.180E-02	1.151E-02	1.011E-02	6.350E-03	9.863E-04	1.532E-04	1.987E-06	2.577E-08
SN121M	0.000E+00	5.934E-03	5.934E-03	5.934E-03	5.934E-03	5.933E-03	5.933E-03	5.932E-03	5.930E-03	5.929E-03	5.927E-03
SB121	0.000E+00	1.307E+01	1.307E+01	1.307E+01	1.307E+01	1.307E+01	1.308E+01	1.308E+01	1.308E+01	1.308E+01	1.308E+01
CD122	0.000E+00	6.082E-07	3.204E-10	1.666E-13	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
IN122	0.000E+00	1.190E-06	3.926E-08	6.241E-10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SN122	0.000E+00	1.586E+01	1.586E+01	1.586E+01	1.586E+01	1.586E+01	1.586E+01	1.586E+01	1.586E+01	1.586E+01	1.586E+01
SB122	0.000E+00	7.472E-03	7.471E-03	7.470E-03	7.393E-03	7.008E-03	5.781E-03	5.626E-03	5.454E-03	5.285E-03	5.116E-03
TE122	0.000E+00	1.804E+00	1.804E+00	1.804E+00	1.804E+00	1.804E+00	1.808E+00	1.810E+00	1.811E+00	1.811E+00	1.811E+00
CD123	0.000E+00	8.935E-07	6.457E-09	4.580E-11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
IN123	0.000E+00	5.908E-07	1.275E-08	9.852E-11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
IN123M	0.000E+00	1.993E-06	9.428E-07	3.971E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SN123	0.000E+00	3.139E-01	3.139E-01	3.139E-01	3.135E-01	3.123E-01	3.073E-01	3.024E-01	2.912E-01	2.805E-01	2.673E-01

SN123M	0.000E+00	2.807E-04	2.777E-04	2.732E-04	1.003E-04	5.600E-04	4.338E-15	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SB123	0.000E+00	1.634E+01	1.634E+01	1.634E+01	1.634E+01	1.634E+01	1.634E+01	1.634E+01	1.634E+01	1.634E+01	1.634E+01	1.634E+01	1.634E+01	1.634E+01	1.634E+01	1.634E+01	1.634E+01	1.634E+01	1.634E+01
TE123	0.000E+00	2.911E-02	2.911E-02	2.911E-02	2.911E-02	2.911E-02	2.911E-02	2.911E-02	2.911E-02	2.911E-02	2.911E-02	2.911E-02	2.911E-02	2.911E-02	2.911E-02	2.911E-02	2.911E-02	2.911E-02	2.911E-02
TE123M	0.000E+00	5.457E-03	5.457E-03	5.457E-03	5.457E-03	5.457E-03	5.457E-03	5.457E-03	5.457E-03	5.457E-03	5.457E-03	5.457E-03	5.457E-03	5.457E-03	5.457E-03	5.457E-03	5.457E-03	5.457E-03	5.457E-03
CD124	0.000E+00	1.674E-06	1.487E-07	1.320E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SN124	0.000E+00	2.127E+01	2.127E+01	2.127E+01	2.127E+01	2.127E+01	2.127E+01	2.127E+01	2.127E+01	2.127E+01	2.127E+01	2.127E+01	2.127E+01	2.127E+01	2.127E+01	2.127E+01	2.127E+01	2.127E+01	2.127E+01
SB124	0.000E+00	1.131E-01	1.131E-01	1.131E-01	1.131E-01	1.131E-01	1.131E-01	1.131E-01	1.131E-01	1.131E-01	1.131E-01	1.131E-01	1.131E-01	1.131E-01	1.131E-01	1.131E-01	1.131E-01	1.131E-01	1.131E-01
TE124	0.000E+00	1.309E+00	1.309E+00	1.309E+00	1.309E+00	1.309E+00	1.309E+00	1.309E+00	1.309E+00	1.309E+00	1.309E+00	1.309E+00	1.309E+00	1.309E+00	1.309E+00	1.309E+00	1.309E+00	1.309E+00	1.309E+00
INI25M	0.000E+00	9.182E-07	2.997E-08	9.366E-10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SN125	0.000E+00	8.690E-02	8.690E-02	8.690E-02	8.664E-02	8.536E-02	8.088E-02	6.518E-02	5.254E-02	3.176E-02	1.920E-02	1.005E-02							

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* 1 MTHM, E=3.93%, 54000 MWD/MT (BWRUE)

FISSION PRODUCTS

POWER= 1.00000E+00 MW, BURNUP= 1.00000E+00 MWD, FLUX= 1.00E+00 N/CM**2-SEC

5 SUMMARY TABLE: CONCENTRATIONS, GRAMS

BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
SN125M	0.000E+00	9.130E-05	8.491E-05	1.244E-06	4.062E-16	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SB125	0.000E+00	1.669E+01	1.669E+01	1.669E+01	1.669E+01	1.668E+01	1.666E+01	1.664E+01	1.658E+01	1.652E+01	1.642E+01
TE125	0.000E+00	1.526E+01	1.526E+01	1.526E+01	1.526E+01	1.528E+01	1.531E+01	1.534E+01	1.542E+01	1.550E+01	1.560E+01
TE125M	0.000E+00	2.149E-01	2.149E-01	2.149E-01	2.149E-01	2.149E-01	2.149E-01	2.152E-01	2.156E-01	2.158E-01	2.159E-01
SN126	0.000E+00	4.699E+01	4.699E+01	4.699E+01	4.699E+01	4.699E+01	4.699E+01	4.699E+01	4.699E+01	4.699E+01	4.699E+01
SB126	0.000E+00	1.125E-02	1.125E-02	1.123E-02	1.110E-02	1.064E-02	8.999E-03	7.609E-03	5.145E-03	3.479E-03	2.104E-03
SB126M	0.000E+00	4.433E-06	4.275E-06	4.122E-06	5.118E-07	1.698E-08	1.697E-08	1.697E-08	1.697E-08	1.697E-08	1.697E-08
TE126	0.000E+00	1.636E+00	1.636E+00	1.636E+00	1.636E+00	1.637E+00	1.638E+00	1.640E+00	1.642E+00	1.644E+00	1.645E+00
SN127	0.000E+00	3.969E-03	3.948E-03	3.927E-03	2.854E-03	1.439E-06	6.873E-17	3.282E-27	0.000E+00	0.000E+00	0.000E+00
SN127M	0.000E+00	6.152E-05	5.202E-05	4.399E-05	2.625E-09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SN127	0.000E+00	2.749E-01	2.749E-01	2.740E-01	2.662E-01	2.331E-01	1.358E-01	7.912E-02	2.243E-02	6.361E-03	1.258E-03
TE127	0.000E+00	2.768E-02	2.768E-02	2.768E-02	2.754E-02	2.576E-02	1.684E-02	1.131E-02	5.686E-03	3.983E-03	3.303E-03
TE127M	0.000E+00	1.060E+00	1.060E+00	1.060E+00	1.060E+00	1.059E+00	1.053E+00	1.041E+00	1.003E+00	9.616E-01	9.088E-01
I127	0.000E+00	8.832E+01	8.832E+01	8.832E+01	8.833E+01	8.837E+01	8.848E+01	8.855E+01	8.865E+01	8.871E+01	8.877E+01
XE127	0.000E+00	5.017E-06	5.016E-06	5.013E-06	4.993E-06	4.922E-06	4.649E-06	4.391E-06	3.843E-06	3.363E-06	2.834E-06
IN128	0.000E+00	0.055E-07	1.089E-11	1.430E-16	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SN128	0.000E+00	4.151E-03	4.103E-03	4.035E-03	2.052E-03	6.045E-05	1.867E-10	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SB128	0.000E+00	3.761E-03	3.756E-03	3.752E-03	3.483E-03	2.371E-03	5.937E-04	2.336E-06	9.190E-09	2.244E-14	5.480E-20
SB128M	0.000E+00	8.029E-04	7.980E-04	7.929E-04	4.374E-04	1.294E-05	3.994E-11	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TE128	0.000E+00	1.862E+02	1.862E+02	1.862E+02	1.862E+02	1.862E+02	1.863E+02	1.863E+02	1.863E+02	1.863E+02	1.863E+02
I128	0.000E+00	2.877E-04	2.798E-04	2.722E-04	5.445E-05	1.322E-08	1.283E-21	0.000E+00	0.000E+00	0.000E+00	0.000E+00
XE128	0.000E+00	1.070E+01	1.070E+01	1.070E+01	1.070E+01	1.070E+01	1.070E+01	1.070E+01	1.070E+01	1.070E+01	1.070E+01
SN129	0.000E+00	3.649E-04	3.328E-04	3.034E-04	1.426E-06	1.297E-18	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SN129M	0.000E+00	1.296E-04	9.828E-05	7.448E-05	7.729E-12	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SB129	0.000E+00	3.668E-02	3.664E-02	3.660E-02	3.167E-02	1.420E-02	7.902E-04	7.584E-09	7.280E-14	1.425E-25	2.790E-37
TE129	0.000E+00	9.705E-03	9.703E-03	9.701E-03	9.335E-03	5.384E-03	1.179E-03	8.714E-04	7.090E-04	6.137E-04	5.097E-04
TE129M	0.000E+00	1.006E+00	1.006E+00	1.006E+00	1.006E+00	1.004E+00	9.899E-01	9.306E-01	8.748E-01	7.572E-01	6.553E-01
I129	0.000E+00	2.911E+02	2.911E+02	2.911E+02	2.912E+02	2.912E+02	2.913E+02	2.913E+02	2.914E+02	2.915E+02	2.917E+02
XE129	0.000E+00	1.019E-01	1.019E-01	1.019E-01	1.019E-01	1.020E-01	1.020E-01	1.020E-01	1.020E-01	1.020E-01	1.021E-01
XE129M	0.000E+00	1.195E-04	1.195E-04	1.195E-04	1.190E-04	1.169E-04	1.096E-04	8.448E-05	6.514E-05	3.552E-05	1.937E-05
SN130	0.000E+00	5.533E-04	4.593E-04	3.812E-04	7.721E-09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SB130	0.000E+00	1.866E-03	1.834E-03	1.802E-03	6.596E-04	3.645E-06	2.716E-14	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SB130M	0.000E+00	1.244E-01	1.203E-03	1.151E-03	3.508E-06	1.632E-20	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TE130	0.000E+00	5.911E+02	5.911E+02	5.911E+02	5.911E+02	5.911E+02	5.911E+02	5.911E+02	5.911E+02	5.911E+02	5.911E+02
I130	0.000E+00	2.134E-02	2.133E-02	2.132E-02	2.026E-02	1.531E-02	5.579E-03	9.843E-05	1.737E-06	1.407E-10	1.140E-14
I130M	0.000E+00	1.011E-04	9.364E-05	8.670E-05	9.955E-07	9.199E-17	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
XE130	0.000E+00	3.174E+01	3.174E+01	3.174E+01	3.174E+01	3.175E+01	3.176E+01	3.176E+01	3.176E+01	3.176E+01	3.176E+01
SN131	0.000E+00	1.323E-04	6.840E-05	6.316E-05	8.316E-22	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SB131	0.000E+00	7.799E-03	7.631E-03	7.437E-03	1.301E-03	1.541E-07	1.129E-21	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TE131	0.000E+00	9.151E-03	9.124E-03	9.093E-03	4.368E-03	3.082E-04	2.014E-04	3.816E-05	7.229E-06	1.490E-07	3.073E-09
TE131M	0.000E+00	1.116E-01	1.116E-01	1.115E-01	1.095E-01	9.762E-02	6.441E-02	1.220E-02	2.312E-03	4.767E-05	9.828E-07

II131	0.000E+00	4.807E+00	4.807E+00	4.803E+00	4.735E+00	4.470E+00	3.496E+00	2.708E+00	1.482E+00	8.108E-01	3.732E-01
XE131	0.000E+00	4.926E+02	4.926E+02	4.926E+02	4.927E+02	4.930E+02	4.940E+02	4.948E+02	4.960E+02	4.967E+02	4.972E+02
XE131M	0.000E+00	7.957E-02	7.957E-02	7.957E-02	7.956E-02	7.939E-02	7.707E-02	7.281E-02	5.940E-02	4.550E-02	3.059E-02
SN132	0.000E+00	4.381E-05	1.549E-05	5.477E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SB132	0.000E+00	5.511E-04	4.548E-04	3.638E-04	2.156E-10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SB132M	0.000E+00	5.496E-04	4.660E-04	3.951E-04	2.751E-08	8.659E-30	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TE132	0.000E+00	2.739E+00	2.739E+00	2.739E+00	2.739E+00	2.739E+00	2.215E+00	1.170E+00	6.181E-01	1.394E-01	3.145E-02
II132	0.000E+00	8.214E-02	8.213E-02	8.212E-02	8.164E-02	7.860E-02	6.714E-02	3.546E-02	1.873E-02	4.225E-03	9.530E-04
XE132	0.000E+00	1.978E+03	1.978E+03	1.978E+03	1.979E+03	1.979E+03	1.979E+03	1.980E+03	1.981E+03	1.981E+03	1.981E+03
CS132	0.000E+00	1.735E-03	1.735E-03	1.735E-03	1.728E-03	1.690E-03	1.559E-03	1.131E-03	8.203E-04	3.877E-04	1.832E-04

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* 1 MTIHM, E=3.93%, 54000 MWD/MT (BWRUE)

FISSION PRODUCTS

POWER= 1.00000E+00 MW, BURNUP= 1.00000E+00 MWD, FLUX= 1.00E+00 N/CM**2-SEC

5 SUMMARY TABLE: CONCENTRATIONS, GRAMS

BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
BA132	0.000E+00	4.352E-03	4.352E-03	4.352E-03	4.353E-03	4.355E-03	4.364E-03	4.370E-03	4.379E-03	4.383E-03	4.385E-03
SB133	0.000E+00	5.252E-04	3.938E-04	2.950E-04	1.566E-11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TE133	0.000E+00	6.027E-03	5.850E-03	5.610E-03	4.887E-04	6.403E-06	8.668E-12	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TE133M	0.000E+00	1.535E-02	1.516E-02	1.497E-02	7.250E-03	1.699E-04	2.300E-10	0.000E+00	0.000E+00	0.000E+00	0.000E+00
I133	0.000E+00	1.022E+00	1.022E+00	1.022E+00	1.002E+00	8.551E-01	4.694E-01	4.261E-02	3.868E-03	1.433E-05	5.310E-08
I133M	0.000E+00	4.209E-06	4.143E-08	4.078E-10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
XE133	0.000E+00	6.224E+00	6.224E+00	6.224E+00	6.209E+00	5.995E+00	4.392E+00	3.001E+00	1.199E+00	4.762E-01	1.450E-01
XE133M	0.000E+00	8.267E-02	8.266E-02	8.266E-02	8.255E-02	8.159E-02	7.413E-02	3.531E-02	1.426E-02	1.575E-03	1.719E-04
CS133	0.000E+00	1.576E+03	1.576E+03	1.576E+03	1.577E+03	1.577E+03	1.577E+03	1.579E+03	1.581E+03	1.583E+03	1.584E+03
SB134	0.000E+00	7.497E-06	1.721E-07	3.924E-09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SB134M	0.000E+00	6.720E-06	1.378E-07	2.827E-09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TE134	0.000E+00	2.640E-02	2.598E-02	2.555E-02	9.767E-03	6.750E-05	1.126E-12	0.000E+00	0.000E+00	0.000E+00	0.000E+00
I134	0.000E+00	4.719E-02	4.706E-02	4.692E-02	3.236E-02	1.205E-03	1.006E-09	0.000E+00	0.000E+00	0.000E+00	0.000E+00
I134M	0.000E+00	3.699E-04	3.067E-04	2.543E-04	4.859E-09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
XE134	0.000E+00	2.380E+03	2.380E+03	2.380E+03	2.380E+03	2.380E+03	2.380E+03	2.380E+03	2.380E+03	2.380E+03	2.380E+03
CS134	0.000E+00	2.579E+02	2.579E+02	2.579E+02	2.579E+02	2.579E+02	2.579E+02	2.570E+02	2.563E+02	2.546E+02	2.530E+02
CS134M	0.000E+00	6.970E-03	6.942E-03	6.914E-03	5.488E-03	1.661E-03	2.249E-05	7.552E-13	2.536E-20	9.231E-38	0.000E+00
BA134	0.000E+00	2.200E+02	2.200E+02	2.200E+02	2.200E+02	2.200E+02	2.200E+02	2.209E+02	2.217E+02	2.233E+02	2.249E+02
SB135	0.000E+00	5.964E-07	1.421E-17	3.371E-28	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TE135	0.000E+00	1.105E-04	1.273E-05	1.459E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
I135	0.000E+00	3.095E-01	3.090E-01	3.085E-01	2.787E-01	1.650E-01	2.500E-02	1.317E-05	6.935E-09	1.554E-16	3.480E-24
XE135	0.000E+00	1.627E-01	1.630E-01	1.634E-01	1.812E-01	2.171E-01	1.169E-01	8.144E-04	3.533E-06	9.706E-12	2.647E-17
XE135M	0.000E+00	2.624E-03	2.589E-03	2.556E-03	1.768E-03	1.019E-03	1.544E-04	8.129E-08	4.282E-11	9.592E-19	2.149E-26
CS135	0.000E+00	8.969E+02	8.969E+02	8.969E+02	8.969E+02	8.970E+02	8.972E+02	8.974E+02	8.974E+02	8.974E+02	8.974E+02
CS135M	0.000E+00	1.486E-03	1.467E-03	1.448E-03	6.782E-04	1.341E-05	9.845E-12	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA135	0.000E+00	2.933E+00	2.933E+00	2.933E+00	2.933E+00	2.933E+00	2.933E+00	2.933E+00	2.933E+00	2.933E+00	2.933E+00
BA135M	0.000E+00	5.042E-04	5.040E-04	5.038E-04	4.922E-04	4.362E-04	2.824E-04	4.960E-05	8.713E-06	1.506E-07	2.602E-09
TE136	0.000E+00	6.198E-05	8.557E-06	1.181E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
I136	0.000E+00	5.109E-04	3.482E-04	2.163E-04	5.207E-17	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
I136M	0.000E+00	1.624E-04	6.577E-05	2.663E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
XE136	0.000E+00	3.401E+03	3.401E+03	3.401E+03	3.401E+03	3.401E+03	3.401E+03	3.401E+03	3.401E+03	3.401E+03	3.401E+03
CS136	0.000E+00	1.190E+00	1.190E+00	1.190E+00	1.187E+00	1.174E+00	1.128E+00	9.628E-01	8.215E-01	5.672E-01	3.917E-01
BA136	0.000E+00	7.313E+01	7.313E+01	7.313E+01	7.313E+01	7.314E+01	7.319E+01	7.335E+01	7.349E+01	7.392E+01	7.407E+01
TE137	0.000E+00	3.139E-06	2.172E-11	1.500E-16	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
I137	0.000E+00	4.442E-04	2.726E-05	5.027E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
XE137	0.000E+00	2.807E-03	2.444E-03	2.058E-03	5.701E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CS137	0.000E+00	1.859E+03	1.859E+03	1.859E+03	1.859E+03	1.859E+03	1.859E+03	1.859E+03	1.859E+03	1.859E+03	1.859E+03
BA137	0.000E+00	1.502E+02	1.502E+02	1.502E+02	1.502E+02	1.503E+02	1.504E+02	1.507E+02	1.511E+02	1.519E+02	1.527E+02
BA137M	0.000E+00	2.848E-04	2.847E-04	2.846E-04	2.845E-04	2.845E-04	2.845E-04	2.844E-04	2.843E-04	2.842E-04	2.841E-04
I138	0.000E+00	1.852E-05	2.861E-08	4.326E-11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
XE138	0.000E+00	9.475E-03	9.041E-03	8.609E-03	5.044E-04	2.136E-10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

PM146	0.000E+00	8.859E-03	8.859E-03	8.859E-03	8.859E-03	8.847E-03	8.838E-03	8.817E-03	8.795E-03	8.768E-03
SMI46	0.000E+00	1.767E-02	1.767E-02	1.767E-02	1.767E-02	1.767E-02	1.768E-02	1.768E-02	1.769E-02	1.770E-02
BA147	0.000E+00	7.603E-07	5.928E-15	4.596E-23	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
LA147	0.000E+00	2.249E-05	3.668E-07	5.730E-09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CE147	0.000E+00	3.288E-04	1.962E-04	1.085E-04	1.175E-19	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PR147	0.000E+00	3.480E-03	3.435E-03	3.328E-03	1.209E-04	3.605E-12	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ND147	0.000E+00	4.688E+00	4.688E+00	4.687E+00	4.679E+00	4.618E+00	4.406E+00	3.651E+00	3.025E+00	1.951E+00
PM147	0.000E+00	1.050E+02	1.050E+02	1.050E+02	1.050E+02	1.052E+02	1.052E+02	1.061E+02	1.066E+02	1.066E+02
SMI47	0.000E+00	1.134E+02	1.134E+02	1.134E+02	1.134E+02	1.134E+02	1.134E+02	1.137E+02	1.139E+02	1.144E+02
LA148	0.000E+00	1.141E-06	9.443E-11	8.208E-14	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* 1 MTIHM, E=3.93%, 54000 MWD/MT (BWRUE)

FISSION PRODUCTS

POWER= 1.00000E+00 MW, BURNUP= 1.00000E+00 MWD, FLUX= 1.00E+00 N/CM**2-SEC

5 SUMMARY TABLE: CONCENTRATIONS, GRAMS

BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
H	0.000E+00	8.660E-02	8.660E-02	8.660E-02	8.660E-02	8.659E-02	8.655E-02	8.651E-02	8.642E-02	8.632E-02	8.620E-02
LI	0.000E+00	2.329E-04	2.329E-04	2.329E-04	2.329E-04	2.329E-04	2.329E-04	2.329E-04	2.329E-04	2.329E-04	2.329E-04
BE	0.000E+00	2.429E-04	2.429E-04	2.429E-04	2.429E-04	2.429E-04	2.429E-04	2.429E-04	2.429E-04	2.429E-04	2.429E-04
C	0.000E+00	4.270E-05	4.270E-05	4.270E-05	4.270E-05	4.270E-05	4.270E-05	4.270E-05	4.270E-05	4.270E-05	4.270E-05
ZN	0.000E+00	1.076E-02	1.076E-02	1.076E-02	1.076E-02	1.075E-02	1.073E-02	1.072E-02	1.071E-02	1.071E-02	1.071E-02
GA	0.000E+00	3.683E-05	3.642E-05	3.629E-05	3.438E-05	2.401E-05	1.561E-05	1.225E-05	1.061E-05	1.048E-05	1.047E-05
GE	0.000E+00	1.051E+00	1.051E+00	1.050E+00	1.050E+00	1.050E+00	1.050E+00	1.050E+00	1.050E+00	1.050E+00	1.050E+00
AS	0.000E+00	3.141E-01	3.141E-01	3.141E-01	3.139E-01	3.135E-01	3.128E-01	3.126E-01	3.125E-01	3.125E-01	3.125E-01
SE	0.000E+00	8.828E+01	8.828E+01	8.828E+01	8.828E+01	8.828E+01	8.828E+01	8.828E+01	8.828E+01	8.828E+01	8.828E+01
BR	0.000E+00	3.260E+01	3.260E+01	3.260E+01	3.260E+01	3.260E+01	3.259E+01	3.259E+01	3.259E+01	3.259E+01	3.259E+01
KR	0.000E+00	5.618E+02	5.618E+02	5.618E+02	5.618E+02	5.618E+02	5.618E+02	5.618E+02	5.617E+02	5.617E+02	5.616E+02
RB	0.000E+00	5.225E+02	5.225E+02	5.225E+02	5.225E+02	5.225E+02	5.225E+02	5.225E+02	5.226E+02	5.226E+02	5.227E+02
SR	0.000E+00	1.310E+03	1.310E+03	1.310E+03	1.310E+03	1.310E+03	1.309E+03	1.308E+03	1.307E+03	1.305E+03	1.304E+03
Y	0.000E+00	6.983E+02	6.983E+02	6.983E+02	6.983E+02	6.981E+02	6.978E+02	6.976E+02	6.971E+02	6.966E+02	6.961E+02
ZR	0.000E+00	5.532E+03	5.532E+03	5.532E+03	5.532E+03	5.532E+03	5.532E+03	5.531E+03	5.531E+03	5.530E+03	5.529E+03
NB	0.000E+00	2.289E+01	2.289E+01	2.289E+01	2.288E+01	2.286E+01	2.280E+01	2.272E+01	2.240E+01	2.193E+01	2.116E+01
MO	0.000E+00	5.384E+03	5.384E+03	5.384E+03	5.384E+03	5.385E+03	5.385E+03	5.386E+03	5.389E+03	5.392E+03	5.396E+03
TC	0.000E+00	1.149E+03	1.149E+03	1.149E+03	1.149E+03	1.150E+03	1.151E+03	1.151E+03	1.151E+03	1.151E+03	1.151E+03
RU	0.000E+00	4.016E+03	4.016E+03	4.016E+03	4.016E+03	4.015E+03	4.012E+03	4.010E+03	4.005E+03	4.000E+03	3.994E+03
RH	0.000E+00	5.223E+02	5.223E+02	5.223E+02	5.224E+02	5.226E+02	5.228E+02	5.252E+02	5.284E+02	5.313E+02	5.345E+02
PD	0.000E+00	2.670E+03	2.670E+03	2.670E+03	2.670E+03	2.670E+03	2.672E+03	2.673E+03	2.675E+03	2.677E+03	2.680E+03
AG	0.000E+00	1.240E+02	1.240E+02	1.240E+02	1.240E+02	1.240E+02	1.240E+02	1.239E+02	1.238E+02	1.237E+02	1.237E+02
CD	0.000E+00	2.529E+02	2.529E+02	2.529E+02	2.529E+02	2.530E+02	2.531E+02	2.531E+02	2.532E+02	2.533E+02	2.534E+02
IN	0.000E+00	2.177E+00	2.177E+00	2.177E+00	2.178E+00	2.183E+00	2.198E+00	2.205E+00	2.213E+00	2.218E+00	2.223E+00
SN	0.000E+00	1.570E+02	1.570E+02	1.570E+02	1.570E+02	1.570E+02	1.570E+02	1.570E+02	1.569E+02	1.569E+02	1.569E+02
SB	0.000E+00	4.655E+01	4.655E+01	4.655E+01	4.654E+01	4.646E+01	4.634E+01	4.626E+01	4.615E+01	4.606E+01	4.597E+01
TE	0.000E+00	8.026E+02	8.026E+02	8.026E+02	8.024E+02	8.020E+02	8.009E+02	8.003E+02	7.997E+02	7.995E+02	7.995E+02
I	0.000E+00	3.858E+02	3.858E+02	3.857E+02	3.854E+02	3.846E+02	3.833E+02	3.826E+02	3.816E+02	3.811E+02	3.808E+02
XE	0.000E+00	8.301E+03	8.301E+03	8.301E+03	8.301E+03	8.302E+03	8.302E+03	8.302E+03	8.302E+03	8.302E+03	8.302E+03
CS	0.000E+00	4.592E+03	4.592E+03	4.592E+03	4.592E+03	4.593E+03	4.594E+03	4.594E+03	4.593E+03	4.591E+03	4.588E+03
BA	0.000E+00	2.511E+03	2.511E+03	2.511E+03	2.511E+03	2.511E+03	2.510E+03	2.510E+03	2.510E+03	2.510E+03	2.512E+03
LA	0.000E+00	1.946E+03	1.946E+03	1.946E+03	1.946E+03	1.945E+03	1.945E+03	1.945E+03	1.945E+03	1.944E+03	1.944E+03
CE	0.000E+00	4.043E+03	4.043E+03	4.043E+03	4.043E+03	4.043E+03	4.040E+03	4.038E+03	4.034E+03	4.029E+03	4.022E+03
PR	0.000E+00	1.773E+03	1.773E+03	1.773E+03	1.773E+03	1.774E+03	1.774E+03	1.775E+03	1.776E+03	1.777E+03	1.779E+03
ND	0.000E+00	6.237E+03	6.237E+03	6.237E+03	6.238E+03	6.241E+03	6.244E+03	6.244E+03	6.250E+03	6.255E+03	6.261E+03
PM	0.000E+00	1.082E+02	1.082E+02	1.082E+02	1.082E+02	1.080E+02	1.077E+02	1.077E+02	1.078E+02	1.077E+02	1.074E+02
SM	0.000E+00	1.215E+03	1.215E+03	1.215E+03	1.215E+03	1.215E+03	1.216E+03	1.216E+03	1.217E+03	1.218E+03	1.219E+03
EU	0.000E+00	3.185E+02	3.185E+02	3.185E+02	3.186E+02	3.186E+02	3.186E+02	3.179E+02	3.168E+02	3.160E+02	3.151E+02
GD	0.000E+00	2.529E+02	2.529E+02	2.529E+02	2.529E+02	2.531E+02	2.538E+02	2.544E+02	2.555E+02	2.564E+02	2.573E+02
TB	0.000E+00	5.032E+00	5.032E+00	5.032E+00	5.032E+00	5.032E+00	5.032E+00	5.022E+00	5.009E+00	4.999E+00	4.987E+00
DY	0.000E+00	3.115E+00	3.115E+00	3.115E+00	3.115E+00	3.117E+00	3.124E+00	3.130E+00	3.143E+00	3.153E+00	3.165E+00

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* 1 MTIHM, E=3.93%, 54000 MWD/MT (BWRUE)

FISSION PRODUCTS

POWER= 1.00000E+00 MW, BURNUP= 1.00000E+00 MWD, FLUX= 1.00E+00 N/CM**2-SEC

7 SUMMARY TABLE: RADIOACTIVITY, CURIES

BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
PD114	0.000E+00	1.434E+04	1.094E+04	8.194E+03	4.351E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AG114	0.000E+00	1.455E+04	1.129E+04	8.461E+03	4.492E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
IN114	0.000E+00	2.733E+01	1.983E+01	1.562E+01	1.022E+01	1.011E+01	9.694E+00	9.295E+00	8.428E+00	7.641E+00	6.736E+00
IN114M	0.000E+00	1.071E+01	1.071E+01	1.071E+01	1.068E+01	1.056E+01	1.013E+01	9.713E+00	8.806E+00	7.984E+00	7.039E+00
MO115	0.000E+00	3.939E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TC115	0.000E+00	2.673E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RU115	0.000E+00	1.763E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RH115	0.000E+00	7.498E+03	7.761E+03	7.808E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PD115	0.000E+00	1.357E+04	5.029E+03	1.684E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AG115	0.000E+00	1.017E+04	1.004E+04	9.777E+03	1.315E+03	4.014E-02	2.228E-18	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AG115M	0.000E+00	3.919E+03	2.143E+03	7.954E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CD115	0.000E+00	1.400E+04	1.400E+04	1.400E+04	1.387E+04	1.301E+04	1.030E+04	4.051E+03	1.593E+03	1.805E+02	2.045E+01
IN115M	0.000E+00	1.339E+03	1.339E+03	1.339E+03	1.338E+03	1.334E+03	1.318E+03	1.258E+03	1.201E+03	1.077E+03	9.659E+02
IN115M	0.000E+00	1.402E+04	1.402E+04	1.402E+04	1.401E+04	1.366E+04	1.118E+04	4.406E+03	1.733E+03	1.964E+02	2.231E+01
TC116	0.000E+00	1.649E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RU116	0.000E+00	3.953E+02	5.518E-11	7.694E-24	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RH116	0.000E+00	3.550E+03	1.356E-10	1.891E-23	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PD116	0.000E+00	1.008E+04	5.310E+02	2.722E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AG116	0.000E+00	5.625E+03	4.699E+03	3.646E+03	1.115E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AG116M	0.000E+00	5.625E+03	4.699E+03	3.646E+03	1.115E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
IN116	0.000E+00	8.563E+03	4.484E+02	2.348E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
IN116M	0.000E+00	6.158E+03	6.080E+03	6.003E+03	2.857E+03	6.140E+01	6.085E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TC117	0.000E+00	6.980E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RU117	0.000E+00	5.721E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RH117	0.000E+00	1.768E+03	2.933E-14	4.851E-31	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PD117	0.000E+00	8.773E+03	2.262E+00	5.520E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AG117	0.000E+00	5.511E+03	3.313E+03	1.877E+03	9.163E-12	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AG117M	0.000E+00	5.509E+03	1.346E+01	8.028E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CD117	0.000E+00	7.351E+03	7.337E+03	7.313E+03	5.661E+03	1.493E+03	1.230E+01	5.672E-08	2.615E-16	8.449E-36	0.000E+00
CD117M	0.000E+00	3.977E+03	3.968E+03	3.957E+03	3.251E+03	1.173E+03	2.990E+01	1.261E-05	5.322E-12	7.107E-27	0.000E+00
IN117	0.000E+00	6.778E+03	6.778E+03	6.777E+03	6.551E+03	3.284E+03	5.797E+01	1.689E-05	7.069E-12	9.438E-27	0.000E+00
IN117M	0.000E+00	8.586E+03	8.586E+03	8.586E+03	8.279E+03	4.025E+03	7.144E+01	1.313E-05	5.455E-12	7.282E-27	0.000E+00
SN117M	0.000E+00	1.621E+02	1.621E+02	1.621E+02	1.618E+02	1.601E+02	1.543E+02	1.330E+02	1.147E+02	8.108E+01	5.734E+01
RU118	0.000E+00	3.885E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RH118	0.000E+00	3.039E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PD118	0.000E+00	7.487E+03	1.180E-02	1.760E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AG118	0.000E+00	7.248E+03	7.568E-01	1.159E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AG118M	0.000E+00	5.066E+03	4.828E-02	8.644E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CD118	0.000E+00	1.105E+04	1.092E+04	1.077E+04	4.844E+03	7.758E+01	2.669E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00
IN118	0.000E+00	1.106E+04	1.094E+04	1.079E+04	4.852E+03	7.771E+01	2.673E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00
IN118M	0.000E+00	4.797E+00	4.105E+00	3.513E+00	4.189E-04	2.128E-24	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* 1 MTIHM, E=3.93%, 54000 MWD/MT (BWRUE)
FISSION PRODUCTS
POWER= 1.00000E+00 MW, BURNUP= 1.00000E+00 MWD, FLUX= 1.00E+00 N/CM**2-SEC

7 SUMMARY TABLE: RADIOACTIVITY, CURIES

BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
PD120	0.000E+00	2.072E+03	1.227E-01	7.255E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AG120	0.000E+00	7.007E+03	1.689E-01	9.992E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CD120	0.000E+00	1.084E+04	4.938E+03	2.178E+03	5.201E-18	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
IN120	0.000E+00	5.532E+03	4.350E+03	2.667E+03	2.064E-17	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
IN120M	0.000E+00	5.532E+03	2.629E+03	1.159E+03	2.769E-18	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RH121	0.000E+00	5.834E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PD121	0.000E+00	8.167E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AG121	0.000E+00	4.908E+03	4.886E-03	4.658E-09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CD121	0.000E+00	1.070E+04	4.758E+02	1.847E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
IN121	0.000E+00	9.110E+03	3.651E+03	8.884E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
IN121M	0.000E+00	2.257E+03	1.947E+03	1.593E+03	8.103E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SN121	0.000E+00	1.141E+04	1.141E+04	1.141E+04	1.113E+04	9.779E+03	6.139E+03	9.536E+02	1.481E+02	1.921E+00	2.492E-02
SN121M	0.000E+00	3.510E-01	3.510E-01	3.510E-01	3.510E-01	3.510E-01	3.510E-01	3.509E-01	3.508E-01	3.507E-01	3.506E-01
RH122	0.000E+00	7.070E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PD122	0.000E+00	2.497E+02	1.499E-12	8.984E-27	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AG122	0.000E+00	3.043E+03	1.627E-12	9.752E-27	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CD122	0.000E+00	1.023E+04	5.390E+00	2.802E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
IN122	0.000E+00	1.101E+04	3.632E+02	5.773E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
IN122M	0.000E+00	7.821E+02	7.115E-10	6.467E-22	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SB122	0.000E+00	2.963E+03	2.963E+03	2.963E+03	2.932E+03	2.779E+03	2.292E+03	1.061E+03	4.913E+02	8.147E+01	1.351E+01
SB122M	0.000E+00	2.350E+01	1.992E+01	1.689E+01	1.176E-03	3.702E-25	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RH123	0.000E+00	6.044E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PD123	0.000E+00	5.672E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AG123	0.000E+00	1.597E+03	1.886E-18	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CD123	0.000E+00	9.755E+03	7.051E+01	5.001E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
IN123	0.000E+00	9.080E+03	1.960E+02	1.514E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
IN123M	0.000E+00	3.809E+03	1.802E+03	7.592E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SN123	0.000E+00	2.581E+03	2.581E+03	2.581E+03	2.581E+03	2.578E+03	2.567E+03	2.526E+03	2.486E+03	2.394E+03	2.306E+03
SN123M	0.000E+00	1.071E+04	1.059E+04	1.042E+04	3.826E+03	2.137E+01	1.655E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TE123M	0.000E+00	4.843E+01	4.843E+01	4.843E+01	4.842E+01	4.836E+01	4.815E+01	4.732E+01	4.651E+01	4.466E+01	4.288E+01
PD124	0.000E+00	1.064E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AG124	0.000E+00	7.297E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CD124	0.000E+00	8.874E+03	7.885E+02	6.995E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
IN124	0.000E+00	1.447E+04	9.691E+02	8.598E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SB124	0.000E+00	1.979E+01	1.979E+03	1.979E+03	1.974E+03	1.957E+03	1.890E+03	1.826E+03	1.755E+03	1.685E+03	1.554E+03
SB124M	0.000E+00	1.055E+01	6.743E+00	4.312E+00	2.345E-11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AG125	0.000E+00	2.310E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CD125	0.000E+00	6.503E+03	4.813E-08	3.221E-19	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
IN125	0.000E+00	9.476E+03	3.543E-04	6.527E-12	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
IN125M	0.000E+00	6.909E+03	2.255E+02	7.047E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SN125	0.000E+00	9.421E+03	9.421E+03	9.420E+03	9.393E+03	8.767E+03	7.066E+03	5.695E+03	3.443E+03	2.081E+03	1.090E+03

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* 1 MTIHM, E=3.93%, 54000 MWD/MT (BWRUE)

FISSION PRODUCTS

POWER= 1.00000E+00 MW, BURNUP= 1.00000E+00 MWD, FLUX= 1.00E+00 N/CM**2-SEC

7 SUMMARY TABLE: RADIOACTIVITY, CURIES

BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
EU163	0.000E+00	5.060E+01	3.124E+00	1.895E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
GD163	0.000E+00	1.588E+02	1.071E+02	6.876E+01	3.509E-10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TB163	0.000E+00	1.714E+02	1.700E+02	1.671E+02	2.202E+01	5.147E-04	1.094E-20	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SM164	0.000E+00	3.718E-01	2.077E-05	1.160E-09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
EU164	0.000E+00	9.972E+00	4.252E-05	2.372E-09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
GD164	0.000E+00	6.217E+01	6.023E+01	5.833E+01	9.135E+00	6.249E-04	6.341E-19	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TB164	0.000E+00	7.718E+01	7.388E+01	7.086E+01	1.060E+01	7.252E-04	7.359E-19	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SM165	0.000E+00	2.267E-02	7.583E-22	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
EU165	0.000E+00	1.538E+00	1.265E-07	1.031E-14	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
GD165	0.000E+00	2.056E+01	1.360E+01	8.983E+00	3.151E-10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TB165	0.000E+00	3.364E+01	2.106E+01	1.358E+01	4.681E-10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
DY165	0.000E+00	8.717E+02	8.695E+02	8.665E+02	6.529E+02	1.494E+02	7.389E-01	4.421E-10	2.646E-19	0.000E+00	0.000E+00
DY165M	0.000E+00	5.456E+02	3.197E+02	1.877E+02	9.461E-10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
DY166	0.000E+00	2.439E+01	2.439E+01	2.438E+01	2.419E+01	2.318E+01	1.989E+01	1.078E+01	5.844E+00	1.400E+00	3.355E-01
HO166M	0.000E+00	2.720E+02	2.719E+02	2.718E+02	2.657E+02	1.563E+02	3.574E+01	1.176E+01	2.126E+00	5.003E-01	7.962E-02
ER167M	0.000E+00	1.287E-02	1.287E-02	1.287E-02	1.287E-02	1.287E-02	1.287E-02	1.287E-02	1.287E-02	1.287E-02	1.287E-02
ER169	0.000E+00	4.541E-01	4.540E-01	4.540E-01	4.527E-01	4.458E-01	4.218E-01	3.381E-01	2.710E-01	1.617E-01	9.651E-02
TM170	0.000E+00	1.569E-01	1.569E-01	1.569E-01	1.569E-01	1.567E-01	1.567E-01	1.567E-01	1.567E-01	1.567E-01	1.567E-01
TM170M	0.000E+00	1.423E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TM171	0.000E+00	3.794E-03	3.794E-03	3.794E-03	3.794E-03	3.790E-03	3.779E-03	3.768E-03	3.742E-03	3.716E-03	3.683E-03
SUMTOT	0.000E+00	1.019E+08	7.172E+07	6.560E+07	3.886E+07	2.939E+07	2.225E+07	1.567E+07	1.336E+07	9.326E+06	8.162E+06
TOTAL	0.000E+00	1.019E+08	7.172E+07	6.560E+07	3.886E+07	2.939E+07	2.225E+07	1.567E+07	1.336E+07	9.326E+06	8.162E+06

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* 1 MTIHM, E=3.93%, 54000 MWD/MT (BWRUE)

FISSION PRODUCTS

POWER= 1.00000E+00 MW, BURNUP= 1.00000E+00 MWD, FLUX= 1.00E+00 N/CM**2-SEC

7 SUMMARY TABLE: RADIOACTIVITY, CURIES

	BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
H	0.000E+00	8.361E+02	8.361E+02	8.361E+02	8.361E+02	8.360E+02	8.359E+02	8.356E+02	8.352E+02	8.343E+02	8.334E+02	8.322E+02
CO	0.000E+00	1.523E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
NI	0.000E+00	5.279E+01	6.971E-07	2.380E-14	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CU	0.000E+00	2.943E+02	5.380E-02	7.630E-05	9.473E-09	3.319E-11	2.713E-11	1.211E-11	5.404E-12	8.226E-13	1.252E-13	1.113E-14
ZN	0.000E+00	2.318E+03	1.639E+02	1.129E+02	4.617E+01	4.285E+01	3.276E+01	1.120E+01	3.830E+00	3.130E-01	2.558E-02	1.022E-03
GA	0.000E+00	1.053E+04	7.525E+02	4.949E+02	1.247E+02	8.406E+01	4.372E+01	1.590E+01	5.491E+00	4.507E-01	3.684E-02	1.468E-03
GE	0.000E+00	6.378E+04	1.014E+04	6.008E+03	2.865E+03	6.190E+02	1.272E+02	1.500E+00	1.812E-02	6.061E-07	2.028E-11	3.572E-17
AS	0.000E+00	1.810E+05	3.233E+04	1.642E+04	4.719E+03	2.173E+03	1.071E+03	3.062E+02	8.434E+01	4.176E+00	2.075E-01	4.378E-03
SE	0.000E+00	5.157E+05	1.933E+05	1.432E+05	7.900E+03	2.757E+04	3.246E+00	1.401E+00	8.584E-01	6.608E-01	6.510E-01	6.505E-01
BR	0.000E+00	1.069E+06	4.398E+05	3.263E+05	8.540E+04	1.730E+04	4.027E+03	9.644E+02	2.346E+02	8.668E+00	3.202E-01	4.611E-03
KR	0.000E+00	1.956E+06	1.132E+06	9.948E+05	5.530E+05	1.686E+05	1.671E+04	1.258E+04	1.257E+04	1.256E+04	1.254E+04	1.252E+04
RB	0.000E+00	2.820E+06	1.415E+06	1.192E+06	3.061E+05	8.332E+04	3.484E+03	2.222E+03	1.991E+03	1.535E+03	1.183E+03	8.471E+02
SR	0.000E+00	4.586E+06	2.886E+06	2.547E+06	1.510E+06	1.006E+06	6.118E+05	4.992E+05	4.828E+05	4.481E+05	4.165E+05	3.801E+05
Y	0.000E+00	6.509E+06	4.561E+06	4.337E+06	2.406E+06	1.777E+06	8.927E+05	6.475E+05	6.265E+05	5.844E+05	5.461E+05	5.013E+05
ZR	0.000E+00	5.601E+06	2.146E+06	1.901E+06	1.782E+06	1.614E+06	1.226E+06	8.673E+05	8.229E+05	7.619E+05	7.063E+05	6.407E+05
NB	0.000E+00	5.800E+06	3.245E+06	2.861E+06	2.681E+06	2.372E+06	1.581E+06	9.331E+05	8.960E+05	8.812E+05	8.625E+05	8.319E+05
MO	0.000E+00	6.051E+06	4.440E+06	3.707E+06	1.186E+06	1.047E+06	8.663E+05	4.067E+05	1.909E+05	3.271E+04	5.602E+03	5.797E+02
TC	0.000E+00	7.275E+06	5.780E+06	5.141E+06	1.323E+06	9.591E+05	8.284E+05	3.920E+05	1.841E+05	3.153E+04	5.416E+03	5.779E+02
RU	0.000E+00	3.505E+06	3.165E+06	3.005E+06	2.256E+06	1.881E+06	1.572E+06	1.499E+06	1.446E+06	1.334E+06	1.234E+06	1.122E+06
RH	0.000E+00	4.800E+06	4.002E+06	3.626E+06	2.491E+06	2.264E+06	1.985E+06	1.534E+06	1.389E+06	1.257E+06	1.165E+06	1.063E+06
PD	0.000E+00	5.764E+05	5.211E+05	5.061E+05	3.258E+05	2.466E+05	1.005E+05	3.173E+03	1.371E+02	4.774E-01	2.141E-01	2.133E-01
AG	0.000E+00	7.625E+05	5.379E+05	4.988E+05	4.073E+05	3.196E+05	1.615E+05	4.905E+04	3.653E+04	2.249E+04	1.518E+04	1.057E+04
CD	0.000E+00	1.153E+05	5.380E+04	4.834E+04	2.918E+04	1.721E+04	1.178E+04	5.427E+03	2.912E+03	1.375E+03	1.104E+03	9.586E+02
IN	0.000E+00	2.495E+05	7.441E+04	6.457E+04	3.806E+04	2.113E+04	1.133E+04	4.426E+03	1.752E+03	2.1136E+02	3.793E+01	1.519E+01
SN	0.000E+00	8.920E+05	6.434E+05	5.214E+05	1.125E+05	2.997E+04	1.788E+04	1.091E+04	8.672E+03	6.144E+03	4.664E+03	3.538E+03
SB	0.000E+00	2.190E+06	1.869E+06	1.712E+06	4.517E+05	1.823E+05	9.071E+04	5.721E+04	4.129E+04	2.532E+04	2.062E+04	1.888E+04
TE	0.000E+00	4.554E+06	3.779E+06	3.657E+06	2.045E+06	1.122E+06	8.723E+05	4.720E+05	2.771E+05	1.085E+05	6.568E+04	4.972E+04
I	0.000E+00	6.866E+06	5.692E+06	5.387E+06	4.460E+06	3.010E+06	1.878E+06	8.483E+05	5.337E+05	2.275E+05	1.104E+05	4.774E+04
XE	0.000E+00	5.162E+06	3.875E+06	3.513E+06	1.882E+06	1.854E+06	1.475E+06	8.468E+05	5.745E+05	2.302E+05	9.306E+04	2.973E+04
CS	0.000E+00	4.856E+06	3.302E+06	2.893E+06	1.098E+06	5.964E+05	5.785E+05	5.651E+05	5.538E+05	5.329E+05	5.178E+05	5.041E+05
BA	0.000E+00	5.592E+06	3.874E+06	3.746E+06	1.932E+06	1.178E+06	1.083E+06	9.437E+05	8.250E+05	6.128E+05	4.676E+05	3.461E+05
LA	0.000E+00	5.468E+06	4.064E+06	3.707E+06	2.515E+06	1.430E+06	1.011E+06	8.796E+05	7.571E+05	5.211E+05	3.568E+05	2.191E+05
CE	0.000E+00	4.411E+06	3.771E+06	3.499E+06	2.551E+06	2.404E+06	2.160E+06	1.708E+06	1.564E+06	1.418E+06	1.309E+06	1.191E+06
PR	0.000E+00	3.905E+06	3.524E+06	3.410E+06	2.360E+06	1.940E+06	1.645E+06	1.490E+06	1.386E+06	1.184E+06	1.038E+06	9.072E+05
ND	0.000E+00	9.365E+05	8.689E+05	8.330E+05	5.452E+05	3.930E+05	3.541E+05	2.934E+05	2.431E+05	1.568E+05	1.011E+05	5.751E+04
PM	0.000E+00	1.018E+06	9.802E+05	9.571E+05	7.714E+05	7.290E+05	6.039E+05	3.356E+05	2.304E+05	1.512E+05	1.291E+05	1.184E+05
SM	0.000E+00	4.981E+05	4.957E+05	4.934E+05	4.453E+05	4.028E+05	3.027E+05	1.033E+05	3.586E+04	3.505E+03	8.326E+02	6.017E+02
EU	0.000E+00	3.333E+06	3.324E+06	3.318E+06	3.240E+06	3.119E+06	2.940E+06	2.551E+06	2.268E+06	1.745E+06	1.365E+06	1.025E+06
GD	0.000E+00	7.672E+03	7.530E+03	7.363E+03	5.990E+03	4.967E+03	2.560E+03	1.220E+03	5.123E+01	3.870E+01	3.791E+01	3.694E+01
TB	0.000E+00	3.696E+03	3.678E+03	3.663E+03	3.073E+03	2.880E+03	2.880E+03	2.554E+03	2.300E+03	1.896E+03	1.647E+03	1.438E+03
DY	0.000E+00	1.442E+03	1.214E+03	1.079E+03	6.771E+02	1.726E+02	2.063E+01	1.078E+01	5.844E+00	1.400E+00	3.355E-01	5.344E-02

HO	0.000E+00	2.720E+02	2.719E+02	2.718E+02	2.657E+02	2.363E+02	1.563E+02	3.575E+01	1.178E+01	2.139E+00	5.132E-01	9.249E-02
ER	0.000E+00	8.407E+00	4.540E-01	4.540E-01	4.527E-01	4.458E-01	4.218E-01	3.381E-01	2.710E-01	1.617E-01	9.651E-02	4.970E-02
TM	0.000E+00	1.752E-01	1.610E-01	1.610E-01	1.610E-01	1.608E-01	1.601E-01	1.575E-01	1.549E-01	1.493E-01	1.438E-01	1.372E-01
SUMTOT	0.000E+00	1.019E+08	7.172E+07	6.560E+07	3.886E+07	2.939E+07	2.225E+07	1.567E+07	1.336E+07	1.072E+07	9.326E+06	8.162E+06
TOTAL	0.000E+00	1.019E+08	7.172E+07	6.560E+07	3.886E+07	2.939E+07	2.225E+07	1.567E+07	1.336E+07	1.072E+07	9.326E+06	8.162E+06

CUMULATIVE TABLE TOTALS

AP+FP	0.000E+00	1.019E+08	7.172E+07	6.560E+07	3.886E+07	2.939E+07	2.225E+07	1.567E+07	1.336E+07	1.072E+07	9.326E+06	8.162E+06
ACT+FP	2.315E+00	1.345E+08	1.039E+08	9.732E+07	5.869E+07	4.543E+07	3.508E+07	2.138E+07	1.609E+07	1.149E+07	9.755E+06	8.492E+06
AP+ACT+FP	2.315E+00	1.345E+08	1.039E+08	9.732E+07	5.869E+07	4.543E+07	3.508E+07	2.138E+07	1.609E+07	1.149E+07	9.755E+06	8.492E+06

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* 1 MTIHM, E=3.93%, 54000 MWD/MT (BWRUE)
 FISSION PRODUCTS
 POWER= 1.00000E+00 MW, BURNUP= 1.00000E+00 MWD, FLUX= 1.00E+00 N/CM**2-SEC

9 SUMMARY TABLE: THERMAL POWER, WATTS

	BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
ZN 80	0.000E+00	2.626E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
GA 80	0.000E+00	6.832E+01	1.684E-09	3.995E-20	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
GE 80	0.000E+00	7.619E+01	1.364E+01	2.411E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AS 80	0.000E+00	3.144E+02	9.762E+01	2.064E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR 80	0.000E+00	3.259E-03	3.208E-03	3.159E-03	1.892E-03	8.149E-04	4.842E-05	6.036E-10	7.524E-15	2.711E-26	7.197E-38	0.000E+00
BR 80M	0.000E+00	2.058E-04	2.052E-04	2.047E-04	1.759E-04	8.030E-05	4.771E-06	5.948E-11	7.415E-16	2.672E-27	9.464E-39	0.000E+00
CU 81	0.000E+00	1.050E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ZN 81	0.000E+00	1.144E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
GA 81	0.000E+00	3.317E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
GE 81	0.000E+00	2.755E+02	4.515E+00	7.350E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AS 81	0.000E+00	2.589E+02	8.744E+01	2.411E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SE 81	0.000E+00	1.034E+02	1.019E+02	9.891E+01	1.274E+01	5.026E-02	1.062E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SE 81M	0.000E+00	4.438E-01	4.384E-01	4.331E-01	2.147E-01	5.700E-03	1.208E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ZN 82	0.000E+00	1.452E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
GA 82	0.000E+00	2.173E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
GE 82	0.000E+00	1.461E+02	1.733E-02	2.053E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AS 82	0.000E+00	4.351E+02	6.962E+01	9.609E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AS 82M	0.000E+00	3.070E+02	1.252E+01	5.109E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR 82	0.000E+00	1.045E+02	1.045E+02	1.044E+02	1.026E+02	9.298E+01	6.530E+01	1.589E+01	3.865E+00	1.428E-01	5.275E-03	7.595E-05
BR 82M	0.000E+00	1.133E+00	1.012E+00	9.040E-01	1.280E-03	2.371E-18	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ZN 83	0.000E+00	1.697E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
GA 83	0.000E+00	5.829E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
GE 83	0.000E+00	2.541E+02	7.933E-08	2.472E-17	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AS 83	0.000E+00	5.620E+02	2.684E+01	1.233E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SE 83	0.000E+00	4.366E+02	4.256E+02	4.123E+02	6.914E+01	6.699E-03	2.380E-17	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SE 83M	0.000E+00	4.587E+02	2.908E+02	1.623E+02	1.758E-13	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR 83	0.000E+00	1.193E+02	1.192E+02	1.190E+02	9.501E+01	2.261E+01	1.223E-01	1.044E-10	8.912E-20	0.000E+00	0.000E+00	0.000E+00
BR 83M	0.000E+00	1.492E+01	1.491E+01	1.491E+01	1.439E+01	6.455E-00	5.866E-02	5.524E-11	4.716E-20	0.000E+00	0.000E+00	0.000E+00
GA 84	0.000E+00	1.035E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
GE 84	0.000E+00	8.279E+01	7.359E-14	6.531E-29	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AS 84	0.000E+00	1.037E+03	8.181E-01	6.289E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SE 84	0.000E+00	5.377E+02	4.401E+02	3.567E+02	1.826E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR 84	0.000E+00	1.819E+03	1.814E+03	1.802E+03	5.468E+02	7.934E-01	4.740E-11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR 84M	0.000E+00	9.999E+01	8.908E+01	7.936E+01	9.758E-02	8.667E-17	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
GE 85	0.000E+00	2.629E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AS 85	0.000E+00	4.904E+02	6.247E-07	7.907E-16	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SE 85	0.000E+00	1.057E+03	3.690E+02	1.270E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SE 85M	0.000E+00	8.225E+02	9.216E+01	1.032E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR 85	0.000E+00	7.342E+02	6.400E+02	5.197E+02	4.315E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR 85M	0.000E+00	1.886E+01	1.886E+01	1.886E+01	1.886E+01	1.886E+01	1.886E+01	1.886E+01	1.886E+01	1.886E+01	1.886E+01	1.886E+01
KR 85	0.000E+00	2.962E+02	2.961E+02	2.959E+02	2.568E+02	1.185E+02	7.316E+02	1.064E-04	1.547E-09	7.985E-21	4.122E-32	0.000E+00
KR 85M	0.000E+00	2.962E+02	2.961E+02	2.959E+02	2.568E+02	1.185E+02	7.316E+02	1.064E-04	1.547E-09	7.985E-21	4.122E-32	0.000E+00

* 1 MTIHM, E=3.93%, 54000 MWD/MT (BWRUE)
 FISSION PRODUCTS
 POWER= 1.00000E+00 MW, BURNUP= 1.00000E+00 MWD, FLUX= 1.00E+00 N/CM**2-SEC

9 SUMMARY TABLE: THERMAL POWER, WATTS

BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
BR 87	0.000E+00	4.302E+03	2.144E+03	1.018E+03	1.712E-16	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
KR 87	0.000E+00	2.804E+03	2.794E+03	2.776E+03	1.643E+03	1.077E+02	5.904E-03	4.776E-37	0.000E+00	0.000E+00	0.000E+00
SR 87M	0.000E+00	2.678E-02	2.667E-02	2.656E-02	2.092E-02	6.082E-03	7.123E-05	1.334E-20	2.514E-38	0.000E+00	0.000E+00
GE 88	0.000E+00	3.585E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AS 88	0.000E+00	1.987E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SE 88	0.000E+00	7.156E+02	6.518E-10	5.924E-22	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR 88	0.000E+00	2.839E+03	2.252E+02	1.755E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
KR 88	0.000E+00	4.298E+03	4.284E+03	4.267E+03	3.370E+03	9.942E+02	1.227E+01	2.845E-07	6.596E-15	1.011E-32	0.000E+00
RB 88	0.000E+00	5.092E+03	5.087E+03	5.082E+03	4.311E+03	1.285E+03	1.586E+01	3.677E-07	8.526E-15	1.307E-32	0.000E+00
AS 89	0.000E+00	2.071E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SE 89	0.000E+00	2.944E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR 89	0.000E+00	3.524E+03	3.441E-01	3.333E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
KR 89	0.000E+00	6.999E+03	5.668E+03	4.554E+03	1.414E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB 89	0.000E+00	7.420E+03	7.362E+03	7.254E+03	5.977E+02	6.841E-04	2.793E-25	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SR 89	0.000E+00	1.440E+03	1.440E+03	1.440E+03	1.440E+03	1.421E+03	1.364E+03	1.309E+03	1.189E+03	1.080E+03	9.544E+02
Y 89M	0.000E+00	1.998E-03	1.499E-04	1.125E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SE 90	0.000E+00	7.540E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR 90	0.000E+00	2.518E+03	1.321E-08	6.793E-20	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
KR 90	0.000E+00	5.578E+03	1.555E+03	4.295E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB 90	0.000E+00	9.178E+03	8.015E+03	6.402E+03	1.751E-02	1.653E-23	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SR 90M	0.000E+00	2.604E+03	2.314E+03	1.996E+03	1.748E-01	1.740E-22	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Y 90	0.000E+00	1.210E+02	1.210E+02	1.210E+02	1.210E+02	1.210E+02	1.210E+02	1.210E+02	1.209E+02	1.209E+02	1.208E+02
Y 90M	0.000E+00	5.982E+02	5.982E+02	5.982E+02	5.980E+02	5.970E+02	5.850E+02	5.811E+02	5.781E+02	5.773E+02	5.769E+02
SE 91	0.000E+00	5.084E-02	5.065E-02	5.046E-02	4.065E-02	1.329E-02	2.375E-04	2.421E-11	2.468E-18	1.198E-34	0.000E+00
BR 91	0.000E+00	1.829E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
KR 91	0.000E+00	8.969E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB 91	0.000E+00	5.317E+03	4.495E+01	3.772E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SR 91	0.000E+00	1.205E+04	6.453E+03	3.163E+03	3.164E-15	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Y 91	0.000E+00	4.385E+03	4.383E+03	4.380E+03	4.083E+03	2.835E+03	7.624E+02	3.987E+00	2.086E-02	9.903E-08	4.702E-13
Y 91M	0.000E+00	2.022E+03	2.022E+03	2.022E+03	2.021E+03	2.020E+03	2.009E+03	1.941E+03	1.874E+03	1.724E+03	1.587E+03
SE 92	0.000E+00	1.050E+03	1.050E+03	1.050E+03	1.026E+03	7.423E-02	1.998E+02	1.045E+00	5.466E-03	2.595E-08	1.232E-13
BR 92	0.000E+00	1.023E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR 92	0.000E+00	1.676E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
KR 92	0.000E+00	2.726E+03	4.181E-07	6.380E-17	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB 92	0.000E+00	9.906E+03	1.130E+00	1.050E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SR 92	0.000E+00	5.605E+03	5.583E+03	5.559E+03	4.342E+03	1.208E+03	1.210E+01	1.216E-07	1.222E-15	2.664E-34	0.000E+00
Y 92	0.000E+00	6.237E+03	6.236E+03	6.236E+03	6.097E+03	3.816E+03	1.972E+02	1.804E-04	1.358E-10	6.953E-25	0.000E+00
BR 93	0.000E+00	2.706E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
KR 93	0.000E+00	1.574E+03	9.465E-12	5.674E-26	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB 93	0.000E+00	7.074E+03	5.676E+00	4.364E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SR 93	0.000E+00	1.102E+04	1.011E+04	9.221E+03	4.334E+01	3.942E-11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* 1 MTIHM, E=3.93%, 54000 MWD/MT (BWRUE)

FISSION PRODUCTS

POWER= 1.00000E+00 MW, BURNUP= 1.00000E+00 MWD, FLUX= 1.00E+00 N/CM**2-SEC

9 SUMMARY TABLE: THERMAL POWER, WATTS

BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
CD120	0.000E+00	6.090E+01	2.775E+01	1.224E+01	2.923E-20	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
IN120	0.000E+00	1.281E+02	1.007E+02	6.175E+01	4.780E-19	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
IN120M	0.000E+00	8.864E+01	4.212E+01	1.857E+01	4.436E-20	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RH121	0.000E+00	2.155E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PD121	0.000E+00	2.401E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AG121	0.000E+00	1.124E+02	1.118E-04	1.066E-10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CD121	0.000E+00	1.773E+02	7.884E+00	3.059E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
IN121	0.000E+00	1.097E+02	4.398E+01	1.070E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
IN121M	0.000E+00	2.907E+01	2.508E+01	2.039E+01	1.044E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SN121	0.000E+00	1.380E+01	1.380E+01	1.379E+01	1.346E+01	1.182E+01	7.423E+00	1.153E+00	1.791E-01	2.323E-03	3.013E-05
SN121M	0.000E+00	7.032E-04	7.032E-04	7.032E-04	7.032E-04	7.031E-04	7.031E-04	7.030E-04	7.028E-04	7.026E-04	7.024E-04
RH122	0.000E+00	3.341E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PD122	0.000E+00	5.573E+00	3.345E-14	2.006E-28	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AG122	0.000E+00	1.060E+02	5.668E-14	3.398E-28	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CD122	0.000E+00	8.787E+01	4.629E-02	2.407E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
IN122	0.000E+00	3.034E+02	1.001E+01	1.591E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
IN122M	0.000E+00	1.534E+00	1.395E-12	1.268E-24	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SB122	0.000E+00	1.767E+01	1.767E+01	1.766E+01	1.748E+01	1.657E+01	1.367E+01	6.328E+00	2.930E+00	4.858E-01	8.055E-02
SB122M	0.000E+00	2.256E-02	1.913E-02	1.622E-02	1.130E-06	3.555E-28	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RH123	0.000E+00	2.478E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PD123	0.000E+00	1.913E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AG123	0.000E+00	4.447E+01	5.253E-20	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CD123	0.000E+00	1.948E+02	1.408E+00	9.984E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
IN123	0.000E+00	1.260E+02	2.720E+00	2.101E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
IN123M	0.000E+00	6.140E+01	2.905E+01	1.224E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SN123	0.000E+00	8.062E+00	8.062E+00	8.062E+00	8.060E+00	8.051E+00	8.019E+00	7.891E+00	7.765E+00	7.479E+00	7.203E+00
SN123M	0.000E+00	3.903E+01	3.861E+01	3.799E+01	1.394E+01	7.787E-02	6.032E-10	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TE123M	0.000E+00	7.054E-02	7.054E-02	7.053E-02	7.052E-02	7.043E-02	7.013E-02	6.892E-02	6.773E-02	6.504E-02	6.246E-02
PD124	0.000E+00	2.850E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AG124	0.000E+00	2.869E+01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CD124	0.000E+00	1.203E+02	1.069E+01	9.483E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
IN124	0.000E+00	3.820E+02	2.559E+01	2.271E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SB124	0.000E+00	2.628E+01	2.628E+01	2.628E+01	2.627E+01	2.621E+01	2.598E+01	2.510E+01	2.425E+01	2.237E+01	2.064E+01
SB124M	0.000E+00	2.711E-02	1.734E-02	1.108E-02	6.029E-14	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AG125	0.000E+00	7.502E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CD125	0.000E+00	1.557E+02	1.152E-09	8.431E-21	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
IN125	0.000E+00	1.815E+02	6.785E-06	1.201E-13	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
IN125M	0.000E+00	1.372E+02	4.480E+00	1.400E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SN125	0.000E+00	6.243E+01	6.243E+01	6.243E+01	6.225E+01	6.132E+01	5.810E+01	4.683E+01	3.774E+01	2.282E+01	1.379E+01
SN125M	0.000E+00	1.033E+02	9.710E+01	9.030E+01	1.323E+00	4.320E-10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SB125	0.000E+00	5.389E+01	5.389E+01	5.389E+01	5.389E+01	5.387E+01	5.381E+01	5.374E+01	5.355E+01	5.334E+01	5.304E+01

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* 1 MTIHM, E=3.93%, 54000 MWD/MT (BWRUE)

FISSION PRODUCTS

POWER= 1.00000E+00 MW, BURNUP= 1.00000E+00 MWD, FLUX= 1.00E+00 N/CM**2-SEC

9 SUMMARY TABLE: THERMAL POWER, WATTS

BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
TB163	0.000E+00	1.034E+00	1.026E+00	1.329E-01	3.106E-06	6.603E-23	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SM164	0.000E+00	6.472E-03	3.616E-07	2.020E-11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
EU164	0.000E+00	2.607E-01	1.111E-06	6.202E-11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
GD164	0.000E+00	3.961E-01	3.838E-01	3.717E-01	5.821E-02	3.982E-06	4.040E-21	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TB164	0.000E+00	1.081E+00	1.035E+00	9.925E-01	1.485E-01	1.016E-05	1.031E-20	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SM165	0.000E+00	5.898E-04	1.973E-23	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
EU165	0.000E+00	3.446E-02	2.834E-09	2.310E-16	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
GD165	0.000E+00	2.836E-01	1.877E-01	1.239E-01	4.346E-12	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TB165	0.000E+00	3.396E-01	2.126E-01	1.371E-01	4.725E-12	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
DY165	0.000E+00	4.035E+00	4.025E+00	4.011E+00	3.022E+00	6.916E-01	3.421E-03	2.047E-12	1.225E-21	0.000E+00	0.000E+00
DY165M	0.000E+00	4.075E-01	2.388E-01	1.402E-01	7.066E-13	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
DY166	0.000E+00	2.848E-02	2.848E-02	2.848E-02	2.824E-02	2.322E-02	1.259E-02	6.824E-02	1.635E-03	3.917E-04	6.240E-05
HO166	0.000E+00	1.166E+00	1.165E+00	1.165E+00	1.139E+00	1.013E+00	6.700E-01	1.532E-01	5.042E-02	9.112E-03	2.145E-03
HO166M	0.000E+00	1.426E-04	1.426E-04	1.426E-04	1.426E-04	1.426E-04	1.426E-04	1.426E-04	1.426E-04	1.426E-04	1.426E-04
ER167M	0.000E+00	9.806E-03	1.376E-10	1.929E-18	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ER169	0.000E+00	9.151E-04	9.151E-04	9.150E-04	9.123E-04	8.984E-04	8.500E-04	6.813E-04	5.461E-04	3.259E-04	1.945E-04
TMI70	0.000E+00	3.113E-04	3.113E-04	3.113E-04	3.112E-04	3.109E-04	3.096E-04	3.047E-04	2.998E-04	2.887E-04	2.780E-04
SUMTOT	0.000E+00	1.183E+06	6.579E+05	5.684E+05	2.451E+05	1.452E+05	1.003E+05	6.976E+04	5.942E+04	4.015E+04	3.458E+04
TOTAL	0.000E+00	1.183E+06	6.579E+05	5.684E+05	2.451E+05	1.452E+05	1.003E+05	6.976E+04	5.942E+04	4.015E+04	3.458E+04

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

* 1 MTIHM, E=3.93%, 54000 MWD/MT (BWRUE)

FISSION PRODUCTS

POWER= 1.00000E+00 MW, BURNUP= 1.00000E+00 MWD, FLUX= 1.00E+00 N/CM**2-SEC

9 SUMMARY TABLE: THERMAL POWER, WATTS

	BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
H	0.000E+00	2.815E-02	2.815E-02	2.815E-02	2.815E-02	2.815E-02	2.815E-02	2.813E-02	2.812E-02	2.809E-02	2.806E-02	2.802E-02
CO	0.000E+00	7.583E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
NI	0.000E+00	1.381E+00	1.325E-08	4.523E-16	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CU	0.000E+00	8.872E+00	1.485E-03	1.597E-06	6.467E-11	5.330E-14	4.356E-14	1.944E-14	8.677E-15	1.321E-15	2.011E-16	1.788E-17
ZN	0.000E+00	4.620E+01	9.898E-01	5.181E-01	6.989E-02	6.485E-02	4.958E-02	1.695E-02	5.796E-03	4.737E-04	3.872E-05	1.547E-06
GA	0.000E+00	2.731E+02	1.290E+01	7.671E+00	1.270E+00	1.053E+00	7.889E-01	3.022E-01	1.044E-01	8.567E-03	7.002E-04	2.791E-05
GE	0.000E+00	9.784E+02	7.331E+01	3.406E+01	1.216E+01	4.490E+00	1.277E+00	1.541E-02	1.861E-04	6.227E-09	2.083E-13	3.669E-19
AS	0.000E+00	4.005E+03	3.920E+02	1.508E+02	5.201E+01	1.437E+01	1.693E+00	4.579E-01	1.228E-01	5.929E-03	2.928E-04	6.168E-06
SE	0.000E+00	8.085E+03	1.844E+03	1.833E+03	8.213E+01	6.782E-02	4.008E-03	4.700E-04	4.700E-04	1.773E-04	1.627E-04	1.620E-04
BR	0.000E+00	2.197E+04	6.718E+03	4.362E+03	7.445E+02	1.164E+02	6.542E+01	1.589E+01	3.865E+00	1.428E-01	5.275E-03	7.595E-05
KR	0.000E+00	3.015E+04	1.468E+04	1.236E+04	5.304E+03	1.246E+03	3.850E+01	1.885E+01	1.884E+01	1.881E+01	1.879E+01	1.876E+01
RB	0.000E+00	6.237E+04	2.925E+04	2.391E+04	4.920E+03	1.297E+03	2.710E+03	1.006E+01	8.995E+00	6.936E+00	5.347E+00	3.828E+00
SR	0.000E+00	5.957E+04	2.929E+04	2.417E+04	1.003E+04	5.600E+03	2.317E+03	1.489E+03	1.430E+03	1.310E+03	1.201E+03	1.075E+03
Y	0.000E+00	9.877E+04	5.328E+04	4.870E+04	1.682E+04	1.094E+04	4.093E+03	2.535E+03	2.455E+03	2.303E+03	2.165E+03	2.004E+03
ZR	0.000E+00	5.295E+04	1.167E+04	9.919E+03	9.154E+03	8.279E+03	6.259E+03	4.396E+03	4.168E+03	3.859E+03	3.577E+03	3.245E+03
NB	0.000E+00	1.161E+05	2.211E+04	1.648E+04	1.432E+04	1.256E+04	8.092E+03	4.483E+03	4.279E+03	4.208E+03	4.119E+03	3.974E+03
MO	0.000E+00	5.400E+04	3.299E+04	2.445E+04	4.263E+03	3.361E+03	2.782E+03	1.306E+03	6.132E+02	1.050E+02	1.799E+01	1.862E+00
TC	0.000E+00	8.077E+04	5.639E+04	4.798E+04	4.324E+03	8.085E+02	6.983E+02	3.304E+02	1.551E+02	2.657E+01	4.559E+00	4.805E-01
RU	0.000E+00	1.888E+04	1.492E+04	1.346E+04	8.259E+03	5.842E+03	3.527E+03	3.221E+03	3.057E+03	2.705E+03	2.394E+03	2.046E+03
RH	0.000E+00	2.592E+03	1.866E+04	1.633E+04	7.263E+03	6.555E+03	6.193E+03	5.606E+03	5.433E+03	5.301E+03	5.213E+03	5.107E+03
PD	0.000E+00	2.376E+03	1.557E+03	1.414E+03	8.444E+02	6.180E+02	2.466E+02	6.693E+00	2.185E-01	2.715E-04	1.336E-05	1.264E-05
AG	0.000E+00	3.903E+03	1.600E+03	1.265E+03	8.164E+02	7.319E+02	4.684E+02	2.290E+02	1.926E+02	1.581E+02	1.397E+02	1.268E+02
CD	0.000E+00	1.298E+03	3.240E+02	2.741E+02	1.298E+02	6.696E+01	3.815E+01	1.775E+01	9.734E+00	4.788E+00	3.866E+00	3.334E+00
IN	0.000E+00	5.189E+03	7.055E+02	5.397E+02	2.069E+02	5.925E+01	2.288E+01	8.846E+00	3.513E+00	4.442E-01	9.220E-02	4.489E-02
SN	0.000E+00	1.089E+04	6.916E+03	5.259E+03	8.359E+02	1.822E+02	7.420E+01	5.624E+01	4.602E+01	3.056E+01	2.122E+01	1.426E+01
SB	0.000E+00	4.205E+04	3.383E+04	3.036E+04	5.574E+03	1.597E+03	5.625E+02	3.146E+02	2.181E+02	1.199E+02	8.954E+01	7.692E+01
TE	0.000E+00	4.256E+04	2.835E+04	2.653E+04	1.117E+04	3.095E+03	2.146E+03	9.956E+02	5.489E+02	2.061E+02	1.219E+02	8.942E+01
I	0.000E+00	9.995E+04	7.391E+04	6.779E+04	5.115E+04	2.886E+04	1.764E+04	7.786E+03	4.347E+03	1.342E+03	5.033E+02	1.811E+02
XE	0.000E+00	4.685E+04	2.710E+04	2.233E+04	3.876E+03	3.448E+03	2.298E+03	9.159E+02	6.167E+02	2.462E+02	9.929E+01	3.157E+01
CS	0.000E+00	8.795E+04	5.255E+04	4.407E+04	1.442E+04	4.781E+03	4.703E+03	4.527E+03	4.377E+03	4.100E+03	3.903E+03	3.727E+03
BA	0.000E+00	5.002E+04	2.580E+04	2.438E+04	8.413E+03	3.746E+03	3.323E+03	2.915E+03	2.568E+03	1.947E+03	1.522E+03	1.167E+03
LA	0.000E+00	6.81E+04	5.901E+04	5.260E+04	3.574E+04	2.051E+04	1.679E+04	1.475E+04	1.269E+04	8.733E+03	5.980E+03	3.672E+03
CE	0.000E+00	2.107E+04	1.428E+04	1.184E+04	5.324E+03	4.918E+03	3.931E+03	2.205E+03	1.763E+03	1.493E+03	1.343E+03	1.181E+03
PR	0.000E+00	3.260E+04	2.630E+04	2.483E+04	1.227E+04	8.623E+03	7.392E+03	6.876E+03	6.644E+03	6.199E+03	5.859E+03	5.530E+03
ND	0.000E+00	4.720E+03	4.037E+03	3.703E+03	1.811E+03	1.011E+03	8.542E+02	7.077E+02	5.864E+02	3.782E+02	2.439E+02	1.387E+02
PM	0.000E+00	5.530E+04	4.962E+03	4.681E+03	2.939E+03	2.750E+03	3.222E+03	1.369E+03	9.350E+02	5.129E+02	3.526E+02	2.616E+02
SM	0.000E+00	1.245E+03	1.222E+03	1.203E+03	9.063E+02	7.958E+02	5.945E+02	2.016E+02	6.927E+01	5.784E+00	5.414E-01	8.852E-02
EU	0.000E+00	3.164E+03	3.152E+03	3.145E+03	3.062E+03	2.951E+03	2.820E+03	2.459E+03	2.168E+03	1.629E+03	1.238E+03	8.872E+02
GD	0.000E+00	3.011E+01	2.897E+01	2.768E+01	1.946E+01	1.611E+01	8.253E+00	5.975E-01	7.403E-02	3.501E-02	3.425E-02	3.337E-02
TB	0.000E+00	2.383E+01	2.364E+01	2.349E+01	1.797E+01	1.725E+01	1.696E+01	1.599E+01	1.517E+01	1.368E+01	1.254E+01	1.135E+01
DY	0.000E+00	4.471E+00	4.293E+00	4.180E+00	3.051E+00	7.187E-01	2.665E-02	1.259E-02	6.824E-03	1.635E-03	3.917E-04	6.240E-05

HO	0.000E+00	1.166E+00	1.166E+00	1.165E+00	1.139E+00	1.013E+00	6.701E-01	1.533E-01	5.057E-02	9.255E-03	2.287E-03	4.839E-04
ER	0.000E+00	1.072E-02	9.151E-04	9.150E-04	9.123E-04	8.984E-04	8.500E-04	6.813E-04	5.461E-04	3.259E-04	1.945E-04	1.002E-04
TM	0.000E+00	3.153E-04	3.153E-04	3.152E-04	3.151E-04	3.146E-04	3.128E-04	3.064E-04	3.009E-04	2.894E-04	2.786E-04	2.654E-04
SUMTOT	0.000E+00	1.183E+06	6.579E+05	5.684E+05	2.451E+05	1.452E+05	1.003E+05	6.976E+04	5.942E+04	4.697E+04	4.015E+04	3.458E+04
TOTAL	0.000E+00	1.183E+06	6.579E+05	5.684E+05	2.451E+05	1.452E+05	1.003E+05	6.976E+04	5.942E+04	4.697E+04	4.015E+04	3.458E+04

CUMULATIVE TABLE TOTALS

AP+FP	0.000E+00	1.183E+06	6.579E+05	5.684E+05	2.451E+05	1.452E+05	1.003E+05	6.976E+04	5.942E+04	4.697E+04	4.015E+04	3.458E+04
ACT+FP	6.533E-02	1.270E+06	7.437E+05	6.530E+05	2.977E+05	1.880E+05	1.355E+05	8.716E+04	6.941E+04	5.211E+04	4.444E+04	3.855E+04
AP+ACT+FP	6.533E-02	1.270E+06	7.437E+05	6.530E+05	2.977E+05	1.880E+05	1.355E+05	8.716E+04	6.941E+04	5.211E+04	4.444E+04	3.855E+04

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15
 1 MTIHM, E=3.93%, 54000 MWD/MT (BWRUE)
 (ALPHA,N) NEUTRON SOURCE, NEUTRONS/SEC

BASIS=	BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
U234	1.059E+03	4.444E+02	4.444E+02	4.444E+02	4.444E+02	4.444E+02	4.445E+02	4.446E+02	4.447E+02	4.450E+02	4.453E+02	4.457E+02
U235	3.107E+01	3.918E+00	3.918E+00	3.918E+00	3.918E+00	3.918E+00	3.918E+00	3.918E+00	3.918E+00	3.918E+00	3.918E+00	3.918E+00
U238	1.016E+02	9.723E+01	9.723E+01	9.723E+01	9.723E+01	9.723E+01	9.723E+01	9.723E+01	9.723E+01	9.723E+01	9.723E+01	9.723E+01
PU238	0.000E+00	9.659E+06	9.659E+06	9.659E+06	9.660E+06	9.663E+06	9.672E+06	9.695E+06	9.706E+06	9.721E+06	9.731E+06	9.744E+06
PU239	0.000E+00	2.997E+05	2.997E+05	2.997E+05	2.997E+05	2.999E+05	3.005E+05	3.017E+05	3.023E+05	3.026E+05	3.026E+05	3.026E+05
PU240	0.000E+00	5.948E+05	5.948E+05	5.948E+05	5.948E+05	5.948E+05	5.948E+05	5.948E+05	5.948E+05	5.948E+05	5.948E+05	5.949E+05
AM241	0.000E+00	3.163E+05	3.163E+05	3.163E+05	3.163E+05	3.165E+05	3.170E+05	3.192E+05	3.215E+05	3.266E+05	3.318E+05	3.384E+05
CM242	0.000E+00	1.188E+08	1.188E+08	1.188E+08	1.188E+08	1.188E+08	1.187E+08	1.173E+08	1.159E+08	1.125E+08	1.092E+08	1.051E+08
CM244	0.000E+00	1.973E+07	1.973E+07	1.973E+07	1.973E+07	1.973E+07	1.973E+07	1.972E+07	1.972E+07	1.970E+07	1.969E+07	1.967E+07

TOTALS												
TABLE	1.192E+03	1.496E+08	1.496E+08	1.496E+08	1.496E+08	1.496E+08	1.494E+08	1.481E+08	1.467E+08	1.433E+08	1.400E+08	1.359E+08
ACTUAL	1.192E+03	1.496E+08	1.496E+08	1.496E+08	1.496E+08	1.496E+08	1.494E+08	1.481E+08	1.467E+08	1.433E+08	1.400E+08	1.359E+08

Calc. No. 2004-07600
Project No. 11163-013
Attachment B2

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OUTPUT UNIT = 6

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

2.750E+00 5.346E-03 1.519E+03 1.519E+03 1.519E+03 1.519E+03 1.537E+03 1.517E+03 1.516E+03 1.516E+03 1.517E+03 1.517E+03 1.519E+03 1.519E+03
3.500E+00 6.076E-03 1.091E+03 1.091E+03 1.091E+03 1.091E+03 1.090E+03 1.088E+03 1.085E+03 1.085E+03 1.078E+03 1.071E+03 1.071E+03 1.062E+03
5.000E+00 3.723E-03 6.666E+02 6.666E+02 6.666E+02 6.667E+02 6.664E+02 6.648E+02 6.629E+02 6.586E+02 6.586E+02 6.544E+02 6.492E+02
7.000E+00 5.989E-04 1.075E+02 1.075E+02 1.075E+02 1.075E+02 1.075E+02 1.072E+02 1.069E+02 1.062E+02 1.062E+02 1.056E+02 1.047E+02
9.500E+00 9.336E-05 1.678E+01 1.678E+01 1.678E+01 1.678E+01 1.678E+01 1.674E+01 1.669E+01 1.658E+01 1.658E+01 1.648E+01 1.634E+01
TOTAL 6.054E+02 1.527E+11 1.515E+11 1.504E+11 1.191E+11 1.054E+11 8.470E+10 3.616E+10 1.593E+10 2.919E+09 8.217E+08 2.622E+08
GAM POW 9.704E-05 2.447E+04 2.429E+04 2.411E+04 1.909E+04 1.690E+04 1.358E+04 5.796E+03 2.554E+03 4.678E+02 1.317E+02 4.203E+01

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

PRINCIPAL PHOTON SOURCES IN GROUP 1, PHOTONS/SEC
MEAN ENERGY= 0.010MEV

NUCLIDE	BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
U234	9.591E+09	4.025E+09	4.025E+09	4.025E+09	4.025E+09	4.025E+09	4.026E+09	4.027E+09	4.028E+09	4.031E+09	4.034E+09	4.037E+09
U235	1.880E+09	2.371E+08	2.371E+08	2.371E+08	2.371E+08	2.371E+08	2.371E+08	2.371E+08	2.371E+08	2.371E+08	2.371E+08	2.371E+08
U237	0.000E+00	2.987E+16	2.987E+16	2.987E+16	2.987E+16	2.987E+16	2.987E+16	2.987E+16	2.987E+16	2.987E+16	2.987E+16	2.987E+16
U238	1.362E+09	1.304E+09	1.304E+09	1.304E+09	1.304E+09	1.304E+09	1.304E+09	1.304E+09	1.304E+09	1.304E+09	1.304E+09	1.304E+09
U239	0.000E+00	2.474E+17	2.403E+17	2.333E+17	4.226E+16	6.144E+12	9.408E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
NP238	0.000E+00	1.568E+16	1.567E+16	1.567E+16	1.546E+16	1.444E+16	1.130E+16	4.231E+15	1.584E+15	1.601E+14	1.619E+13	8.555E+11
NP239	0.000E+00	5.086E+17	5.086E+17	5.086E+17	5.053E+17	4.759E+17	3.816E+17	1.578E+17	6.528E+16	8.322E+15	1.063E+15	7.720E+13
FU238	0.000E+00	5.896E+13	5.896E+13	5.896E+13	5.896E+13	5.898E+13	5.904E+13	5.918E+13	5.925E+13	5.933E+13	5.940E+13	5.948E+13
CM242	0.000E+00	5.337E+14	5.337E+14	5.337E+14	5.337E+14	5.337E+14	5.330E+14	5.270E+14	5.204E+14	5.052E+14	4.904E+14	4.720E+14
CM244	0.000E+00	9.592E+13	9.592E+13	9.592E+13	9.592E+13	9.592E+13	9.592E+13	9.589E+13	9.586E+13	9.579E+13	9.572E+13	9.563E+13

PRINCIPAL PHOTON SOURCES IN GROUP 2, PHOTONS/SEC
MEAN ENERGY= 0.025MEV

NUCLIDE	BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
U237	0.000E+00	1.109E+15	1.109E+15	1.109E+15	1.104E+15	1.081E+15	1.001E+15	7.355E+14	5.405E+14	2.634E+14	1.284E+14	5.094E+13
U239	0.000E+00	2.672E+16	2.595E+16	2.519E+16	4.564E+15	6.636E+11	1.016E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
NP238	0.000E+00	6.116E+14	6.115E+14	6.113E+14	5.635E+14	4.408E+14	4.408E+14	1.651E+14	6.181E+13	6.247E+12	6.315E+11	3.338E+10
NP239	0.000E+00	6.646E+15	6.646E+15	6.646E+15	6.603E+15	6.218E+15	4.986E+15	2.062E+15	8.530E+14	1.087E+14	1.388E+13	1.009E+12
FU243	0.000E+00	3.459E+14	3.451E+14	3.443E+14	3.007E+14	1.494E+14	1.205E+13	5.097E+08	2.452E+04	2.961E+03	2.961E+03	2.961E+03
AM244M	0.000E+00	7.068E+14	6.882E+14	6.701E+14	1.428E+14	4.799E+10	1.503E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

PRINCIPAL PHOTON SOURCES IN GROUP 3, PHOTONS/SEC
MEAN ENERGY= 0.038MEV

NUCLIDE	BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
U235	2.870E+06	3.620E+05	3.620E+05	3.620E+05	3.620E+05	3.620E+05	3.620E+05	3.620E+05	3.620E+05	3.620E+05	3.620E+05	3.620E+05
U237	0.000E+00	1.574E+14	1.574E+14	1.574E+14	1.567E+14	1.534E+14	1.421E+14	1.044E+14	7.671E+13	3.738E+13	1.822E+13	7.230E+12
U239	0.000E+00	4.558E+16	4.426E+16	4.298E+16	7.786E+15	1.132E+12	1.733E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
NP238	0.000E+00	4.124E+14	4.123E+14	4.122E+14	4.068E+14	3.800E+14	2.973E+14	1.113E+14	4.168E+13	4.212E+12	4.258E+11	2.251E+10
NP239	0.000E+00	4.515E+15	4.515E+15	4.515E+15	4.486E+15	4.224E+15	3.388E+15	1.401E+15	5.795E+14	7.387E+13	9.432E+12	6.853E+11
FU238	0.000E+00	1.697E+11	1.697E+11	1.697E+11	1.698E+11	1.698E+11	1.700E+11	1.704E+11	1.706E+11	1.708E+11	1.710E+11	1.712E+11
FU243	0.000E+00	3.930E+14	3.921E+14	3.912E+14	3.417E+14	1.698E+14	1.369E+13	5.792E+08	2.786E+04	3.365E+03	3.365E+03	3.365E+03
AM243	0.000E+00	1.532E+11	1.532E+11	1.532E+11	1.532E+11	1.532E+11	1.532E+11	1.533E+11	1.533E+11	1.533E+11	1.532E+11	1.532E+11
CM242	0.000E+00	1.251E+12	1.251E+12	1.251E+12	1.251E+12	1.251E+12	1.249E+12	1.235E+12	1.220E+12	1.184E+12	1.149E+12	1.106E+12
CM244	0.000E+00	1.899E+11	1.899E+11	1.899E+11	1.899E+11	1.899E+11	1.899E+11	1.899E+11	1.898E+11	1.897E+11	1.895E+11	1.893E+11

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PRINCIPAL PHOTON SOURCES IN GROUP 4, PHOTONS/SEC
 MEAN ENERGY= 0.058MEV

NUCLIDE	BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
U234	7.687E+07	3.226E+07	3.226E+07	3.226E+07	3.226E+07	3.226E+07	3.226E+07	3.227E+07	3.228E+07	3.231E+07	3.233E+07	3.236E+07
U237	0.000E+00	1.402E+16	1.402E+16	1.402E+16	1.396E+16	1.367E+16	1.266E+16	9.300E+15	6.834E+15	3.331E+15	1.623E+15	6.442E+14
U238	7.205E+06	6.896E+06	6.896E+06	6.896E+06	6.896E+06	6.896E+06	6.896E+06	6.896E+06	6.896E+06	6.896E+06	6.896E+06	6.896E+06
U239	0.000E+00	2.386E+16	2.317E+16	2.250E+16	4.076E+15	5.926E+11	9.074E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
NP238	0.000E+00	5.226E+14	5.224E+14	5.223E+14	5.155E+14	4.815E+14	3.766E+14	1.410E+14	5.281E+13	5.337E+12	5.395E+11	2.852E+10
NP239	0.000E+00	1.219E+16	1.219E+16	1.219E+16	1.211E+16	1.141E+16	9.149E+15	3.784E+15	1.565E+15	1.995E+14	2.547E+13	1.851E+12
AM244M	0.000E+00	6.489E+14	6.318E+14	6.152E+14	1.311E+14	4.406E+10	1.379E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

PRINCIPAL PHOTON SOURCES IN GROUP 5, PHOTONS/SEC
 MEAN ENERGY= 0.085MEV

NUCLIDE	BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
U235	2.452E+08	3.093E+07	3.093E+07	3.093E+07	3.093E+07	3.093E+07	3.093E+07	3.093E+07	3.093E+07	3.093E+07	3.093E+07	3.093E+07
U237	0.000E+00	6.511E+15	6.511E+15	6.510E+15	6.483E+15	6.346E+15	5.876E+15	4.318E+15	3.173E+15	1.546E+15	7.536E+14	2.991E+14
U239	0.000E+00	2.557E+17	2.483E+17	2.411E+17	4.367E+16	6.349E+12	9.722E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
NP239	0.000E+00	9.063E+16	9.063E+16	9.063E+16	9.004E+16	8.479E+16	6.800E+16	2.812E+16	1.163E+16	1.483E+15	1.893E+14	1.376E+13
PU243	0.000E+00	4.598E+15	4.588E+15	4.577E+15	3.998E+15	1.987E+15	1.602E+14	6.776E+09	3.260E+05	3.937E+04	3.937E+04	3.937E+04

PRINCIPAL PHOTON SOURCES IN GROUP 6, PHOTONS/SEC
 MEAN ENERGY= 0.125MEV

NUCLIDE	BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
U234	2.729E+07	1.145E+07	1.145E+07	1.145E+07	1.145E+07	1.145E+07	1.146E+07	1.146E+07	1.146E+07	1.147E+07	1.148E+07	1.149E+07
U235	4.841E+08	6.106E+07	6.106E+07	6.106E+07	6.106E+07	6.106E+07	6.106E+07	6.106E+07	6.106E+07	6.106E+07	6.106E+07	6.106E+07
U237	0.000E+00	1.134E+16	1.134E+16	1.134E+16	1.129E+16	1.105E+16	1.023E+16	7.521E+15	5.527E+15	2.693E+15	1.313E+15	5.209E+14
U239	0.000E+00	9.293E+15	9.023E+15	8.761E+15	1.587E+15	2.308E+11	3.533E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
NP239	0.000E+00	2.615E+17	2.615E+17	2.615E+17	2.598E+17	2.446E+17	1.962E+17	8.113E+16	3.356E+16	4.278E+15	5.462E+14	3.969E+13

PRINCIPAL PHOTON SOURCES IN GROUP 7, PHOTONS/SEC
 MEAN ENERGY= 0.225MEV

NUCLIDE	BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
U235	1.713E+09	2.161E+08	2.161E+08	2.161E+08	2.161E+08	2.161E+08	2.161E+08	2.161E+08	2.161E+08	2.161E+08	2.161E+08	2.161E+08
U237	0.000E+00	8.550E+15	8.550E+15	8.549E+15	8.514E+15	8.334E+15	7.716E+15	5.670E+15	4.167E+15	2.031E+15	9.896E+14	3.927E+14
U239	0.000E+00	1.017E+16	9.877E+15	9.591E+15	1.737E+15	2.526E+11	3.868E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
NP239	0.000E+00	1.813E+17	1.813E+17	1.813E+17	1.801E+17	1.696E+17	1.360E+17	5.625E+16	2.326E+16	2.966E+15	3.787E+14	2.751E+13

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PRINCIPAL PHOTON SOURCES IN GROUP 8, PHOTONS/SEC
MEAN ENERGY= 0.375MEV

NUCLIDE	BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
U235	4.275E+06	5.392E+05	5.392E+05	5.392E+05	5.392E+05	5.392E+05	5.392E+05	5.392E+05	5.392E+05	5.392E+05	5.392E+05	5.392E+05
U237	0.000E+00	5.044E+14	5.044E+14	5.044E+14	5.023E+14	4.916E+14	4.552E+14	3.345E+14	2.458E+14	1.198E+14	5.838E+13	2.317E+13
U239	0.000E+00	3.448E+15	3.348E+15	3.250E+15	5.889E+14	8.561E+10	1.311E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
NP239	0.000E+00	1.747E+16	1.747E+16	1.747E+16	1.735E+16	1.634E+16	1.310E+16	5.420E+15	2.242E+15	2.858E+14	3.649E+13	2.651E+12

PRINCIPAL PHOTON SOURCES IN GROUP 9, PHOTONS/SEC
MEAN ENERGY= 0.575MEV

NUCLIDE	BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
TL208	0.000E+00	2.326E+08	2.326E+08	2.326E+08	2.390E+08	2.330E+08	2.400E+08	2.327E+08	2.333E+08	2.357E+08	2.386E+08	2.426E+08
U234	3.209E+04	1.347E+04	1.347E+04	1.347E+04	1.347E+04	1.347E+04	1.347E+04	1.347E+04	1.348E+04	1.349E+04	1.349E+04	1.351E+04
U235	2.103E+05	2.653E+04	2.653E+04	2.653E+04	2.653E+04	2.653E+04	2.653E+04	2.653E+04	2.653E+04	2.653E+04	2.653E+04	2.653E+04
U238	0.000E+00	3.244E+15	3.150E+15	3.059E+15	5.541E+14	8.056E+10	1.234E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
NP238	0.000E+00	8.436E+13	8.436E+13	8.432E+13	8.322E+13	7.773E+13	6.080E+13	2.277E+13	8.525E+12	8.616E+11	8.710E+10	4.604E+09
NP239	0.000E+00	7.525E+13	7.525E+13	7.525E+13	7.476E+13	7.040E+13	5.646E+13	2.335E+13	9.658E+12	1.231E+12	1.572E+11	1.142E+10
NP240	0.000E+00	3.101E+14	3.068E+14	3.036E+14	1.636E+14	6.673E+12	6.646E+07	6.541E-13	0.000E+00	0.000E+00	0.000E+00	0.000E+00
AM244M	0.000E+13	3.898E+13	3.795E+13	3.695E+13	7.873E+12	2.647E+09	8.287E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CM242	0.000E+00	8.578E+09	8.578E+09	8.578E+09	8.578E+09	8.578E+09	8.567E+09	8.471E+09	8.365E+09	8.112E+09	7.882E+09	7.587E+09

PRINCIPAL PHOTON SOURCES IN GROUP 10, PHOTONS/SEC
MEAN ENERGY= 0.850MEV

NUCLIDE	BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
U234	2.080E+03	8.731E+02	8.731E+02	8.731E+02	8.731E+02	8.732E+02	8.732E+02	8.735E+02	8.737E+02	8.743E+02	8.749E+02	8.757E+02
U235	2.867E+04	3.616E+03	3.616E+03	3.616E+03	3.616E+03	3.616E+03	3.616E+03	3.616E+03	3.616E+03	3.616E+03	3.616E+03	3.616E+03
U238	2.509E+04	2.401E+04	2.401E+04	2.401E+04	2.401E+04	2.401E+04	2.401E+04	2.401E+04	2.401E+04	2.401E+04	2.401E+04	2.401E+04
U239	0.000E+00	4.806E+15	4.666E+15	4.531E+15	8.208E+14	1.193E+11	1.827E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
NP238	0.000E+00	7.803E+15	7.802E+15	7.800E+15	7.698E+15	7.190E+15	5.624E+15	2.106E+15	7.886E+14	7.970E+13	8.057E+12	4.258E+11
NP240	0.000E+00	3.788E+14	3.748E+14	3.708E+14	1.998E+14	8.149E+12	8.117E+07	7.989E-13	0.000E+00	0.000E+00	0.000E+00	0.000E+00

PRINCIPAL PHOTON SOURCES IN GROUP 11, PHOTONS/SEC
MEAN ENERGY= 1.250MEV

NUCLIDE	BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
U234	1.354E+02	5.683E+01	5.683E+01	5.683E+01	5.683E+01	5.683E+01	5.683E+01	5.685E+01	5.687E+01	5.691E+01	5.695E+01	5.700E+01
U238	1.167E+04	1.117E+04	1.117E+04	1.117E+04	1.117E+04	1.117E+04	1.117E+04	1.117E+04	1.117E+04	1.117E+04	1.117E+04	1.117E+04
U239	0.000E+00	5.664E+13	5.499E+13	5.340E+13	9.674E+12	1.406E+09	2.153E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
NP238	0.000E+00	4.898E+15	4.896E+15	4.895E+15	4.831E+15	4.513E+15	3.530E+15	1.322E+15	4.949E+14	5.002E+13	5.057E+12	2.673E+11

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PRINCIPAL PHOTON SOURCES IN GROUP 12, PHOTONS/SEC
 MEAN ENERGY= 1.750MEV

NUCLIDE	BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1d	FUEL 4d	FUEL 7d	FUEL 14d	FUEL 21d	FUEL 30d
BI212	0.000E+00	2.045E+07	2.045E+07	2.045E+07	2.045E+07	2.045E+07	2.110E+07	2.046E+07	2.051E+07	2.073E+07	2.098E+07	2.132E+07
U234	6.777E+01	2.844E+01	2.844E+01	2.844E+01	2.844E+01	2.844E+01	2.845E+01	2.845E+01	2.846E+01	2.848E+01	2.850E+01	2.853E+01
U238	5.711E+03	5.466E+03	5.466E+03	5.466E+03	5.466E+03	5.466E+03	5.466E+03	5.466E+03	5.466E+03	5.466E+03	5.466E+03	5.466E+03
NP240M	0.000E+00	9.751E+11	8.884E+11	8.094E+11	8.111E+09	3.593E+09	1.483E+09	4.305E+07	1.251E+06	1.332E+03	1.008E+03	1.008E+03
CM242	0.000E+00	2.112E+08	2.112E+08	2.112E+08	2.112E+08	2.112E+08	2.109E+08	2.086E+08	2.059E+08	1.999E+08	1.940E+08	1.868E+08
CM244	0.000E+00	8.057E+08	8.057E+08	8.057E+08	8.057E+08	8.057E+08	8.057E+08	8.054E+08	8.052E+08	8.046E+08	8.040E+08	8.033E+08

PRINCIPAL PHOTON SOURCES IN GROUP 13, PHOTONS/SEC
 MEAN ENERGY= 2.250MEV

NUCLIDE	BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1d	FUEL 4d	FUEL 7d	FUEL 14d	FUEL 21d	FUEL 30d
U234	3.406E+01	1.430E+01	1.430E+01	1.430E+01	1.430E+01	1.430E+01	1.430E+01	1.430E+01	1.431E+01	1.432E+01	1.433E+01	1.434E+01
U238	3.310E+03	3.168E+03	3.168E+03	3.168E+03	3.168E+03	3.168E+03	3.168E+03	3.168E+03	3.168E+03	3.168E+03	3.168E+03	3.168E+03
CM242	0.000E+00	1.225E+08	1.225E+08	1.225E+08	1.225E+08	1.224E+08	1.223E+08	1.209E+08	1.194E+08	1.159E+08	1.125E+08	1.083E+08
CM244	0.000E+00	4.668E+08	4.668E+08	4.668E+08	4.668E+08	4.668E+08	4.668E+08	4.666E+08	4.665E+08	4.662E+08	4.658E+08	4.654E+08

PRINCIPAL PHOTON SOURCES IN GROUP 14, PHOTONS/SEC
 MEAN ENERGY= 2.750MEV

NUCLIDE	BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1d	FUEL 4d	FUEL 7d	FUEL 14d	FUEL 21d	FUEL 30d
TL208	0.000E+00	2.063E+08	2.063E+08	2.120E+08	2.120E+08	2.067E+08	2.128E+08	2.064E+08	2.069E+08	2.091E+08	2.117E+08	2.151E+08
U238	1.924E+03	1.841E+03	1.841E+03	1.841E+03	1.841E+03	1.841E+03	1.841E+03	1.841E+03	1.841E+03	1.841E+03	1.841E+03	1.841E+03
CM242	0.000E+00	7.072E+07	7.072E+07	7.072E+07	7.072E+07	7.072E+07	7.063E+07	6.984E+07	6.896E+07	6.694E+07	6.498E+07	6.255E+07
CM244	0.000E+00	2.705E+08	2.705E+08	2.705E+08	2.705E+08	2.705E+08	2.705E+08	2.704E+08	2.703E+08	2.701E+08	2.699E+08	2.697E+08

PRINCIPAL PHOTON SOURCES IN GROUP 15, PHOTONS/SEC
 MEAN ENERGY= 3.500MEV

NUCLIDE	BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1d	FUEL 4d	FUEL 7d	FUEL 14d	FUEL 21d	FUEL 30d
U238	1.720E+03	1.647E+03	1.647E+03	1.647E+03	1.647E+03	1.647E+03	1.647E+03	1.647E+03	1.647E+03	1.647E+03	1.647E+03	1.647E+03
CM242	0.000E+00	6.352E+07	6.352E+07	6.352E+07	6.352E+07	6.352E+07	6.343E+07	6.273E+07	6.194E+07	6.012E+07	5.836E+07	5.618E+07
CM244	0.000E+00	2.436E+08	2.436E+08	2.436E+08	2.436E+08	2.436E+08	2.436E+08	2.436E+08	2.436E+08	2.433E+08	2.431E+08	2.429E+08

PRINCIPAL PHOTON SOURCES IN GROUP 16, PHOTONS/SEC
 MEAN ENERGY= 5.000MEV

NUCLIDE	BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1d	FUEL 4d	FUEL 7d	FUEL 14d	FUEL 21d	FUEL 30d
U238	7.396E+02	7.079E+02	7.079E+02	7.079E+02	7.079E+02	7.079E+02	7.079E+02	7.079E+02	7.079E+02	7.079E+02	7.079E+02	7.079E+02
CM242	0.000E+00	2.717E+07	2.717E+07	2.718E+07	2.718E+07	2.717E+07	2.714E+07	2.684E+07	2.650E+07	2.572E+07	2.497E+07	2.403E+07

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PRINCIPAL PHOTON SOURCES IN GROUP 17, PHOTONS/SEC
 MEAN ENERGY= 7.000MEV

NUCLIDE	BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
U238	8.519E+01	8.153E+01	8.153E+01	8.153E+01	8.153E+01	8.153E+01	8.153E+01	8.153E+01	8.153E+01	8.153E+01	8.153E+01	8.153E+01
CM242	0.000E+00	3.120E+06	3.120E+06	3.120E+06	3.120E+06	3.116E+06	3.081E+06	3.043E+06	2.954E+06	2.867E+06	2.760E+06	2.600E+06
CM244	0.000E+00	1.202E+07	1.202E+07	1.202E+07	1.202E+07	1.202E+07	1.202E+07	1.201E+07	1.201E+07	1.201E+07	1.200E+07	1.199E+07

PRINCIPAL PHOTON SOURCES IN GROUP 18, PHOTONS/SEC
 MEAN ENERGY= 9.500MEV

NUCLIDE	BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
U238	9.797E+00	9.377E+00	9.377E+00	9.377E+00	9.377E+00	9.377E+00	9.377E+00	9.377E+00	9.377E+00	9.377E+00	9.377E+00	9.377E+00
CM242	0.000E+00	3.602E+05	3.602E+05	3.602E+05	3.601E+05	3.597E+05	3.512E+05	3.409E+05	3.309E+05	3.185E+05	3.000E+05	2.800E+05
CM244	0.000E+00	1.381E+06	1.381E+06	1.381E+06	1.381E+06	1.381E+06	1.381E+06	1.380E+06	1.379E+06	1.378E+06	1.377E+06	1.376E+06

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15
 PHOTON SPECTRUM FOR FISSION PRODUCTS

1. MTRHM, E=3.93%, 54000 MWD/MT (BWRUE)
 POWER= 1.00 MW, BURNUP= 1. MWD, FLUX= 1.00E+00 N/CM**2-SEC

18 GROUP PHOTON RELEASE RATES, PHOTONS/SECOND
 BASIS=

EMEAN	BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
1.000E-02	0.000E+00	1.257E+18	9.376E+17	8.550E+17	3.889E+17	2.465E+17	1.648E+17	1.128E+17	9.708E+16	7.955E+16	7.026E+16	6.263E+16
2.500E-02	0.000E+00	3.320E+17	2.557E+17	2.356E+17	8.696E+16	6.159E+16	3.987E+16	3.161E+16	2.289E+16	1.906E+16	1.628E+16	1.628E+16
3.750E-02	0.000E+00	2.707E+17	2.204E+17	2.038E+17	1.229E+17	9.652E+16	7.602E+16	4.893E+16	3.776E+16	2.616E+16	2.084E+16	1.714E+16
5.750E-02	0.000E+00	2.710E+17	1.972E+17	1.783E+17	8.283E+16	5.399E+16	3.623E+16	2.323E+16	1.928E+16	1.550E+16	1.374E+16	1.235E+16
8.500E-02	0.000E+00	1.986E+17	1.494E+17	1.370E+17	7.034E+16	4.917E+16	3.826E+16	2.798E+16	2.242E+16	1.512E+16	1.164E+16	9.413E+15
1.250E-01	0.000E+00	2.156E+17	1.740E+17	1.643E+17	1.087E+17	8.428E+16	7.004E+16	4.585E+16	3.483E+16	2.500E+16	2.131E+16	1.841E+16
2.250E-01	0.000E+00	4.593E+17	3.430E+17	3.144E+17	1.505E+17	1.027E+17	6.808E+16	3.017E+16	2.014E+16	1.190E+16	9.295E+15	7.852E+15
3.750E-01	0.000E+00	3.460E+17	2.970E+17	2.791E+17	1.012E+17	5.527E+16	4.213E+16	2.992E+16	2.390E+16	1.565E+16	1.096E+16	7.519E+15
5.750E-01	0.000E+00	5.797E+17	5.118E+17	4.929E+17	3.274E+17	2.414E+17	1.750E+17	1.114E+17	9.238E+16	7.235E+16	6.267E+16	5.503E+16
8.500E-01	0.000E+00	5.823E+17	5.327E+17	5.141E+17	3.098E+17	1.855E+17	1.435E+17	1.072E+17	9.400E+16	7.931E+16	7.178E+16	6.526E+16
1.250E+00	0.000E+00	3.188E+17	2.801E+17	2.628E+17	1.217E+17	5.092E+16	2.257E+16	1.239E+16	9.540E+15	6.345E+15	4.839E+15	3.758E+15
1.750E+00	0.000E+00	1.197E+17	1.099E+17	1.059E+17	6.408E+16	4.335E+16	3.509E+16	2.968E+16	2.546E+16	1.753E+16	1.207E+16	7.491E+15
2.250E+00	0.000E+00	5.895E+16	5.434E+16	5.180E+16	2.296E+16	5.992E+15	2.676E+15	2.070E+15	1.744E+15	1.255E+15	9.513E+14	6.951E+14
2.750E+00	0.000E+00	2.495E+16	2.185E+16	2.046E+16	9.053E+15	1.947E+15	1.241E+15	1.091E+15	9.372E+14	6.451E+14	4.426E+14	2.733E+14
3.500E+00	0.000E+00	1.196E+16	9.541E+15	8.491E+15	2.294E+15	2.244E+14	1.099E+13	9.450E+12	8.209E+12	5.819E+12	4.152E+12	2.752E+12
5.000E+00	0.000E+00	4.869E+15	2.893E+15	2.267E+15	1.132E+13	4.668E+12	5.751E+10	1.334E+03	1.196E-04	8.874E-05	8.877E-05	8.880E-05
7.000E+00	0.000E+00	4.541E+13	9.554E+09	4.067E+08	1.375E-05	5.755E-06	5.755E-06	5.756E-06	5.757E-06	5.758E-06	5.760E-06	5.762E-06
9.500E+00	0.000E+00	9.983E+09	1.942E+03	3.750E-04	3.639E-07	3.639E-07	3.639E-07	3.640E-07	3.640E-07	3.641E-07	3.642E-07	3.643E-07
TOTAL	0.000E+00	5.052E+18	4.097E+18	3.828E+18	2.009E+18	1.305E+18	9.373E+17	6.226E+17	5.111E+17	3.892E+17	3.299E+17	2.841E+17
MEV/SEC	0.000E+00	2.028E+18	1.778E+18	1.688E+18	9.083E+17	5.255E+17	3.729E+17	2.617E+17	2.201E+17	1.684E+17	1.402E+17	1.173E+17

18 GROUP SPECIFIC ENERGY RELEASE RATES, MEV/WATT-SEC
 BASIS=

EMEAN	BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
1.000E-02	0.000E+00	1.257E+18	9.376E+17	8.550E+17	3.889E+17	2.465E+17	1.648E+17	1.128E+17	9.708E+16	7.955E+16	7.026E+16	6.263E+16
2.500E-02	0.000E+00	8.299E+09	6.392E+09	5.890E+09	3.156E+09	2.174E+09	1.540E+09	9.968E+08	7.903E+08	5.724E+08	4.764E+08	4.070E+08
3.750E-02	0.000E+00	1.015E+10	8.265E+09	7.716E+09	4.607E+09	3.619E+09	2.851E+09	1.835E+09	1.416E+09	9.809E+08	7.813E+08	6.427E+08
5.750E-02	0.000E+00	1.588E+10	1.134E+10	1.025E+10	4.763E+09	3.104E+09	2.083E+09	1.336E+09	1.108E+09	8.912E+08	7.899E+08	7.101E+08
8.500E-02	0.000E+00	1.688E+10	1.270E+10	1.164E+10	5.979E+09	4.179E+09	3.252E+09	2.378E+09	1.905E+09	1.286E+09	9.890E+08	8.001E+08
1.250E-01	0.000E+00	2.696E+10	2.175E+10	2.053E+10	1.359E+10	1.053E+10	8.755E+09	5.731E+09	4.354E+09	3.125E+09	2.664E+09	2.301E+09
2.250E-01	0.000E+00	1.034E+11	7.717E+10	7.074E+10	3.387E+10	2.312E+10	1.532E+10	6.789E+09	4.532E+09	2.678E+09	2.091E+09	1.767E+09
3.750E-01	0.000E+00	1.298E+11	1.114E+11	1.046E+11	3.793E+10	2.073E+10	1.580E+10	1.122E+10	8.963E+09	5.869E+09	4.110E+09	2.820E+09
5.750E-01	0.000E+00	3.333E+11	2.943E+11	2.834E+11	1.883E+11	1.006E+11	6.405E+10	5.312E+10	4.160E+10	3.604E+10	3.164E+10	2.820E+10
8.500E-01	0.000E+00	4.950E+11	4.528E+11	4.370E+11	2.634E+11	1.577E+11	1.220E+11	9.110E+10	7.900E+10	6.741E+10	6.102E+10	5.547E+10
1.250E+00	0.000E+00	3.985E+11	3.502E+11	3.285E+11	1.521E+11	6.365E+10	2.821E+10	1.548E+10	1.192E+10	7.931E+09	6.049E+09	4.697E+09
1.750E+00	0.000E+00	2.096E+11	1.923E+11	1.853E+11	1.121E+11	7.587E+10	6.140E+10	5.193E+10	4.455E+10	3.068E+10	2.111E+10	1.311E+10
2.250E+00	0.000E+00	1.326E+11	1.223E+11	1.165E+11	5.166E+10	1.348E+10	6.021E+09	4.658E+09	3.924E+09	2.825E+09	2.141E+09	1.564E+09

2.750E+00	0.000E+00	6.860E+10	6.008E+10	5.627E+10	2.489E+10	5.353E+09	3.412E+09	2.577E+09	1.774E+09	1.217E+09	7.517E+08
3.500E+00	0.000E+00	4.186E+10	3.339E+10	2.972E+10	8.029E+09	7.853E+08	3.845E+07	3.307E+07	2.873E+07	2.037E+07	1.453E+06
5.000E+00	0.000E+00	2.435E+10	1.447E+10	1.133E+10	1.066E+08	2.334E+07	2.875E+05	6.668E-03	5.982E-10	4.437E-10	4.438E-10
7.000E+00	0.000E+00	3.179E+08	6.688E+04	2.847E+03	9.623E-11	4.029E-11	4.029E-11	4.029E-11	4.030E-11	4.031E-11	4.033E-11
9.500E+00	0.000E+00	9.484E+04	1.844E-02	3.562E-09	3.457E-12	3.457E-12	3.457E-12	3.458E-12	3.459E-12	3.460E-12	3.461E-12
TOTAL	0.000E+00	2.028E+12	1.778E+12	1.688E+12	9.083E+11	5.255E+11	3.729E+11	2.617E+11	2.201E+11	1.684E+11	1.173E+11
GAM POW	0.000E+00	3.250E+05	2.850E+05	2.706E+05	1.456E+05	8.424E+04	5.978E+04	4.195E+04	3.528E+04	2.700E+04	2.247E+04

1.881E+04

II135 0.000E+00 8.564E+15 8.552E+15 8.538E+15 7.715E+15 4.567E+15 6.919E+14 3.644E+11 1.919E+08 4.300E+00 9.633E-08 1.407E-17
XE135 0.000E+00 2.783E+15 2.789E+15 2.795E+15 3.099E+15 3.715E+15 2.000E+15 1.393E+13 6.045E+10 1.660E+05 4.529E-01 3.176E-08

PR144 0.000E+00 4.383E+15 4.382E+15 4.381E+15 4.361E+15 4.357E+15 4.349E+15 4.317E+15 4.285E+15 4.213E+15 4.142E+15 4.052E+15

BA142	0.000E+00	6.628E+15	6.221E+15	5.830E+15	1.361E+14	4.942E+05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
LA142	0.000E+00	2.380E+15	2.379E+15	2.377E+15	1.707E+15	1.818E+14	5.654E+10	5.294E-04	4.957E-18	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

SN130 0.000E+00 3.766E+15 3.126E+15 2.595E+15 5.255E+10 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
I131 0.000E+00 3.484E+14 3.484E+14 3.484E+14 3.481E+14 3.432E+14 3.240E+14 2.534E+14 1.963E+14 1.075E+14 1.075E+14 5.877E+13 5.877E+13 2.705E+13

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15		OUTPUT UNIT = 6	PAGE 164								
TE132	0.000E+00	3.909E+15	3.908E+15	3.876E+15	3.708E+15	3.161E+15	1.670E+15	8.820E+14	1.989E+14	4.487E+13	6.613E+12
TE132	0.000E+00	1.729E+15	1.728E+15	1.718E+15	1.654E+15	1.413E+15	7.464E+14	3.943E+14	8.892E+13	2.006E+13	2.956E+12
TE133	0.000E+00	2.507E+15	2.434E+15	2.353E+15	2.033E+15	2.664E+14	3.606E+14	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TE133	0.000E+00	1.893E+15	1.893E+15	1.839E+15	1.857E+15	1.584E+15	8.698E+14	7.168E+14	2.656E+14	9.839E+07	7.360E+04
TE133	0.000E+00	3.391E+15	3.382E+15	3.372E+15	2.326E+15	8.661E+13	7.230E+07	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CS134	0.000E+00	1.692E+14	1.692E+14	1.692E+14	1.692E+14	1.691E+14	1.690E+14	1.686E+14	1.681E+14	1.670E+14	1.659E+14
TE135	0.000E+00	5.854E+15	6.747E+14	7.733E+13	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TE135	0.000E+00	1.544E+15	1.542E+15	1.539E+15	1.391E+15	8.234E+14	1.247E+14	6.570E+10	3.460E+07	7.752E-01	1.737E-08
XE135	0.000E+00	4.704E+14	4.715E+14	4.725E+14	5.240E+14	6.280E+14	3.381E+14	2.355E+12	1.022E+10	2.807E+04	7.656E-02
TE136	0.000E+00	5.290E+15	3.606E+15	2.240E+15	5.392E+14	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TE136M	0.000E+00	3.230E+15	1.308E+15	5.296E+14	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CS136	0.000E+00	4.904E+14	4.904E+14	4.903E+14	4.893E+14	4.839E+14	4.651E+14	3.968E+14	3.386E+14	2.338E+14	1.614E+14
XE137	0.000E+00	8.821E+15	7.682E+15	6.469E+15	1.792E+11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TE138	0.000E+00	3.851E+15	5.951E+12	8.998E+09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TE138	0.000E+00	2.684E+15	2.561E+15	2.439E+15	1.429E+14	6.049E+07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CS138	0.000E+00	5.825E+15	5.813E+15	5.795E+15	2.513E+15	4.277E+12	3.424E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00
XE139	0.000E+00	6.041E+15	2.127E+15	7.421E+14	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CS139	0.000E+00	8.051E+15	7.736E+15	7.276E+15	1.018E+14	2.514E+04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA139	0.000E+00	4.096E+15	4.094E+15	4.091E+15	2.792E+15	2.264E+14	2.653E+10	4.998E+06	9.416E-22	0.000E+00	0.000E+00
BA140	0.000E+00	1.049E+15	1.049E+15	1.049E+15	1.046E+15	1.035E+15	9.933E+14	8.442E+14	7.176E+14	4.910E+14	3.360E+14
LA140	0.000E+00	2.405E+15	2.405E+15	2.405E+15	2.402E+15	2.390E+15	2.390E+15	2.063E+15	1.775E+15	1.222E+15	8.366E+14
BA141	0.000E+00	3.631E+15	3.543E+15	3.420E+15	3.788E+14	4.311E+09	6.861E-09	0.000E+00	0.000E+00	0.000E+00	0.000E+00
LA141	0.000E+00	3.988E+15	3.988E+15	3.987E+15	3.592E+15	1.502E+15	6.282E+13	1.922E+08	5.882E+02	7.996E-11	1.087E-23
CE141	0.000E+00	3.917E+14	3.917E+14	3.917E+14	3.917E+14	3.910E+14	3.855E+14	3.617E+14	3.93E+14	2.922E+14	2.517E+14
LA142	0.000E+00	3.386E+15	3.384E+15	3.382E+15	2.447E+15	2.386E+14	8.045E+04	7.532E-04	7.052E-18	0.000E+00	0.000E+00
CE143	0.000E+00	4.861E+15	4.861E+15	4.861E+15	4.793E+15	4.316E+15	2.957E+15	6.518E+14	1.437E+14	4.215E+12	1.237E+11
PR143	0.000E+00	9.735E+14	9.735E+14	9.735E+14	9.735E+14	9.729E+14	9.635E+14	8.694E+14	7.552E+14	5.303E+14	3.709E+14
CE144	0.000E+00	4.355E+15	4.354E+15	4.353E+15	4.333E+15	4.329E+15	4.321E+15	4.289E+15	4.258E+15	4.186E+15	4.115E+15
PR144	0.000E+00	4.603E+15	4.158E+15	3.424E+15	5.226E+09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CE145	0.000E+00	1.693E+15	1.693E+15	1.693E+15	1.523E+15	8.530E+14	1.059E+14	2.517E+10	5.980E+06	2.092E-02	7.315E-11
ND147	0.000E+00	3.093E+14	3.093E+14	3.093E+14	3.087E+14	3.047E+14	2.907E+14	2.409E+14	1.996E+14	1.287E+14	8.301E+13
PR148	0.000E+00	2.416E+15	2.144E+15	1.721E+15	4.778E+07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PM148	0.000E+00	5.331E+14	5.331E+14	5.331E+14	5.303E+14	5.163E+14	4.691E+14	3.197E+14	2.182E+14	9.041E+13	3.840E+13
PM149	0.000E+00	5.091E+14	5.091E+14	5.091E+14	5.063E+14	4.806E+14	3.808E+14	1.487E+14	5.809E+13	6.477E+12	7.222E+11
SM153	0.000E+00	2.921E+15	2.920E+15	2.920E+15	2.879E+15	2.673E+15	2.046E+15	7.027E+14	2.413E+14	1.993E+13	1.646E+12
EU156	0.000E+00	6.469E+14	6.468E+14	6.468E+14	6.457E+14	6.399E+14	6.189E+14	5.399E+14	4.708E+14	3.420E+14	2.485E+14

PRINCIPAL PHOTON SOURCES IN GROUP 5, PHOTONS/SEC
 MEAN ENERGY= 0.085MEV

NUCLIDE	BOC #1	DISCHARGE FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1d	FUEL 4d	FUEL 7d	FUEL 14d	FUEL 21d	FUEL 30d
RB 88	0.000E+00	2.155E+15	2.153E+15	2.150E+15	1.824E+15	5.437E+14	6.709E+12	1.556E+05	3.608E-03	5.531E-21	0.000E+00
SR 89	0.000E+00	6.319E+14	6.319E+14	6.319E+14	6.316E+14	6.299E+14	6.234E+14	5.983E+14	5.741E+14	5.215E+14	4.737E+14
RB 90	0.000E+00	2.322E+15	2.027E+15	1.620E+15	4.430E+09	4.181E-12	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Y 90	0.000E+00	2.927E+14	2.927E+14	2.927E+14	2.926E+14	2.920E+14	2.904E+14	2.862E+14	2.843E+14	2.828E+14	2.822E+14
SR 91	0.000E+00	9.694E+14	9.690E+14	9.682E+14	9.027E+14	6.267E+14	1.685E+14	8.815E+11	4.611E+09	2.189E+04	1.040E-01
Y 91	0.000E+00	8.890E+14	8.890E+14	8.890E+14	8.890E+14	8.885E+14	8.836E+14	8.537E+14	8.239E+14	7.584E+14	6.980E+14

RB 92 0.000E+00 5.248E+15 5.986E+11 5.564E+07 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
Y 92 0.000E+00 2.819E+15 2.819E+15 2.819E+15 2.756E+15 1.725E+15 8.914E+13 8.157E+07 6.137E+01 3.143E-13 0.000E+00 0.000E+00 0.000E+00

ORIGEN2 V2.1	(8-1-91), Run on 10/19/04	at 15:12:15	OUTPUT UNIT = 6	PAGE 165
Y 93	0.000E+00	2.664E+15	2.664E+15	2.664E+15
RB 94	0.000E+00	2.482E+15	4.827E+08	9.313E+01
Y 94	0.000E+00	4.186E+15	4.141E+15	4.053E+15
Y 96	0.000E+00	7.568E+15	5.692E+15	4.211E+15
ZR 97	0.000E+00	1.746E+15	1.744E+15	1.743E+15
NB 97	0.000E+00	1.053E+15	1.053E+15	1.036E+15
NB 98	0.000E+00	6.144E+15	1.745E+15	4.562E+14
NB 99	0.000E+00	4.803E+15	3.183E+14	1.737E+13
MO 99	0.000E+00	9.936E+14	9.934E+14	9.933E+14
TC100	0.000E+00	2.152E+15	1.548E+14	1.113E+13
ZR101	0.000E+00	5.116E+15	1.779E+10	5.979E+04
MO101	0.000E+00	2.708E+15	2.612E+15	2.491E+15
TC102	0.000E+00	4.852E+15	4.656E+15	4.388E+15
TC104	0.000E+00	4.744E+15	4.701E+15	4.613E+15
RH104	0.000E+00	2.649E+15	1.090E+15	4.917E+14
RU105	0.000E+00	8.057E+14	8.056E+14	8.054E+14
RH106	0.000E+00	2.534E+15	2.432E+15	2.407E+15
RU107	0.000E+00	1.715E+15	1.551E+15	1.338E+15
RH108	0.000E+00	1.909E+15	1.738E+15	1.498E+15
PD109	0.000E+00	6.726E+14	6.725E+14	6.722E+14
I1131	0.000E+00	7.211E+14	7.211E+14	7.211E+14
I1132	0.000E+00	1.023E+15	1.023E+15	1.023E+15
TE133	0.000E+00	1.547E+15	1.502E+15	1.451E+15
TE133M	0.000E+00	2.029E+15	2.004E+15	1.979E+15
XE133	0.000E+00	1.543E+16	1.543E+16	1.543E+16
TE134	0.000E+00	6.920E+15	6.810E+15	6.698E+15
I134	0.000E+00	2.045E+15	2.040E+15	2.034E+15
TE135	0.000E+00	3.861E+15	4.450E+14	5.101E+13
I135	0.000E+00	8.846E+14	8.833E+14	8.818E+14
I136	0.000E+00	3.477E+15	2.369E+15	1.472E+15
I136M	0.000E+00	2.114E+15	8.559E+14	3.466E+14
XE137	0.000E+00	5.732E+15	4.992E+15	4.204E+15
I138	0.000E+00	2.573E+15	3.976E+12	6.012E+09
XE138	0.000E+00	1.635E+15	1.560E+15	1.486E+15
CS138	0.000E+00	3.688E+15	3.680E+15	3.669E+15
XE139	0.000E+00	3.967E+15	1.397E+15	4.873E+14
CS139	0.000E+00	5.224E+15	5.020E+15	4.721E+15
BA139	0.000E+00	2.536E+15	2.535E+15	2.532E+15
BA140	0.000E+00	5.798E+14	5.797E+14	5.797E+14
LA140	0.000E+00	1.415E+15	1.415E+15	1.415E+15
BA141	0.000E+00	2.256E+15	2.201E+15	2.125E+15
LA141	0.000E+00	2.491E+15	2.491E+15	2.490E+15
CE141	0.000E+00	1.846E+14	1.846E+14	1.846E+14
BA142	0.000E+00	4.304E+15	4.039E+15	3.786E+15
LA142	0.000E+00	2.109E+15	2.108E+15	2.106E+15
CE143	0.000E+00	7.626E+14	7.626E+14	7.626E+14
PR143	0.000E+00	5.412E+14	5.412E+14	5.412E+14
CE144	0.000E+00	6.930E+14	6.930E+14	6.930E+14
Y 93	0.000E+00	2.664E+15	2.664E+15	2.664E+15
RB 94	0.000E+00	2.482E+15	4.827E+08	9.313E+01
Y 94	0.000E+00	4.186E+15	4.141E+15	4.053E+15
Y 96	0.000E+00	7.568E+15	5.692E+15	4.211E+15
ZR 97	0.000E+00	1.746E+15	1.744E+15	1.743E+15
NB 97	0.000E+00	1.053E+15	1.053E+15	1.036E+15
NB 98	0.000E+00	6.144E+15	1.745E+15	4.562E+14
NB 99	0.000E+00	4.803E+15	3.183E+14	1.737E+13
MO 99	0.000E+00	9.936E+14	9.934E+14	9.933E+14
TC100	0.000E+00	2.152E+15	1.548E+14	1.113E+13
ZR101	0.000E+00	5.116E+15	1.779E+10	5.979E+04
MO101	0.000E+00	2.708E+15	2.612E+15	2.491E+15
TC102	0.000E+00	4.852E+15	4.656E+15	4.388E+15
TC104	0.000E+00	4.744E+15	4.701E+15	4.613E+15
RH104	0.000E+00	2.649E+15	1.090E+15	4.917E+14
RU105	0.000E+00	8.057E+14	8.056E+14	8.054E+14
RH106	0.000E+00	2.534E+15	2.432E+15	2.407E+15
RU107	0.000E+00	1.715E+15	1.551E+15	1.338E+15
RH108	0.000E+00	1.909E+15	1.738E+15	1.498E+15
PD109	0.000E+00	6.726E+14	6.725E+14	6.722E+14
I1131	0.000E+00	7.211E+14	7.211E+14	7.211E+14
I1132	0.000E+00	1.023E+15	1.023E+15	1.023E+15
TE133	0.000E+00	1.547E+15	1.502E+15	1.451E+15
TE133M	0.000E+00	2.029E+15	2.004E+15	1.979E+15
XE133	0.000E+00	1.543E+16	1.543E+16	1.543E+16
TE134	0.000E+00	6.920E+15	6.810E+15	6.698E+15
I134	0.000E+00	2.045E+15	2.040E+15	2.034E+15
TE135	0.000E+00	3.861E+15	4.450E+14	5.101E+13
I135	0.000E+00	8.846E+14	8.833E+14	8.818E+14
I136	0.000E+00	3.477E+15	2.369E+15	1.472E+15
I136M	0.000E+00	2.114E+15	8.559E+14	3.466E+14
XE137	0.000E+00	5.732E+15	4.992E+15	4.204E+15
I138	0.000E+00	2.573E+15	3.976E+12	6.012E+09
XE138	0.000E+00	1.635E+15	1.560E+15	1.486E+15
CS138	0.000E+00	3.688E+15	3.680E+15	3.669E+15
XE139	0.000E+00	3.967E+15	1.397E+15	4.873E+14
CS139	0.000E+00	5.224E+15	5.020E+15	4.721E+15
BA139	0.000E+00	2.536E+15	2.535E+15	2.532E+15
BA140	0.000E+00	5.798E+14	5.797E+14	5.797E+14
LA140	0.000E+00	1.415E+15	1.415E+15	1.415E+15
BA141	0.000E+00	2.256E+15	2.201E+15	2.125E+15
LA141	0.000E+00	2.491E+15	2.491E+15	2.490E+15
CE141	0.000E+00	1.846E+14	1.846E+14	1.846E+14
BA142	0.000E+00	4.304E+15	4.039E+15	3.786E+15
LA142	0.000E+00	2.109E+15	2.108E+15	2.106E+15
CE143	0.000E+00	7.626E+14	7.626E+14	7.626E+14
PR143	0.000E+00	5.412E+14	5.412E+14	5.412E+14
CE144	0.000E+00	6.930E+14	6.930E+14	6.930E+14

PR144 0.000E+00 2.762E+15 2.761E+15 2.760E+15 2.748E+15 2.745E+15 2.740E+15 2.720E+15 2.700E+15 2.655E+15 2.610E+15 2.553E+15

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

0.000E+00 1.059E+15 1.059E+15 1.524E+15 1.059E+15 9.524E+14 5.335E+14 6.624E+13 1.574E+10 3.740E+06 1.308E-02 4.575E-11 6.139E-22
PR145 0.000E+00 4.333E+15 4.333E+15 4.333E+15 4.325E+15 4.269E+15 4.073E+15 4.073E+15 3.375E+15 2.796E+15 1.803E+15 1.163E+15 6.616E+14
ND147 0.000E+00 1.744E+14 1.744E+14 1.744E+14 1.744E+14 1.744E+14 1.744E+14 1.744E+14 1.744E+14 1.744E+14 1.735E+14 1.731E+14 1.725E+14
EU155 0.000E+00 1.154E+15 1.154E+15 1.154E+15 1.152E+15 1.142E+15 1.104E+15 9.632E+14 8.399E+14 6.102E+14 4.433E+14 2.940E+14
EU156

PRINCIPAL PHOTON SOURCES IN GROUP 6, PHOTONS/SEC
MEAN ENERGY= 0.125MEV

NUCLIDE

BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1d	FUEL 4d	FUEL 7d	FUEL 14d	FUEL 21d	FUEL 30d	
RB 88	0.000E+00	1.527E+15	1.526E+15	1.524E+15	1.293E+15	3.854E+14	4.756E+12	1.103E+05	2.557E-03	3.921E-21	0.000E+00	0.000E+00
SR 89	0.000E+00	4.053E+14	4.053E+14	4.053E+14	4.052E+14	4.040E+14	3.999E+14	3.838E+14	3.345E+14	3.039E+14	2.686E+14	2.686E+14
KR 90	0.000E+00	5.696E+15	1.588E+15	4.386E+14	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Y 90	0.000E+00	1.960E+14	1.960E+14	1.960E+14	1.960E+14	1.956E+14	1.945E+14	1.917E+14	1.904E+14	1.894E+14	1.892E+14	1.891E+14
Y 91	0.000E+00	5.725E+14	5.725E+14	5.725E+14	5.725E+14	5.722E+14	5.690E+14	5.306E+14	4.884E+14	4.495E+14	4.041E+14	4.041E+14
KR 92	0.000E+00	2.870E+15	4.401E+05	6.717E-05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB 92	0.000E+00	3.774E+15	4.306E+11	4.002E+07	1.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Y 92	0.000E+00	1.946E+15	1.946E+15	1.946E+15	1.902E+15	1.191E+15	6.153E+13	5.630E+07	4.236E+01	2.169E-13	0.000E+00	0.000E+00
Y 93	0.000E+00	1.816E+15	1.816E+15	1.816E+15	1.718E+15	1.218E+15	3.541E+14	2.530E+12	1.808E+10	1.778E+05	1.749E+00	6.381E-07
Y 94	0.000E+00	2.925E+15	2.893E+15	2.832E+15	3.527E+14	6.594E+09	6.274E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Y 96	0.000E+00	5.389E+15	4.053E+15	2.998E+15	7.684E+07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ZR 97	0.000E+00	1.159E+15	1.158E+15	1.158E+15	1.113E+15	9.063E+14	4.332E+14	2.260E+13	1.179E+12	1.205E+09	1.227E+06	1.743E+02
NB 98	0.000E+00	4.322E+15	1.228E+15	3.209E+14	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
NB 99	0.000E+00	3.326E+15	2.204E+14	1.203E+13	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
MO 99	0.000E+00	2.902E+15	2.902E+15	2.902E+15	2.872E+15	2.725E+15	2.256E+15	1.059E+15	4.972E+14	8.517E+13	1.459E+13	1.509E+12
TC 99M	0.000E+00	3.609E+16	3.609E+16	3.609E+16	3.607E+16	3.548E+16	3.064E+16	1.450E+16	6.807E+15	1.165E+15	1.996E+14	2.066E+13
ZR101	0.000E+00	3.649E+15	1.268E+10	4.284E+04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TC101	0.000E+00	1.683E+15	1.683E+15	1.679E+15	3.682E+14	9.482E+08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TC102	0.000E+00	3.371E+15	3.235E+15	3.048E+15	8.153E+13	5.962E+05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TC104	0.000E+00	3.360E+15	3.330E+15	3.267E+15	3.728E+14	4.069E+09	5.574E-09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RH105M	0.000E+00	1.710E+15	1.710E+15	1.710E+15	1.515E+15	6.941E+14	4.176E+13	5.469E+08	7.164E+03	2.897E-08	1.172E-19	0.000E+00
RH106	0.000E+00	1.748E+15	1.678E+15	1.661E+15	1.655E+15	1.654E+15	1.652E+15	1.642E+15	1.633E+15	1.612E+15	1.591E+15	1.564E+15
TE131	0.000E+00	1.670E+16	1.665E+16	1.659E+16	7.972E+15	5.625E+14	3.675E+14	6.964E+13	1.319E+13	2.720E+11	5.608E+09	3.815E+07
SB132M	0.000E+00	2.504E+15	2.123E+15	1.800E+15	1.254E+11	3.945E-11	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TE132	0.000E+00	1.071E+15	1.071E+15	1.071E+15	1.062E+15	1.016E+15	8.662E+14	4.575E+14	2.417E+14	5.451E+13	1.229E+13	1.812E+12
I134	0.000E+00	3.578E+15	3.568E+15	3.557E+15	2.453E+15	9.137E+13	7.627E+07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TE135	0.000E+00	2.722E+15	3.138E+14	3.596E+13	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
I136	0.000E+00	2.437E+15	1.661E+15	1.032E+15	2.484E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
XE137	0.000E+00	3.982E+15	3.468E+15	2.921E+15	8.089E+10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CS138	0.000E+00	3.181E+15	3.174E+15	3.165E+15	1.373E+15	2.336E+12	1.870E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
XE139	0.000E+00	2.904E+15	1.022E+15	3.567E+14	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CS139	0.000E+00	3.614E+15	3.473E+15	3.266E+15	4.569E+13	1.128E+04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA139	0.000E+00	1.694E+15	1.693E+15	1.692E+15	1.155E+15	9.365E+13	1.097E+10	2.067E-06	3.895E-22	0.000E+00	0.000E+00	0.000E+00
LA140	0.000E+00	1.161E+15	1.161E+15	1.161E+15	1.160E+15	1.154E+15	1.128E+15	9.956E+14	8.569E+14	5.898E+14	4.038E+14	2.479E+14
BA141	0.000E+00	1.789E+15	1.745E+15	1.685E+15	1.866E+14	2.123E+09	3.380E-09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
LA141	0.000E+00	1.670E+15	1.670E+15	1.669E+15	1.504E+15	6.288E+14	2.630E+13	8.047E+07	2.462E+02	3.348E-11	4.550E-24	0.000E+00
CE141	0.000E+00	1.911E+16	1.911E+16	1.911E+16	1.911E+16	1.907E+16	1.881E+16	1.764E+16	1.655E+16	1.426E+16	1.228E+16	1.014E+16
CE144	0.000E+00	3.241E+15	3.241E+15	3.241E+15	3.241E+15	3.239E+15	3.233E+15	3.210E+15	3.187E+15	3.133E+15	3.080E+15	3.013E+15
PR144	0.000E+00	1.885E+15	1.885E+15	1.884E+15	1.876E+15	1.874E+15	1.870E+15	1.857E+15	1.843E+15	1.812E+15	1.781E+15	1.743E+15

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15		OUTPUT UNIT = 6										PAGE 168
		FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1d	FUEL 4d	FUEL 7d	FUEL 14d	FUEL 21d	FUEL 30d	
CS139	0.000E+00	5.582E+15	5.364E+15	5.044E+15	7.056E+13	1.743E+04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA139	0.000E+00	8.416E+15	8.412E+15	8.404E+15	5.736E+15	4.652E+14	5.450E+10	1.027E-05	1.935E-21	0.000E+00	0.000E+00	0.000E+00
BA140	0.000E+00	1.822E+15	1.822E+15	1.822E+15	1.818E+15	1.797E+15	1.726E+15	1.467E+15	1.247E+15	8.530E+14	5.837E+14	3.584E+14
LA140	0.000E+00	1.551E+15	1.551E+15	1.551E+15	1.550E+15	1.542E+15	1.508E+15	1.331E+15	1.145E+15	7.884E+14	5.397E+14	3.314E+14
BA141	0.000E+00	2.515E+16	2.454E+16	2.369E+16	2.622E+15	2.985E+10	4.752E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
LA141	0.000E+00	2.356E+15	2.356E+15	2.355E+15	2.122E+15	8.871E+14	3.710E+13	1.135E+08	3.474E+02	4.723E-11	6.420E-24	0.000E+00
BA142	0.000E+00	1.338E+16	1.256E+16	1.177E+16	2.748E+14	9.977E+05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CE142	0.000E+00	1.838E+16	1.838E+16	1.838E+16	1.812E+16	1.632E+16	1.118E+16	2.465E+15	5.432E+14	1.594E+13	4.677E+11	5.007E+09
PR143	0.000E+00	3.416E+14	3.416E+14	3.416E+14	3.416E+14	3.414E+14	3.381E+14	3.051E+14	2.650E+14	1.861E+14	1.302E+14	8.218E+13
PR144	0.000E+00	2.753E+15	2.753E+15	2.752E+15	2.740E+15	2.732E+15	2.732E+15	2.712E+15	2.692E+15	2.647E+15	2.602E+15	2.545E+15
CE145	0.000E+00	4.059E+15	3.666E+15	3.020E+15	4.642E+09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CE146	0.000E+00	4.130E+15	3.966E+15	3.777E+15	2.226E+14	9.723E+07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PM148M	0.000E+00	1.568E+14	1.568E+14	1.568E+14	1.567E+14	1.561E+14	1.542E+14	1.466E+14	1.394E+14	1.240E+14	1.102E+14	9.476E+13
ND149	0.000E+00	6.046E+15	6.038E+15	6.021E+15	4.134E+15	5.577E+14	4.114E+11	1.219E-01	3.610E-14	0.000E+00	0.000E+00	0.000E+00
EU156	0.000E+00	2.929E+14	2.929E+14	2.929E+14	2.924E+14	2.897E+14	2.802E+14	2.444E+14	2.132E+14	1.549E+14	1.125E+14	7.460E+13

PRINCIPAL PHOTON SOURCES IN GROUP 8, PHOTONS/SEC
 MEAN ENERGY= 0.375MEV

NUCLIDE	BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1d	FUEL 4d	FUEL 7d	FUEL 14d	FUEL 21d	FUEL 30d
KR 87	0.000E+00	4.869E+15	4.853E+15	4.822E+15	2.854E+15	1.870E+14	1.025E+10	9.246E-08	8.293E-25	0.000E+00	0.000E+00	0.000E+00
RB 88	0.000E+00	1.338E+15	1.336E+15	1.335E+15	1.132E+15	3.376E+14	4.166E+12	9.659E+04	2.240E-03	3.434E-21	0.000E+00	0.000E+00
SR 89	0.000E+00	1.988E+14	1.988E+14	1.988E+14	1.987E+14	1.982E+14	1.961E+14	1.882E+14	1.806E+14	1.641E+14	1.491E+14	1.317E+14
Y 90	0.000E+00	1.270E+14	1.270E+14	1.270E+14	1.269E+14	1.267E+14	1.266E+14	1.242E+14	1.233E+14	1.227E+14	1.225E+14	1.222E+14
Y 91	0.000E+00	2.894E+14	2.894E+14	2.894E+14	2.894E+14	2.892E+14	2.876E+14	2.779E+14	2.682E+14	2.469E+14	2.272E+14	2.042E+14
RB 92	0.000E+00	3.692E+15	4.211E+11	3.914E+07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Y 92	0.000E+00	2.159E+15	2.159E+15	2.159E+15	2.111E+15	1.321E+15	6.827E+13	6.247E+07	4.700E+01	2.407E-13	0.000E+00	0.000E+00
Y 93	0.000E+00	1.306E+15	1.306E+15	1.306E+15	1.234E+15	8.757E+14	2.546E+14	1.819E+12	1.300E+10	1.279E+05	1.258E+00	4.588E-07
Y 94	0.000E+00	3.039E+15	3.006E+15	2.943E+15	3.665E+14	6.853E+09	6.520E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Y 96	0.000E+00	4.965E+15	3.734E+15	2.762E+15	7.080E+07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ZR 97	0.000E+00	1.539E+15	1.538E+15	1.537E+15	1.477E+15	1.203E+15	5.750E+14	3.000E+13	1.566E+12	1.600E+09	1.629E+06	2.314E+02
NB 98	0.000E+00	3.679E+15	1.045E+15	2.732E+14	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
MO 99	0.000E+00	7.215E+14	7.214E+14	7.213E+14	7.140E+14	6.775E+14	5.608E+14	2.633E+14	1.236E+14	2.117E+13	3.626E+12	3.752E+11
ZR101	0.000E+00	6.625E+15	2.303E+10	7.742E+04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TC101	0.000E+00	2.728E+16	2.726E+16	2.718E+16	5.963E+15	1.536E+10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RU103	0.000E+00	1.510E+14	1.510E+14	1.510E+14	1.508E+14	1.503E+14	1.483E+14	1.407E+14	1.334E+14	1.179E+14	1.042E+14	8.891E+13
TC104	0.000E+00	3.172E+16	3.144E+16	3.085E+16	3.520E+15	3.842E+10	5.263E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RU105	0.000E+00	5.992E+15	5.992E+15	5.990E+15	5.294E+15	2.425E+15	1.459E+14	1.911E+09	2.503E+04	1.012E-07	4.094E-19	0.000E+00
RH105	0.000E+00	5.567E+15	5.568E+15	5.568E+15	5.568E+15	5.385E+15	4.004E+15	9.814E+14	2.393E+14	8.886E+12	3.300E+11	4.783E+09
RH106	0.000E+00	1.383E+15	1.328E+15	1.314E+15	1.309E+15	1.309E+15	1.307E+15	1.299E+15	1.292E+15	1.275E+15	1.258E+15	1.237E+15
RH107	0.000E+00	1.441E+16	1.439E+16	1.432E+16	2.669E+15	1.840E+11	1.917E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RH108	0.000E+00	7.185E+15	6.539E+15	5.637E+15	7.436E+11	6.349E-09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SB125	0.000E+00	2.302E+14	2.302E+14	2.302E+14	2.302E+14	2.302E+14	2.301E+14	2.299E+14	2.296E+14	2.287E+14	2.278E+14	2.266E+14
SB128M	0.000E+00	3.471E+15	3.450E+15	3.428E+15	1.891E+15	5.992E+13	1.727E+08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
I131	0.000E+00	1.751E+16	1.751E+16	1.751E+16	1.750E+16	1.725E+16	1.629E+16	1.273E+16	9.864E+15	5.400E+15	2.953E+15	1.359E+15
I132	0.000E+00	1.261E+15	1.261E+15	1.261E+15	1.254E+15	1.207E+15	1.031E+15	5.445E+14	2.876E+14	6.488E+13	1.463E+13	2.157E+12
TE133	0.000E+00	2.406E+16	2.335E+16	2.256E+16	1.951E+15	2.556E+13	3.460E+07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TE133M	0.000E+00	2.942E+15	2.906E+15	2.870E+15	1.390E+15	3.257E+13	4.409E+07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

CS138	0.000E+00	1.452E+16	1.449E+16	1.445E+16	6.267E+15	1.067E+13	8.538E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA140	0.000E+00	6.692E+15	6.692E+15	6.692E+15	6.677E+15	6.603E+15	6.340E+15	5.388E+15	4.580E+15	3.134E+15	2.144E+15	1.317E+15			

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LA140 0.000E+00 1.400E+16 1.400E+16 1.400E+16 1.391E+16 1.360E+16 1.201E+16 1.033E+16 7.113E+15 4.869E+15 2.990E+15
 BA141 0.000E+00 9.347E+15 9.120E+15 8.803E+15 9.752E+15 1.110E+16 1.766E+16 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
 LA142 0.000E+00 1.999E+16 1.998E+16 1.997E+16 1.434E+16 1.527E+15 4.750E+11 4.448E+03 4.164E+17 0.000E+00 0.000E+00 0.000E+00
 CE143 0.000E+00 2.747E+15 2.747E+15 2.747E+15 2.708E+15 2.439E+15 1.671E+15 3.683E+14 8.117E+13 2.382E+12 6.988E+10 7.481E+08
 PR144 0.000E+00 1.309E+15 1.309E+15 1.309E+15 1.303E+15 1.301E+15 1.299E+15 1.299E+15 1.280E+15 1.280E+15 1.237E+15 1.210E+15
 ND147 0.000E+00 1.895E+15 1.895E+15 1.895E+15 1.891E+15 1.867E+15 1.781E+15 1.476E+15 1.223E+15 7.886E+14 5.085E+14 2.893E+14
 PM148M 0.000E+00 1.969E+15 1.969E+15 1.969E+15 1.968E+15 1.961E+15 1.936E+15 1.841E+15 1.751E+15 1.557E+15 1.384E+15 1.190E+15

PRINCIPAL PHOTON SOURCES IN GROUP 10, PHOTONS/SEC
 MEAN ENERGY= 0.850MEV

BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
BR 88	0.000E+00	6.745E+15	5.350E+14	4.171E+13	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SR 91	0.000E+00	5.262E+15	5.260E+15	5.256E+15	4.900E+15	3.402E+15	9.149E+14	4.785E+12	2.503E+10	1.188E+05	5.643E-01
Y 92	0.000E+00	4.355E+15	4.355E+15	4.354E+15	4.257E+15	2.665E+15	1.377E+14	1.260E+08	9.481E+01	4.855E-13	0.000E+00
RB 94	0.000E+00	7.557E+15	1.470E+09	2.836E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Y 94	0.000E+00	2.417E+16	2.391E+16	2.340E+16	2.915E+15	5.450E+10	5.186E-07	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ZR 95	0.000E+00	2.850E+16	2.850E+16	2.850E+16	2.849E+16	2.843E+16	2.820E+16	2.729E+16	2.642E+16	2.449E+16	2.270E+16
NB 95	0.000E+00	2.977E+16	2.977E+16	2.977E+16	2.977E+16	2.977E+16	2.976E+16	2.970E+16	2.960E+16	2.918E+16	2.857E+16
NB 97M	0.000E+00	2.805E+16	2.801E+16	2.798E+16	2.688E+16	2.190E+16	1.047E+16	5.461E+14	2.850E+13	2.911E+10	2.965E+07
MO 99	0.000E+00	6.101E+15	6.101E+15	6.100E+15	6.038E+15	5.729E+15	4.743E+15	2.226E+15	1.045E+15	1.790E+14	3.067E+13
MO101	0.000E+00	6.109E+15	5.893E+15	5.620E+15	3.593E+14	2.390E+08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TC104	0.000E+00	9.521E+15	9.435E+15	9.258E+15	1.056E+15	1.153E+10	1.579E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RU105	0.000E+00	1.425E+16	1.425E+16	1.424E+16	1.259E+16	5.768E+15	3.470E+14	4.545E+09	5.953E+04	2.407E-07	9.736E-19
SB128M	0.000E+00	7.890E+15	7.842E+15	7.792E+15	4.299E+15	1.271E+14	3.925E+08	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SB129	0.000E+00	6.389E+15	6.383E+15	6.375E+15	5.517E+15	2.473E+15	1.376E+14	1.321E+09	1.268E+04	2.483E-08	4.861E-20
SB130	0.000E+00	6.017E+15	5.913E+15	5.812E+15	2.127E+15	1.175E+13	8.758E+04	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SB130M	0.000E+00	2.176E+16	2.105E+16	2.015E+16	6.139E+13	2.855E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SB131	0.000E+00	1.589E+16	1.554E+16	1.515E+16	2.651E+15	3.140E+11	2.299E-03	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TE131M	0.000E+00	3.053E+15	3.052E+15	3.051E+15	2.995E+15	2.670E+15	1.762E+15	3.338E+14	6.324E+13	1.304E+12	2.688E+10
SB132	0.000E+00	1.556E+16	1.284E+16	1.027E+16	6.088E+09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SB132M	0.000E+00	8.415E+15	7.135E+15	6.049E+15	4.213E+11	1.326E-10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
I132	0.000E+00	3.420E+16	3.420E+16	3.419E+16	3.399E+16	3.273E+16	2.795E+16	1.477E+16	7.799E+15	1.759E+15	3.968E+14
TE133M	0.000E+00	2.464E+16	2.434E+16	2.404E+16	1.164E+16	2.728E+14	3.693E+08	0.000E+00	0.000E+00	0.000E+00	0.000E+00
I133	0.000E+00	3.422E+15	3.422E+15	3.422E+15	3.357E+15	2.864E+15	1.572E+15	1.427E+14	1.296E+13	4.801E+10	1.779E+08
TE134	0.000E+00	1.561E+16	1.536E+16	1.511E+16	5.775E+15	3.991E+13	6.657E+05	0.000E+00	0.000E+00	0.000E+00	0.000E+00
I134	0.000E+00	8.758E+16	8.735E+16	8.708E+16	6.006E+16	2.237E+15	1.867E+09	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CS134	0.000E+00	1.089E+16	1.089E+16	1.089E+16	1.089E+16	1.089E+16	1.089E+16	1.085E+16	1.082E+16	1.075E+16	1.068E+16
I135	0.000E+00	4.141E+15	4.136E+15	4.129E+15	3.731E+15	2.209E+15	3.346E+14	1.762E+11	9.281E+07	2.107E+00	4.658E-08
CS136	0.000E+00	3.097E+15	3.097E+15	3.097E+15	3.090E+15	3.056E+15	2.937E+15	2.506E+15	2.139E+15	1.477E+15	1.020E+15
LA140	0.000E+00	1.578E+16	1.578E+16	1.578E+16	1.576E+16	1.568E+16	1.535E+16	1.354E+16	1.165E+16	8.019E+15	5.490E+15
BA142	0.000E+00	9.393E+15	8.815E+15	8.262E+15	1.929E+14	7.300E+04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
LA142	0.000E+00	4.321E+15	4.319E+15	4.315E+15	3.099E+15	3.000E+14	1.027E+11	9.612E-04	9.000E-18	0.000E+00	0.000E+00
CE145	0.000E+00	1.341E+16	1.211E+16	9.977E+15	1.534E+10	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
EU156	0.000E+00	2.231E+15	2.230E+15	2.230E+15	2.227E+15	2.207E+15	2.134E+15	1.862E+15	1.623E+15	1.179E+15	8.568E+14

NUCLIDE

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

PRINCIPAL PHOTON SOURCES IN GROUP 11, PHOTONS/SEC
MEAN ENERGY= 1.250MEV

NUCLIDE	BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
KR 89	0.000E+00	3.387E+15	2.743E+15	2.204E+15	6.845E+09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB 89	0.000E+00	1.376E+16	1.365E+16	1.345E+16	1.108E+15	1.269E+09	5.180E-13	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
KR 90	0.000E+00	5.481E+15	1.528E+15	4.220E+14	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SR 91	0.000E+00	6.091E+15	6.089E+15	6.084E+15	5.672E+15	3.938E+15	1.059E+15	5.539E+12	2.898E+10	1.376E+05	6.532E-01	9.346E-08
Y 91	0.000E+00	6.225E+13	6.225E+13	6.225E+13	6.225E+13	6.222E+13	6.187E+13	5.978E+13	5.770E+13	5.310E+13	4.888E+13	4.393E+13
SR 92	0.000E+00	2.324E+16	2.315E+16	2.305E+16	1.800E+16	5.011E+15	5.017E+15	5.042E+05	5.067E-03	1.104E-21	0.000E+00	0.000E+00
Y 92	0.000E+00	1.504E+15	1.503E+15	1.503E+15	1.470E+15	9.200E+14	4.754E+13	4.350E+07	3.273E+01	1.676E-13	0.000E+00	0.000E+00
Y 94	0.000E+00	4.301E+15	4.254E+15	4.164E+15	5.186E+14	9.697E+09	9.227E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ZR 97	0.000E+00	2.115E+15	2.113E+15	2.112E+15	2.030E+15	1.653E+15	7.903E+14	4.124E+13	2.152E+12	2.198E+09	2.239E+06	3.181E+02
MO101	0.000E+00	1.356E+16	1.308E+16	1.247E+16	7.975E+14	5.305E+08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TC102	0.000E+00	4.196E+15	4.026E+15	3.794E+15	1.015E+14	7.420E+05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TC104	0.000E+00	6.655E+15	6.595E+15	6.471E+15	7.384E+14	8.058E+09	1.104E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RH106	0.000E+00	5.497E+14	5.277E+14	5.222E+14	5.204E+14	5.202E+14	5.195E+14	5.165E+14	5.136E+14	5.069E+14	5.003E+14	4.919E+14
AG110M	0.000E+00	9.159E+13	9.159E+13	9.159E+13	9.158E+13	9.153E+13	9.134E+13	9.058E+13	8.983E+13	8.810E+13	8.641E+13	8.428E+13
SB130M	0.000E+00	5.166E+15	4.998E+15	4.784E+15	1.457E+13	6.778E-02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SB131	0.000E+00	4.737E+15	4.634E+15	4.517E+15	7.904E+14	9.362E+10	6.856E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TE131M	0.000E+00	8.825E+14	8.823E+14	8.821E+14	8.659E+14	7.720E+14	5.094E+14	9.650E+13	1.828E+13	3.770E+11	7.772E+09	5.287E+07
I132	0.000E+00	7.342E+15	7.341E+15	7.340E+15	7.297E+15	7.025E+15	6.001E+15	3.170E+15	1.674E+15	3.776E+14	8.518E+13	1.255E+13
TE133	0.000E+00	5.800E+15	5.630E+15	5.438E+15	4.703E+14	6.161E+12	8.341E+06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
I133	0.000E+00	2.000E+15	2.000E+15	2.000E+15	1.962E+15	1.674E+15	9.190E+14	8.343E+13	7.573E+12	2.806E+10	1.040E+08	7.776E+04
I134	0.000E+00	1.486E+16	1.482E+16	1.478E+16	1.019E+16	3.795E+14	3.168E+08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CS134	0.000E+00	7.199E+14	7.199E+14	7.199E+14	7.199E+14	7.198E+14	7.193E+14	7.173E+14	7.153E+14	7.107E+14	7.062E+14	7.003E+14
I135	0.000E+00	2.971E+16	2.967E+16	2.962E+16	2.677E+16	1.585E+16	2.401E+15	1.264E+12	6.659E+08	1.492E+01	3.342E-07	4.883E-17
I136	0.000E+00	1.908E+16	1.301E+16	8.079E+15	1.945E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
I136M	0.000E+00	1.171E+16	4.740E+15	1.919E+15	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CS136	0.000E+00	2.787E+15	2.787E+15	2.787E+15	2.781E+15	2.751E+15	2.644E+15	2.256E+15	1.925E+15	1.329E+15	9.177E+14	5.700E+14
CS138	0.000E+00	4.425E+16	4.416E+16	4.403E+16	1.910E+16	3.250E+13	2.601E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CS139	0.000E+00	4.043E+15	3.885E+15	3.654E+15	5.111E+13	1.262E+04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA141	0.000E+00	4.707E+15	4.593E+15	4.433E+15	4.911E+14	5.588E+09	8.894E-09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BA142	0.000E+00	1.483E+16	1.392E+16	1.304E+16	3.045E+14	1.105E+06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
LA142	0.000E+00	5.837E+15	5.834E+15	5.829E+15	4.186E+15	4.458E+14	1.387E+11	1.298E-03	1.216E-17	0.000E+00	0.000E+00	0.000E+00
PR144	0.000E+00	2.365E+14	2.365E+14	2.365E+14	2.354E+14	2.351E+14	2.347E+14	2.330E+14	2.313E+14	2.274E+14	2.235E+14	2.187E+14
PR148	0.000E+00	3.240E+15	2.875E+15	2.308E+15	6.407E+07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
PM148	0.000E+00	1.585E+15	1.585E+15	1.585E+15	1.576E+15	1.535E+15	1.394E+15	9.504E+14	6.488E+14	2.688E+14	1.141E+14	4.100E+13
PM148M	0.000E+00	1.521E+14	1.521E+14	1.521E+14	1.520E+14	1.515E+14	1.496E+14	1.442E+14	1.353E+14	1.203E+14	1.069E+14	9.194E+13
EU154	0.000E+00	4.106E+14	4.106E+14	4.106E+14	4.106E+14	4.106E+14	4.105E+14	4.103E+14	4.100E+14	4.094E+14	4.087E+14	4.079E+14
EU156	0.000E+00	4.141E+15	4.141E+15	4.141E+15	4.1134E+15	4.097E+15	3.962E+15	3.456E+15	3.014E+15	2.190E+15	1.591E+15	1.055E+15

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15

PRINCIPAL PHOTON SOURCES IN GROUP 12, PHOTONS/SEC
 MEAN ENERGY= 1.750MEV

NUCLIDE	BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
KR 88	0.000E+00	1.504E+15	1.499E+15	1.493E+15	1.179E+15	3.478E+14	4.292E+12	9.951E+04	2.308E-03	3.538E-21	0.000E+00	0.000E+00
RB 88	0.000E+00	2.841E+15	2.839E+15	2.836E+15	2.405E+15	7.170E+14	8.848E+12	2.052E+05	4.757E-03	7.294E-21	0.000E+00	0.000E+00
KR 89	0.000E+00	2.800E+15	2.267E+15	1.822E+15	5.658E+09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
KR 90	0.000E+00	2.606E+15	7.267E+14	2.007E+14	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Y 94	0.000E+00	1.967E+15	1.946E+15	1.904E+15	2.372E+14	4.435E+09	4.220E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ZR 97	0.000E+00	5.934E+14	5.930E+14	5.926E+14	5.696E+14	4.639E+14	2.217E+14	1.157E+13	6.038E+11	6.169E+08	6.282E+05	8.925E+01
MO101	0.000E+00	4.880E+15	4.707E+15	4.489E+15	2.870E+14	1.909E+08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TC104	0.000E+00	9.257E+15	9.174E+15	9.002E+15	1.027E+15	1.121E+10	1.538E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RH106	0.000E+00	1.024E+14	9.833E+13	9.731E+13	9.696E+13	9.693E+13	9.679E+13	9.624E+13	9.570E+13	9.445E+13	9.321E+13	9.165E+13
SB129	0.000E+00	1.175E+15	1.174E+15	1.173E+15	1.015E+15	4.550E+14	2.533E+13	2.431E+08	2.333E+03	4.568E-09	8.943E-21	0.000E+00
SB131	0.000E+00	3.134E+15	3.066E+15	2.988E+15	5.229E+14	6.194E+10	4.536E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SB132	0.000E+00	1.286E+15	1.062E+15	8.492E+14	5.033E+08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
I132	0.000E+00	6.808E+14	6.808E+14	6.807E+14	6.767E+14	6.515E+14	2.939E+14	1.553E+14	3.502E+13	7.899E+12	1.164E+12	
TE133	0.000E+00	1.558E+15	1.512E+15	1.460E+15	1.263E+14	1.655E+12	2.240E+06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TE133M	0.000E+00	1.609E+15	1.589E+15	1.569E+15	7.599E+14	1.781E+13	2.411E+07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
I134	0.000E+00	6.708E+15	6.690E+15	6.670E+15	4.600E+15	1.713E+14	1.430E+08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
I135	0.000E+00	6.990E+15	9.676E+15	9.660E+15	8.729E+15	5.168E+15	7.828E+14	4.123E+11	2.172E+08	4.865E+00	1.090E-07	1.592E-17
XE138	0.000E+00	6.743E+15	6.434E+15	6.127E+15	3.590E+14	1.520E+08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
XE139	0.000E+00	2.056E+15	7.239E+14	2.526E+14	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CS139	0.000E+00	1.188E+15	1.141E+15	1.074E+15	1.502E+13	3.709E+03	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
LA140	0.000E+00	3.308E+16	3.308E+16	3.308E+16	3.304E+16	3.287E+16	3.214E+16	2.837E+16	2.442E+16	1.681E+16	1.151E+16	7.065E+15
BA141	0.000E+00	1.601E+15	1.601E+15	1.545E+15	1.712E+14	1.948E+09	3.100E-09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
LA142	0.000E+00	7.094E+15	7.091E+15	7.085E+15	5.088E+15	5.419E+14	1.686E+11	1.578E-03	1.478E-17	0.000E+00	0.000E+00	0.000E+00
EUI56	0.000E+00	9.281E+14	9.281E+14	9.280E+14	9.264E+14	9.181E+14	8.880E+14	7.746E+14	6.755E+14	4.907E+14	3.565E+14	2.364E+14

PRINCIPAL PHOTON SOURCES IN GROUP 13, PHOTONS/SEC
 MEAN ENERGY= 2.250MEV

NUCLIDE	BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
KR 88	0.000E+00	7.136E+15	7.113E+15	7.085E+15	5.595E+15	1.651E+15	2.037E+13	4.723E+05	1.095E-02	1.679E-20	0.000E+00	0.000E+00
KR 89	0.000E+00	8.044E+14	6.514E+14	5.234E+14	1.626E+09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB 89	0.000E+00	2.346E+15	2.328E+15	2.293E+15	1.889E+14	2.163E+08	8.831E-14	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
Y 93	0.000E+00	9.510E+13	9.509E+13	9.507E+13	8.987E+13	6.377E+13	1.854E+13	1.325E+11	9.468E+08	9.312E+03	9.158E-02	3.341E-08
Y 94	0.000E+00	7.140E+14	7.062E+14	6.913E+14	8.609E+13	1.610E+09	1.532E-08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
MO101	0.000E+00	3.293E+15	3.176E+15	3.029E+15	1.937E+14	1.288E+08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TC104	0.000E+00	2.458E+15	2.436E+15	2.390E+15	2.727E+14	2.976E+09	4.077E-09	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RH106	0.000E+00	3.156E+13	3.030E+13	2.999E+13	2.988E+13	2.987E+13	2.983E+13	2.966E+13	2.949E+13	2.911E+13	2.873E+13	2.824E+13
SB131	0.000E+00	1.509E+15	1.477E+15	1.439E+15	2.518E+14	2.983E+10	2.184E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TE131M	0.000E+00	8.265E+13	8.263E+13	8.261E+13	8.109E+13	7.231E+13	4.770E+13	9.038E+12	1.712E+12	3.531E+10	7.279E+08	4.951E+06
I132	0.000E+00	5.428E+14	5.427E+14	5.427E+14	5.395E+14	5.194E+14	4.436E+14	2.343E+14	1.238E+14	2.792E+13	6.297E+12	9.281E+11
TE133M	0.000E+00	9.609E+14	9.491E+14	9.374E+14	4.539E+14	1.064E+13	1.440E+07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
I134	0.000E+00	4.984E+14	4.971E+14	4.956E+14	3.418E+14	1.273E+13	1.063E+07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

I135	0.000E+00	1.049E+15	1.048E+15	1.046E+15	9.453E+14	5.596E+14	8.478E+13	4.465E+10	2.352E+07	5.269E-01	1.180E-08	1.725E-18
I136	0.000E+00	3.590E+15	2.447E+15	1.520E+15	3.659E+02	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
XE138	0.000E+00	6.979E+15	6.659E+15	6.341E+15	3.715E+14	1.573E+08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

ORIGEN2 V2.1 (8-1-91), Run on 10/19/04 at 15:12:15
 I136 0.000E+00 3.873E+14 2.640E+14 1.640E+14 3.948E+01 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
 CS138 0.000E+00 1.967E+14 1.963E+14 1.957E+14 8.487E+13 1.444E+11 1.156E+01 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
 XE139 0.000E+00 1.657E+14 5.833E+13 2.035E+13 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
 CS139 0.000E+00 2.383E+14 2.290E+14 2.194E+14 3.013E+12 7.441E+02 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00
 LA140 0.000E+00 1.036E+13 1.036E+13 1.035E+13 1.029E+13 1.006E+13 8.883E+12 7.645E+12 5.262E+12 3.603E+12 2.212E+12
 LA142 0.000E+00 2.493E+15 2.492E+15 2.489E+15 1.788E+15 1.904E+14 5.922E+10 5.545E-04 5.192E-18 0.000E+00 0.000E+00 0.000E+00

PRINCIPAL PHOTON SOURCES IN GROUP 16, PHOTONS/SEC
 MEAN ENERGY= 5.000MEV

NUCLIDE	BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
BR 84	0.000E+00	8.636E+12	8.612E+12	8.558E+12	2.596E+12	3.767E+09	2.251E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR 88	0.000E+00	1.051E+15	8.334E+13	6.497E+12	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB 88	0.000E+00	1.847E+13	1.845E+13	1.843E+13	1.563E+13	4.660E+12	5.751E+10	1.334E+03	3.092E-05	4.741E-23	0.000E+00	0.000E+00
KR 89	0.000E+00	9.683E+13	7.841E+13	6.301E+13	1.957E+08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB 89	0.000E+00	9.218E+12	9.147E+12	9.012E+12	7.426E+11	8.499E+05	3.470E-16	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB 90	0.000E+00	2.934E+15	2.562E+15	2.047E+15	5.599E+09	5.284E-12	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB 90M	0.000E+00	1.362E+14	1.211E+14	1.044E+14	9.147E+09	9.104E-12	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB 92	0.000E+00	5.397E+14	6.156E+10	5.722E+06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CS138	0.000E+00	5.409E+12	5.398E+12	5.381E+12	2.334E+12	3.972E+09	3.179E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CE142	0.000E+00	8.369E-05	8.369E-05	8.369E-05	8.369E-05	8.370E-05	8.370E-05	8.370E-05	8.370E-05	8.370E-05	8.370E-05	8.370E-05
SM147	0.000E+00	4.996E-06	4.996E-06	4.996E-06	4.996E-06	4.997E-06	4.999E-06	5.009E-06	5.020E-06	5.043E-06	5.067E-06	5.098E-06

PRINCIPAL PHOTON SOURCES IN GROUP 17, PHOTONS/SEC
 MEAN ENERGY= 7.000MEV

NUCLIDE	BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
AS 82	0.000E+00	1.626E+09	2.602E+08	3.592E+07	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
BR 88	0.000E+00	5.449E+10	4.323E+09	3.370E+08	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB 92	0.000E+00	4.254E+13	4.853E+09	4.511E+05	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RB 94	0.000E+00	2.766E+12	5.380E+05	1.038E-01	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
I136	0.000E+00	7.841E+07	5.344E+07	3.320E+07	7.992E-06	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CE142	0.000E+00	5.430E-06	5.430E-06	5.430E-06	5.431E-06	5.431E-06	5.431E-06	5.431E-06	5.431E-06	5.431E-06	5.431E-06	5.431E-06
SM147	0.000E+00	3.242E-07	3.242E-07	3.242E-07	3.242E-07	3.242E-07	3.244E-07	3.250E-07	3.257E-07	3.272E-07	3.288E-07	3.308E-07

PRINCIPAL PHOTON SOURCES IN GROUP 18, PHOTONS/SEC
 MEAN ENERGY= 9.500MEV

NUCLIDE	BOC #1	DISCHARGE	FUEL 1m	FUEL 2m	FUEL 1h	FUEL 6h	FUEL 1D	FUEL 4D	FUEL 7D	FUEL 14D	FUEL 21D	FUEL 30D
RB 94	0.000E+00	9.983E+09	1.942E+03	3.746E-04	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CE142	0.000E+00	3.434E-07	3.434E-07	3.434E-07	3.434E-07	3.434E-07	3.434E-07	3.434E-07	3.434E-07	3.434E-07	3.434E-07	3.434E-07
SM147	0.000E+00	2.050E-08	2.050E-08	2.050E-08	2.050E-08	2.050E-08	2.051E-08	2.055E-08	2.060E-08	2.069E-08	2.079E-08	2.092E-08

MONTICELLO NUCLEAR GENERATING PLANT		3345
TITLE:	VENDOR CALCULATION REVIEW CHECKLIST	Revision 3
		Page 1 of 1

CA - 04 - 210
Attachment C1

The purpose of the review is to ensure that the vendor calculation or analysis complies with the conditions of the purchase order and is appropriate for its intended use. The purpose of the review is not to serve as an independent verification. Independent verification of the calculation or analysis by the vendor should be evident in the document.

The reviewer should use the criteria below as a guide to assess the overall quality, completeness and usefulness of the calculation or analysis. The reviewer is not required to check the vendor's calculations in detail.

See 4 AWI-05.01.25 (CALCULATION/ANALYSIS CONTROL) for guidance. Place initials by items reviewed.

REVIEW

- | | |
|--|------------|
| 1. Form 3544 (PIPING AND SUPPORT NUMBERING) completed for calculations affecting piping or supports. | <u>N/A</u> |
| 2. Design inputs correspond to those which were transmitted to the vendor. | <u>MLL</u> |
| 3. Assumptions are described and reasonable. Basis for assumptions identified. | <u>MLL</u> |
| 4. Applicable codes, standards and regulations are identified and met. | <u>MLL</u> |
| 5. Applicable construction and operating experience is considered. | <u>N/A</u> |
| 6. Applicable structure(s), system(s), and component(s) are listed. | <u>N/A</u> |
| 7. Formulas and equations documented and unusual symbols are defined. | <u>MLL</u> |
| 8. Acceptance criteria are identified, adequate and satisfied. | <u>MLL</u> |
| 9. Results are reasonable compared to inputs. | <u>MLL</u> |
| 10. Source documents are referenced. | <u>MLL</u> |
| 11. The calculation is appropriate for its intended use. | <u>MLL</u> |
| 12. The calculation complies with the terms of the Purchase Order. | <u>MLL</u> |
| 13. Inputs, assumptions, outputs, etc. which could affect plant operation are enforced by adequate procedural controls. List any affected procedures.
<u>OTH 020543 and PCR001719 (Hudson). Assumptions are pertinent to core design process. Nuclear Analysis & Design Procedure will be updated per PCR001719</u> | <u>MLL</u> |

Completed By: Melissa Limbeck *MLL* Date: 7/1/2005

3087 (DOCUMENT CHANGE, HOLD AND COMMENT FORM) incorporated:					
FOR ADMINISTRATIVE	Resp Supv: CNSTP	Assoc Ref: 4 AWI-05.01.25	SR: N	Freq: 0 yrs	
	ARMS: 3345	Doc Type: 3042	Admin initials:	Date:	

Approved (Signatures available in Master File)

ENCLOSURE 10

MONTICELLO NUCLEAR GENERATING PLANT

**APPLICATION FOR LICENSE AMENDMENT
ALTERNATIVE SOURCE TERM**

**THE PROPRIETARY VERSION OF CALCULATIONS PERFORMED IN SUPPORT OF
THE LICENSE AMENDMENT REQUEST**

**The Attached Proprietary Information Should Be Withheld From Public Disclosure
Pursuant To 10 CFR 2.390**

This Enclosure includes the following proprietary calculations:

- 1) CA-04-036, Rev 1, "MNGP AST - Offsite Post-Accident Atmospheric Dispersion Analysis" (proprietary version)
- 2) CA-04-037, Rev 2, "MNGP AST - CR/TSC Post-Accident Atmospheric Dispersion Analysis" (proprietary version)
- 3) CA-04-038, Rev 0, "MNGP AST - LOCA Radiological Consequence Analysis" (proprietary version)
- 4) CA-04-039, Rev 0, "MNGP AST - MSLBA Radiological Consequence Analysis" (proprietary version)
- 5) CA-04-040, Rev 0, "MNGP AST - CRDA Radiological Consequence Analysis" (proprietary version)
- 6) CA-04-041, Rev 1, "MNGP AST - FHA Radiological Consequence Analysis" (proprietary version)

APPLIED ANALYSIS CORP.

AFFIDAVIT

I, Juan M. Cajigas, being duly sworn, depose and state as follows:

- 1) I am the President of Applied Analysis Corp. ("AAC") and have reviewed the information described in paragraph (2) and sought to be withheld.
- 2) The information sought to be withheld is contained in the AAC proprietary calculations listed in Attachment A.
- 3) In making this application for withholding of proprietary information, AAC relies upon the exemption from disclosure set forth in the Freedom of Information Act ("FOIA"), 5 USC Sec. 552(b)(4), and the Trade Secrets Act, 18 USC Sec. 1905, and NRC regulations 10 CFR 9.17(a)(4) and 2.390(a)(4) for "trade secrets" (Exemption 4). The material for which exemption from disclosure is here sought is all "confidential commercial information", and some portions also qualify under the narrower definition of "trade secret", within the meanings assigned to those terms for purposes of FOIA Exemption 4 in, respectively, Critical Mass Energy Project v. Nuclear Regulatory Commission, 975F2d871 (DC Cir. 1992), and Public Citizen Health Research Group v. FDA, 704F2d1280 (DC Cir. 1983).
- 4) Some examples of categories of information which fit into the definition of proprietary information are:
 - a) Information that discloses a process, method, or apparatus, including supporting data and analyses, where prevention of its use by AAC competitors without license from AAC constitutes a competitive economic advantage over other companies;
 - b) Information which, if used by a competitor, would reduce his expenditure of resources or improve his competitive position in the design, preparation, assurance of quality, or licensing of a similar service;
 - c) Information which reveals cost or price information, production capacities, budget levels, or commercial strategies of AAC, its customers, or its suppliers;
 - d) Information which reveals aspects of past, present, or future AAC customer-funded development plans and programs, of potential commercial value to AAC;
 - e) Information which discloses patentable subject matter for which it may be desirable to obtain patent protection.

The information sought to be withheld is considered to be proprietary for the reasons set forth in both paragraphs (4)a and (4)b, above.

- 5) The information sought to be withheld has, to the best of my knowledge and belief, consistently been held in confidence by AAC, no public disclosure has been made, and it is not available in public sources. All disclosures to third parties including any required transmittals to NRC, have been made, or must be made, pursuant to regulatory provisions or proprietary agreements which provide for maintenance of the information in confidence. Its initial designation as proprietary information, and the subsequent steps taken to prevent its unauthorized disclosure, are as set forth in paragraphs (6) and (7) following.

- 6) Initial approval of proprietary treatment of a document is made by the manager of the originating component, the person most likely to be acquainted with the value and sensitivity of the information in relation to industry knowledge. Access to such documents within AAC is limited on a "need to know" basis.
- 7) The procedure for approval of external release of such a document typically requires review by the staff manager, project manager, principal scientist or other equivalent authority, by the manager of the cognizant marketing function (or his delegate), and by the Legal Operation, for technical content, competitive effect, and determination of the accuracy of the proprietary designation. Disclosures outside AAC are limited to regulatory bodies, customers, and potential customers, and their agents, suppliers, and licensees, and others with a legitimate need for the information, and then only in accordance with appropriate regulatory provisions or proprietary agreements.
- 8) The information identified in paragraph (2), above, is classified as proprietary because it contains detailed methods and processes, which AAC has developed for the preparation of detailed safety analyses in support of the design and licensing of nuclear facilities.

The development of these methods and processes was achieved at a significant cost to AAC and derived from company experience that constitutes a major AAC asset.

- 9) Disclosure of the information sought to be withheld is likely to cause substantial harm to AAC's competitive position and foreclose or reduce the availability of profit-making opportunities. The information is part of AAC's nuclear safety analysis and technology base, and its commercial value includes development of the expertise to determine and apply the appropriate evaluation processes.

The precise value of the expertise to devise an evaluation process and apply the correct analytical methodology is difficult to quantify, but it clearly is substantial.

AAC's competitive advantage will be lost if its competitors are able to use the results of the AAC experience to normalize or verify their own process or if they are able to claim an equivalent understanding by demonstrating that they can arrive at the same or similar results and conclusions.

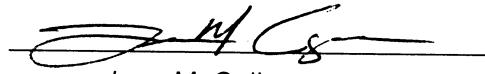
The value of this information to AAC would be lost if the information were disclosed to the public. Making such information available to competitors without their having been required to undertake a similar expenditure of resources would unfairly provide competitors with a windfall, and deprive AAC of the opportunity to exercise its competitive advantage to seek an adequate return on its investment in developing these analytical processes.

STATE OF PENNSYLVANIA)
) ss:
COUNTY OF BERKS)

Juan M. Cajigas, being duly sworn, deposes and says:

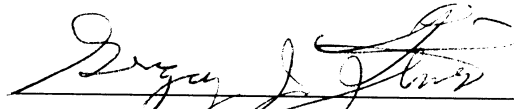
That he has read the foregoing affidavit and the matters stated therein are true and correct to the best of his knowledge, information, and belief.

Executed at Reading, Pennsylvania, this 31st day of August 2005.



Juan M. Cajigas
Applied Analysis Corp.

Subscribed and sworn before me this 31st day of August 2005.



Notary Public, State of Pennsylvania

Notarial Seal
Gregory J. Lewis, Notary Public
Cumru Twp., Berks County
My Commission Expires Apr. 30, 2006
Member, Pennsylvania Association of Notaries

Sworn Before Me This Date 8/31/05
Commonwealth of Pennsylvania
County of Berks

ATTACHMENT A

1. AAC Calculation No. MNGP-001, Rev. 2, "MNGP AST - Offsite Post-accident Atmospheric Dispersion Analysis" and attachments.
2. AAC Calculation No. MNGP-002, Rev. 4, "MNGP AST - CR/TSC Post-accident Atmospheric Dispersion Analysis" and attachments.
3. AAC Calculation No. MNGP-003, Rev. 2, "MNGP AST - LOCA Radiological Consequence Analysis" and attachments.
4. AAC Calculation No. MNGP-004, Rev. 1, "MNGP AST – MSLBA Radiological Consequence Analysis" and attachments.
5. AAC Calculation No. MNGP-005, Rev. 1, "MNGP AST – CRDA Radiological Consequence Analysis" and attachments.
6. AAC Calculation No. MNGP-006, Rev. 1, "MNGP AST - FHA Radiological Consequence Analysis" and attachments.