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U.S. DEPARTMENT OF ENERGY

OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT

OFFICE OF QUALITY ASSURANCE

AUDIT REPORT OF

SANDIA NATIONAL LABORATORIES (SNL)
CASK SYSTEMS DEVELOPMENT PROGRAM (CSDP)

ALBUQUERQUE, NEW MEXICO

AUDIT NO. HQ-94-01

NOVEMBER 8-12, 1993

Prepared by: Thomas R Swift Date: 12/22/93

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for Donald G. Horton
Director
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102.7

1.0 EXECUTIVE SUMMARY

An audit was performed of the SNL CSDP Quality Assurance Program. November 8-12. 1993. As a result of Quality Assurance (QA) Audit HQ-94-01. the audit team determined that SNL is not satisfactorily implementing an effective QA program in accordance with the QA Requirements Document (RW-214. Revision 3) and the SNL CSDP Quality Assurance Manual. Revision E. QA Program Elements 4 and 7 were found to be satisfactorily implemented. QA Program Elements 1. 5. 6. 16. and 18 were judged to be marginal. Implementation of QA Program Elements 2. *QA Program.* and 17, *QA Records.* was determined to be unsatisfactory. No determination was made of the implementation status for QA Program Elements 8 through 15 since they were not applicable and QA Program Element 19 due to a lack of activity.

Using a Performance Based Audit approach. the audit team determined that. at the present time, SNL CSDP is effectively implementing controls for the Burnup Credit and Source Term activities.

The audit team identified sixteen deficiencies during the course of the audit that resulted in the issuance of three Corrective Action Requests (CARs). CAR HQ-94-001 is concerned with an out of date organization chart and the lack of satisfactory implementation of the QA Program Management Information Reporting process. CAR HQ-94-002 identifies deficiencies relative to the flowdown of requirements from the OCRWM Quality Assurance Requirements Document. DOE/RW-214. and the failure to adequately implement the SNL QA Program. Five deficiencies were identified and corrected prior to the postaudit meeting. Deficiencies corrected during the audit are described in Section 5.5.2 of this report. Additionally. there were eight recommendations resulting from the audit for SNL management consideration. Recommendations are discussed in Section 6.0 of this report.

In summary, the SNL QA Program was determined to be ineffective. however. at the present time SNL is effectively implementing controls for the Burnup Credit and Source Term Activities. It should be noted that the technical activities are in process. Prompt corrective action will resolve the QA concerns.

The audit team found that the SNL staff was very cooperative and demonstrated good technical practices in performing their tasks.

2.0 SCOPE

The audit was conducted to evaluate the adequacy. compliance. and the effectiveness of the SNL QA Program as described in the SNL CSDP Quality Assurance Manual dated September 1991 consisting of the SNL Quality Assurance Program Plan (QAPP), Revision E. and the applicable implementing Program Directives (PDs).

The audit scope included the Performance Based review of activities related to the Burnup Credit, Source Term, and a brief review of Seal Testing and Weeping for the SNL Cask Systems Development Program under contract number DE-AC04-76DD00789.

There were no previous OCRWM audits or surveillances performed of the SNL CSDP QA Program, therefore no follow-up actions were required.

2.1 QA Program Elements

The QA Program Elements evaluated during the audit are in accordance with the published audit plan and are as follows:

1.0 - Organization
2.0 - Quality Assurance Program
4.0 - Procurement Document Control
5.0 - Instructions, Procedures, Plans, and Drawings
6.0 - Document Control
7.0 - Control of Purchased Items and Services
16.0 - Corrective Action
17.0 - Quality Assurance Records
18.0 - Audits

The requirements were drawn from the SNL CSDP *Quality Assurance* Manual, the Quality Assurance Program Plan (QAPP), the applicable SNL implementing QA procedures (Program Directives), the applicable Technical Program Plans, and the SNL Performance-Based Audit (PBA) Flowcharts. The PBA Flowcharts contained the critical elements, objectives, and measurement criteria which were used in developing the audit checklist and are included in Attachment 3 of this report.

2.2 The following QA Program Elements were not evaluated during the audit because they are not applicable to the current SNL CSDP quality affecting activities:

8.0 - Identification and Control of Materials, Parts, Components
9.0 - Control of Processes
10.0 - Inspection
11.0 - Test Control
12.0 - Control of Measuring and Test Equipment
13.0 - Handling, Storage, and Shipping
14.0 - Inspection, Test, and Operating Status
15.0 - Control of Nonconforming Items

19.0 - Computer Software requirements were not fully implemented due to the current program status. Implementation of these requirements will be evaluated during future verification activities.

2.3 Technical Areas

Technical adequacy was reviewed using the expertise of a Technical Specialist from the M&O contractor in the areas of Burnup Credit, Source Term, and computer modelling.

3.0 AUDIT TEAM AND OBSERVERS

The following is a list of audit team members (with their assigned area of responsibility) and observers:

Title	Name	Organization	QA Program Element/Requirement
Audit Team Mgr.	Robert Clark	HQAD	N/A
Audit Team Leader	Tom Swift	QATSS/HQAD	All
Auditor	Richard Peck	QATSS/HQAD	4,7,9,10.11,12,13,14,19
Auditor	Walt Coutier	QATSS/HQAD	4.7,9,10.11,12,13,14,19
Auditor	Ken McFall	QATSS/YMQAD	1.2.5,6,8,15,16,17,18
Technical Specialist	James Thornton	M&O	Performance Based
Technical Specialist	Hubert Dameron	M&O	1.2.5.6.8.15.16.17.18
Observer	Dennis Reid	NRC	N/A
Observer	Susan Zimmerman	State of NV	N/A

4.0 AUDIT MEETINGS AND PERSONNEL CONTACTED

The preaudit meeting was held at SNL offices in Albuquerque, NM on November 8, 1993. The audit team met daily to discuss audit activities. Daily debriefings were held with SNL management and their staff. The postaudit meeting was held at SNL offices on November 12, 1993.

Personnel contacted during the audit are listed in Attachment 1. The list also indicates personnel who attended the preaudit and postaudit meetings.

5.0 SUMMARY OF AUDIT RESULTS

5.1 Program Effectiveness

The audit team concluded that in general the implementation of the present QA Program is ineffective. However, the Performance Based Audit of Burnup Credit and Source Term activities indicates that the SNL task leaders are implementing an effective peer review process including proper comment resolution activities.

Two QA Program Elements were determined to be implemented in a satisfactory manner: 4 - *Procurement Document Control*, and 7 - *Control of Purchased Items and Services*.

Implementation of five QA Program Elements was determined to be marginal: 1 - *Organization*, 5 - *Instructions, Procedures, and Drawings*, 6 - *Document Control*, 16 - *Corrective Action* and 18 - *Audits*.

Two QA Program Elements were determined to be unsatisfactory: 2 - *QA Program*, and 17 - *QA Records*.

Eight QA Program Elements were not required for SNL activities and therefore were not implemented (8-15). QA Program Element 19 - *Computer Software*, was not evaluated because there was only partial implementation.

5.2 Stop Work or Immediate Corrective Actions Taken

No Stop Work Orders nor any immediate corrective actions were necessary during the audit.

5.3 QA Program Audit Activities

Details of the QA Program audit activities are provided in Attachment 2. A list of objective evidence reviewed during the audit is provided in Attachment 3.

5.4 Technical Audit Activities

5.4.1 Source Term

The audit team reviewed SNL activities in the area of Source Term analysis and code development. Source Term Analyses for Containment Evaluations (STACE) computer code documentation was reviewed. SNL is currently performing a review of STACE QA reports and have

identified report items requiring updating to reflect the current configuration of STACE.

STACE programming was reviewed by witnessing actual code execution. STACE code libraries and analysis capabilities provide useful information for transportation cask licensing and related LWR fuel storage, transport, and disposal design work under DOE contracts. STACE is currently functional on a demonstration basis and software verification and validation is scheduled to be performed later in FY-1994.

5.4.2 Burnup Credit

The audit team conducted a Performance Based review of SNL activities in the area of Burnup Credit methods development. Burnup Credit program documentation was reviewed. Since much of the SNL scope is limited to program management and coordination activities, audit review activities were limited to program direction and methodology issues.

The review of SNL Burnup Credit program management activities has resulted in a generally favorable conclusion of program status and its potential for a successful licensing effort in the future.

5.4.3 Cask Weeping and Seal Testing

Cask Weeping and Cask Seal Testing were briefly reviewed for compliance to SNL Program Plans. These activities are classified as Quality Level 3 by SNL and non-QA by OCRWM.

5.5 Summary of Deficiencies

The audit team identified sixteen deficiencies during the audit, resulting in the issuance of three CARs.

A synopsis of deficiencies documented as CARs are detailed below. Information Copies of CARs are included in Attachment 4.

5.5.1 Corrective Action Requests (CARs)

As a result of the audit, the following CARs were issued:

CAR HQ-94-001

The actual SNL organization does not agree with current program documents and there is no evidence that the QA Program reporting and tracking system has been implemented.

CAR HQ-94-002

The CSDP QA Manual has not been kept current with SNL practices and does not comply with the applicable requirements of QARD 214, Rev. 3. Detailed position descriptions have not been developed and verification of relevant education and experience has not been performed. Some procedures used for the review and approval of quality affecting documents are not under the QA Program and are deficient in meeting the requirements of the QARD. Implementing procedures do not address: non-significant conditions adverse to quality; verification criteria for receipt inspection records; and adequate record storage requirements.

CAR HQ-94-003

There have been insufficient internal QA surveillances performed, no FY-1993 internal audits were performed to assess quality activities; and a sub-contracted service has not been audited in accordance with QA Program commitments.

5.5.2 Deficiencies Corrected During the Audit

Deficiencies which are isolated in nature and only require remedial action can be corrected during the audit. The following deficiencies were identified and corrected:

1. PD 3.3 (Document Control), Para. 6.1 requires a history file of CSDP controlled documents, which includes Program Directives.

   The following missing PDs were added to the QA records file during the audit.

PD 2.1, Rev. B	PD 2.4, Rev. B
PD 2.7, Revs. D&E	PD 2.8, Rev. D
PD 2.10, Rev. C	PD 3.2, Rev. D
PD 3.4, Rev. C	PD 3.5, Rev. B
PD 4.1, Rev. D	PD 5.8, Rev. D

2. PD 2.3 (Task Definition Statements). Para. 6.1 requires that the Task Definition Statements (TDS) be maintained as QA records.

   The following missing TDSs were added to the QA records file:

TDS #93-33	TDS =94-02
TDS #94-03	TDS =94-05

3. PD 5.10 (Trend Analysis). Paragraph 3.1.2.C requires an annual trend analysis be performed in addition to the 60 and 180 day trend analysis.

   The 1991 and 1992 Trend Analyses were documented during the audit. Since the 60 and 180 day Trend Analysis were performed the audit team did not require any other corrective actions.

4. PD 3.5 (Operation of the TSDD Records Management Center) prohibits food and drink within the RMC.

   The practice of permitting food and drink in the RMC was stopped during the audit and the requirement enforced by the Records Administrator.

5. PD 5.3 (Quality Audit). Paragraph 6.1 requires that audit response and closure documentation be maintained as records.

   The Oak Ridge National Laboratory reply and acceptance of an audit observation was added to the QA record file.

5.5.3 Follow-Up of Previously Identified CARs

There were no previous CARs initiated for CSDP activities.

6.0 RECOMMENDATIONS

The following recommendations are offered by the audit team. They do not reflect deficiencies and are intended to provide SNL management with possible opportunities for improving QA Program implementation.

6.1 The QA Coordinator duties should be reviewed to ensure that QA activities are adequately addressed. Functions such as the approval of technical documents and the performance of record administration activities should be reassigned to appropriate personnel.

6.2 PD 3.3 (Document Control) should be reviewed and the following provisions should be addressed:

1. Failure to return receipt acknowledgement forms
2. Incorporating the SNL Engineering Drawing System (SLEDS) Manual
3. Providing additional control for processing obsolete or superseded documents
4. Clarifying that the history file is being maintained as a QA record (Paragraph 3.3.6).

6.3 PD 3.4 and 3.5 relating to records should be revised to include:

1. Posting of signs in the RMC stating "No Food or Drink Allowed"
2. Guidance for time retention of RMC records before archiving
3. Provisions for submitting records to the cognizant OCRWM organization
4. Posting of access list near the RMC entrance
5. Organizing the training records by individual name and identifying the training completed.

6.4 PDs 5.2, 5.3, and 5.9 relating to corrective action should be evaluated to determine if it would be more effective to eliminate audit and surveillance findings and have one corrective action report (CAR). Also, additional guidance should be provided for:

1. Determining the extent of a deficiency
2. Performing root cause determination
3. Processing rejected Corrective Action responses and implementation
4. Voiding CARs
5. Addressing delinquent responses and implementation of corrective actions

6. Clarifying in the procedure that it is the responsibility of all personnel to initiate a CAR when a deficiency is identified.

6.5 The contract for duplicate storage of records has expired and should be extended or other provisions provided for the storage of records.

6.6 The Seals Program records currently being stored in the same room as the ovens should be relocated to an area which has less potential for record destruction or deterioration.

6.7 Obtain a two-hour rated cabinet for the RMC if one-of-a-kind records will be stored there.

6.8 PD 5.3 (Quality Audit). Paragraph 3.3.5 permits sending the audit checklist with the notification letter to the Audited Organization. It is strongly recommended that this practice be reviewed and deleted from the procedure.

7.0 LIST OF ATTACHMENTS

Attachment 1: Personnel Contacted During the Audit
Attachment 2: Audit Details
Attachment 3: Objective Evidence Reviewed During the Audit
Attachment 4: Information Copies of CARs

ATTACHMENT 1

Personnel Contacted During the Audit

NAME	ORGAN.	TITLE	PRE	CONTACT	POST
R. Baehr	SNL	QA Coordinator	X	X	X
P. Bennett	SNL	SMTS	X		
M. Brady	SNL	Acting Mgr.. Dept 6643	X	X	X
D. Bronowski	SNL	STA		X	
W. Chambers	SNL	MTS	X		
R. Clark	DOE/RW 3.1	Director. HQAD			
W. Coutier	QATSS/HQAD	Auditor	X		X
H. Dameron	TRW	QA Tech Specialist	X		X
W. Lake	DOE/RW-431	Mechanical Engineer	X		
W. Leisher	SNL	Sr. Member Tech. Staff	X	X	X
R. Luna	SNL	PA Manager	X	X	X
P. McConnell	SNL	Weeping Seals Task Mgr.	X	X	X
K. McFall	QATSS/YMQAD	Auditor	X		X
T. Mills	SNL	MLS	X	X	X
R. Peck	QATSS/HQAD	Auditor	X		X
P. Reardon	SNL	Consultant	X	X	
D. Reid	NRC	Observer	X		X
T. Sanders	SNL	Mgr. D&D Programs	X	X	X
K. Seager	SNL	Source Term Prog. Mgr.	X	X	X
T. Swift	QATSS/HQAD	Audit Team Leader	X		X
J. Thornton	TRW	Sr. Engr., Tech Specialist	X		X
W. Uncapher	SNL	Program Mgr., MIDAS	X	X	X
J. Woodard	SNL	Dir. of Env. & Transp.		X	X
S. Zimmerman	State of NV	Observer			

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TECHNICAL ACTIVITIES (Performance-Based Audit (PBA) Activities)

A Performance Based Audit methodology was used to evaluate the technical activities relating to the Source Term and Burnup tasks. To evaluate the effectiveness of these activities the SNL Task Leaders developed PBA Flowcharts that identified the critical elements of their tasks, listed the corresponding objectives, and provided measurement criteria to evaluate the elements. The audit team used the SNL PBA Flowcharts to prepare the technical evaluation criteria and the audit checklist.

Source Term

Documentation reviewed included QA reports supporting STACE software development. The QA reports were evaluated with the SNL QA Program and the PD 2.1 procedure. Since STACE continues to be under development, not all QA reports required under PD 2.1 have been developed. Those reports which have been developed are not consistent with the current version of STACE.

Several examples of Source Term milestone documents were reviewed. Program milestones, including reports and journal article documentation, were reviewed to evaluate records of peer reviews. SNL STACE development personnel produced objective evidence that administrative procedures providing peer review guidance are being implemented and documented. Although the peer review process practiced by SNL STACE code staff provides a record of reviewer acceptance, the formal control and documentation of the reviewer comment resolution process is necessary. This is especially needed, given the high degree of reliance placed on peer reviews to assure a quality product in high technology development efforts such as STACE code. See CAR HQ-94-002 for details regarding the identified deficiencies.

The SNL staff involved in the STACE code development provided extensive written documentation of computer code models, sensitivity parameters, and assumptions. The documents included published SNL "SAND" reports as well as reports and journal articles currently under peer review. Mechanical, thermal, and release Source Term methodology described in these documents were reviewed. The SNL staff responded to numerous confirmatory questions regarding STACE configuration, models, and capabilities. It was observed that a large degree of STACE methodology documentation was provided in early SAND reports that focus on generic Source Term methodology. The specific documentation of the STACE methodology is limited to brief descriptions provided in the STACE software design description report. An extensive fuel characteristics data base (Notz database) has been generated. This database includes revision and enhancement capabilities, that allow specific fuel assembly design parameters to be evaluated, including clad irradiation effects or fuel

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assembly type differences. Fuel crud and cask residual contamination contributions are well established and considered in the STACE methodology.

Implementation by SNL of the Source Term activities was determined to be effective.

Burnup Credit

Examples of Burnup Credit milestone documents were reviewed. In reference to previous work developed prior to the QA Program. Sandia report SAND87-0151. *Feasibility and Incentives for Consideration of Spent Fuel Operating Histories in the Criticality Analysis of Spent Fuel Shipping Casks*, the SNL Task Leader provided written justification that there is no apparent need to qualify this report under the QA Program. Journal article documentation was reviewed for records of peer reviews. SNL Burnup Credit Program management personnel produced objective evidence that administrative procedures providing peer guidance are being implemented. Although the peer review process practiced by the SNL Burnup Credit Program management staff provides a record of reviewer acceptance, the formal control and documentation of the reviewer comment resolution process is necessary given the degree of high reliance on peer reviews to assure a quality product. See CAR HQ-94-002 for details regarding the identified deficiencies.

The Burnup Credit Program management staff responded to numerous questions regarding proposed Burnup Credit licensing methodology:

a. Potential weaknesses in Pacific Northwest Labs (PNL) isotopic measurement activities were investigated, including a limited number of samples: the consideration of assembly heterogeneities in selection of sample locations within the fuel assembly array; the capability of ORIGEN-S to reproduce sample data; the criteria for selecting irradiated fuel isotopes to be measured; and the plans for dealing with the large uncertainties resulting from the preliminary ORIGEN-S versus measurement result comparisons. The need for additional samples (replications) depends on the desired confidential level for the isotopic assay samples. It was agreed that sensitivity studies and a review of available data may be sufficient to further strengthen the Program licensing position in these areas, and that the need for additional measured sample data points is not clearly established at this time.

b. Efforts to provide benchmark data to separate fission yield versus neutron cross-section uncertainties in isotopic calculations were reviewed. These are options that might be exercised if needed to reduce uncertainties. They include international cooperative efforts and domestic activities. The international efforts will provide useful data to validate reactivity calculation cross-sections. The proposed Spent Fuel Safety Experiment (SFSX), to be performed at SNL, would provide addtional data on spend fuel reactivity.

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c. The use of calculated axial profiles to develop an axial profile data base and provide the eventual basis for a generic profile method was discussed and it was agreed that comparison to available measured profile data would strengthen the licensing position in this area.

d. A comparison of ORIGEN-S results for PNL measured isotopics comparison were compared to V.G. Khopin Radium Institute results. It was observed that the Russian methods for separating isobar nuclides may eliminate the need for using ORIGEN-S distributions for isotopic assays, and would reduce the uncertainty levels in measuring these isotopes. A similar problem exists with Rh-103 measurement. The Japanese have suggested a method for measuring this isotope. The SNL staff has confirmed that PNL will attempt to use new separation methods in future isotope measurement work to enhance the quality of measured data.

e. The SNL staff confirmed that the neutron cross-section revision work performed related to Eu-155 is not intended to suggest "code development" work to be conducted under the Burnup Credit effort, but is intended to demonstrate an understanding of the large errors resulting from isotope measurement effort.

f. The feasibility of the proposed SFSX experiment was reviewed. A preliminary feasibility study was reviewed. It was agreed that the estimated 3% contribution of reactivity and the methodology proposed for conducting the experiment would result in valuable benchmark data.

g. International data was reviewed and the comparison to other data seems to be extensive and compare favorably with the ORNL results.

h. A potential weaknesses of the PWR core restart benchmark data was discussed and it was agreed that this data may be of limited value due to non-ideal in-core considerations. The SNL staff agreed that sensitivity studies of potential reactivity effects could be investigated and reported to add value to the Burnup Credit benchmark data and the proposed licensing methodology.

Implementation of the Burnup Credit activities was determined to be effective.

CASK WEEPING AND SEAL TESTING

The Cask Seal testing consisted of verifying the leak performance of the seals under the extreme temperature conditions experienced during cask performance testing. The testing is performed using approved test procedures and calibrated instruments controlled by the SNL

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instrument calibration program. A separate QA Program Plan (QAPP) is being used for this work because the CSDP QAPP did not exist when this activity began, and the QAPP requirements were not incorporated into the CSDP QAPP. The Cask Seal Test Instrumentation had properly identified and calibrated thermocouples and pressure gages. Non-essential thermocouples used as spares and to ensure equilibrium are not required to be calibrated. Also, pressure/flow regulators are not calibrated since calibrated pressure gauges are used. All of the records for this activity are being stored in the laboratory and will be submitted as a whole package. Although these records are for a non-quality affecting activity, they are being stored in a lab which contains a high temperature oven, in a non-fire rated cabinet. That arrangement does not afford adequate protection for the records. See Recommendation in Section 6.6 of this report for management consideration.

The SNL Transportation Development Department activities to examine the Cask Weeping phenomenon include adsorption experiments with various radionuclides, stainless steel and other candidate materials, and the examination of the effectiveness of various methods to block adsorption of these radionuclides. The SNL Chemical and X-Ray Department, the Nuclear Engineering Department at the University of Missouri-Columbia and the Callaway Nuclear Station are involved in the tests. Results from these experiments are also used as input to the MINTEQ data base which is used to predict surface contamination characteristics. As with the Seal Testing program, the Cask Weeping Program also has a separate QAPP which was developed before the CSDP QAPP existed.

Implementation of activities associated with Quality Class 3 Cask Weeping and Seal Testing was determined to be satisfactory.

1.0 ORGANIZATION

The audit team reviewed the SNL organizational interfaces and responsibilities. The organization identified in the CSDP QAPP, (Figure 2) and PD 1.4 (Appendix A) does not reflect the current organization. See CAR HQ-94-001 for details regarding this deficiency. The QA Coordinator position shown on the November 1993 Organization Chart now reports to the Director of Environmental and Transportation Programs versus the Manger of Programs Support as identified in the previous November 1992 Chart. The current organizational reporting level, and authority of the QA Coordinator are adequate.

The QA Coordinator responsibilities include: performing trend analysis, reviewing Performance Evaluation Facility Survey forms; performing QA and capability survey; reviewing and approving test plans and procedures; verifying SNL measuring and test equipment are calibrated and controlled; maintaining documented evidence of

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indoctrination and training; maintaining the SNL CSDP QA Manual; and conducting surveillances.

Recommendation 6.1 is offered for SNL management consideration regarding the duties of the QA Coordinator.

Implementation of QA Program Element 1.0 was determined to be marginal.

2.0 QUALITY ASSURANCE PROGRAM

The SNL QA Program is documented in the SNL Quality Assurance Manual and consists of the CSDP Quality Assurance Program Plan (QAPP), the QA procedures, and Program Directives (PDs). The SNL QA Program was reviewed for adequacy in meeting the Quality Assurance Requirements Document (QARD) DOE/RW-0214, Revision 3 and for implementation. The SNL QA Manual has not been kept current and does not meet QARD 214 requirements. See CARs HQ-94-001 and HQ-94-002 for details regarding the identified deficiencies.

The audit team reviewed the SNL process for the establishment of position description and the verification of education and experience. SNL has not developed detailed position descriptions nor performed the required verification. See CAR HQ-94-002 for details regarding the identified deficiencies. The indoctrination and training records were reviewed for the SNL CSDP staff and direct support personnel. The records were satisfactory. Recommendation 6.3 for organizing records is provided for management consideration.

The Quality Level determination and grading methodology was reviewed and found to be acceptable.

The Quality Information Reporting system required by PD 5.1 and the QARD has not been implemented. See CAR HQ-94-001 for details regarding the identified deficiency.

The SNL Surveillance Program was reviewed. Surveillance schedules were properly prepared, however since mid 1990 there has been only two surveillances performed on CSDP OCRWM quality affecting work. See CAR HQ-94-003 for details.

Implementation of QA Program Element 2.0 was determined to be unsatisfactory.

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4.0 PROCUREMENT DOCUMENT CONTROL

The evaluation of this Program Element was based on interviews with SNL QA and Project Task Leaders and a review of objective evidence to determine compliance with the SNL QA Program and Program Directives 2.3 and 3.2. The specific requirements selected for evaluation of adequacy and compliance include: Task Definition Statements (TDSs) to verify if they were prepared by the Task Leader and contained the appropriate content; TDSs were approved by the Division Supervisor and verified by the QA Coordinator; and to verify that the TDSs are retained as QA records.

The audit team verified that Purchase Request/Change Requests (PR/CR) accurately transcribe technical requirements from the TDS and invoke applicable QA requirements. The QA Coordinator approves the PR/CR prior to processing the procurement. Changes are processed under the same controls as the original procurement and procurement document records are maintained in accordance with procedure requirements.

Eleven TDSs, four purchase orders, and 20 change orders were reviewed for support services supplied to SNL by: The University of Texas at Austin; ANATECH, Gram Inc.; P.C. Reardon, Oak Ridge National Labs; Pacific Northwest Labs; and an internal SNL Division. All procurement documents invoked applicable QA and technical requirements.

QA record files were complete with the exception of four TDSs. See Section 5.5.2(2), Deficiencies Corrected During the Audit.

Implementation of QA Program Element 4.0 was considered to be satisfactory.

5.0 INSTRUCTIONS, PROCEDURES, AND DRAWINGS

Several PDs and test plans were reviewed to verify compliance with QA Program Element 5.0. The control of test plans and the inclusion of qualitative and quantitative acceptance criteria is satisfactory. The acceptance criteria in test plans is in the form of a hold point checklist to ensure that the test is conducted properly. SNL activities consist mainly of data collection. When SNL receives direction to evaluate data, test acceptance criteria is included in the test plan. Compliance with the requirements for review of documents is unsatisfactory. The PDs do not include requirements for specifying review criteria, maintenance of comments and responses, qualification of review personnel, resolution of mandatory vs. non-mandatory comments, nor final review for adequacy prior to approval and issuance. SNL is, however, conducting an

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effective peer review for the Burnup and Source Term tasks. Adequate documentation exists that demonstrates that comments are being resolved. PDs are not being revised to remain current. See CAR HQ-94-002 for details regarding the identified deficiency. PD 3.3 referenced the SNL SLED manual which had been cancelled. This condition had been identified during an audit conducted in 1992. Recommendation 6.2(2) is for management consideration.

Implementation of QA Program Element 5.0 was determined to be marginal.

6.0 DOCUMENT CONTROL

PD 3.3 (Document Control) records were reviewed to verify compliance with QA Element 6.0. Controlled document lists and distribution lists are being maintained as required. The document control system uses a document transmittal receipt acknowledgement form. The Document Control Administrator (DCA) has a self developed method for tracking receipt acknowledgement forms. With the exception of one person, all of the acknowledgement forms have been returned. Thirty days after the due date (this limit is self imposed by the DCA) a letter is sent to notify the recipient that the acknowledgement form has not been received. These letters have been maintained as part of the document control record. The receipt acknowledgement form is also used as a decontrol notice. Although the control of documents is being performed satisfactorily, the document control system is marginal because there are no instructions in the procedures for decontrolling documents, or dealing with the failure to return receipt acknowledgement forms. Recommendation 6.2 is provided for management consideration. Preparation of engineering drawings is not included in the SNL scope of work, therefore, compliance with the related requirements was not verified. An original document history file was not being maintained as required by PD 3.3. While verifying compliance with this requirement the QA records file for the CSDP PDs was reviewed. As a result, a failure to submit all revisions of the PDs to the records system was discovered. This condition was corrected during the audit and specific details are given in Section 5.5.2(1).

Implementation of QA Program Element 6.0 was determined to be marginal.

7.0 CONTROL OF PURCHASED ITEMS AND SERVICES

The evaluation of QA Program Element 7.0 was based on interviews with SNL QA and Task Leader personnel and an examination of objective evidence to determine compliance with selected program requirements of Program Directives 2.2 and 3.2. The specific requirements selected for evaluation of compliance and effectiveness

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included a verification to ensure that: the basis of the sole source procurement is documented and justified: prior to award of a contract. the responsible originator and QA approvals are obtained and: periodic verifications are performed to ensure source program implementation.

Procurements were justified by Letters of Sole Source Authorization. With the exception of Gram Inc., annual audits of support service contracts were performed. See CAR HQ-94-003 for details regarding the identified deficiency. There has been no procurement of hardware items for quality effecting activities associated with the Source Term or Burnup Credit work.

Implementation of QA Program Element 7.0 was determined to be satisfactory.

16.0 CORRECTIVE ACTION

The corrective action and trend analysis PDs and records were reviewed to verify compliance with QA Program Element 16.0. Compliance with the related PD 5.2 and PD 5.10 is satisfactory with the exception of failing to perform a trend analysis on all CARs written for 1991 and 1992. This condition was corrected during the audit and specific details are given in Section 5.5.2(3). Only 2 CARs have been written since 1991, therefore. the failure to perform the annual trend analysis was not significant. The audit team determined that the corrective action program is marginal because PD 5.2 only addresses significant conditions adverse to quality. Conditions which are not considered significant in accordance with the requirements in PD 5.2 are resolved in an informal manner. and there is no documentation of the condition or corrective action. See CAR HQ-94-002 for details regarding the identified deficiency. The corrective action program is marginal also because it does not contain guidance for: determining the extent of a deficiency; performing root cause determination: rejecting the proposed corrective action; identifying due date for submitting proposed corrective actions and extending the time if appropriate; resolving unsatisfactory corrective action; voiding CARs; and addressing delinquent responses and corrective actions. Recommendation 6.4 is for management consideration.

Implementation of QA Program Element 16.0 was determined to be marginal.

17.0 QUALITY ASSURANCE RECORDS

The audit team reviewed the SNL record management system and noted that some QA records were not in the Records Management Center (RMC). See Section 5.5.2(1,2,5) for Deficiencies Corrected During the Audit. The written procedures for records (PDs

ATTACHMENT 2

Audit Details

3.4 and 3.5) need to be revised to meet QARD requirements. Also. Transmittal Form required by PD 1.5 is not being used. See CAR HQ-94-002 for details regarding the deficiencies. The permitting of food and drink in the RMC was stopped during the audit. See Section 5.5.2(4) for Deficiencies Corrected During the Audit and Recommendation 6.3(1). Included in Recommendation 6.3 is further guidance for management consideration regarding record retention time. submitting records to OCRWM, and posting of the access list. In addition. Recommendations 6.5. 6.6. and 6.7 provide guidance on the SNL dual storage facility. Seals Program record storage, and one-of-a-kind record storage in a fire-rated cabinet.

Implementation of QA Program Element 17.0 was determined to be unsatisfactory.

18.0 AUDITS

The audit term verified the adequacy of the audit process by reviewing audit plans, reports, written replies. record of completion of corrective action. and audit close-out for the required annual audit of SNL internal and external services contractors. FY 1993 SNL audit of Gram Inc. was not performed. Deficiencies are identified in CAR HQ-94-003. PD 5.3 (Quality Audit) permits the practice of transmitting audit checklists with the notification letter and should be deleted. See Recommendation 6.8.

Implementation of QA Program Element 18.0 was determined to be marginal.

19.0 COMPUTER SOFTWARE

The evaluation of QA Program Element 19.0 was based on the examination of objective evidence to determine the degree of compliance and implementation with selected requirements of SNL Program Directives PD 2.1 and 2.4. The specific requirements selected for evaluation of compliance and effectiveness included: the preparation of a Software QA Plan (SQAP) to address required procedure controls; the validation by qualified individuals designated by the Task Leader: and the preparation of software. documentation of requirements. specification. design description. implementation. verification and validation. user documentation. models. and manuals.

STACE is the only computer software code under development at SNL for this scope of work. STACE software is still in the development stage and no production versions are available or in use at this time.

The following software documentation has been developed but is in the review process and subject to changes resulting from the development process: Software Quality

ATTACHMENT 2

Audit Details

Assurance Plan. Design Description. Design Reviews. and Validation and Verification Plans.

Implementation of QA Program Element 19.0 is considered indeterminate at this time and will be evaluated during future verification activities.

ATTACHMENT 3

List of Objective Evidence Reviewed During the Audit

QA PROGRAM ELEMENT 1.0, ORGANIZATION

Procedures Evaluated During the Audit•

Compliance with and the adequacy of the following procedures were reviewed:

- SNL CSDP QAPP, Revision E
- SNL CSDP PD 1.4, Revision C. "Organization"
- Department 6643 Organization Chart. dated 11/8/93
- Bi-monthly Trend Analysis Reports for 1991
- Bi-monthly Trend Analysis Reports for 1992
- Task Definition Statement Log, 88-01 through 94-08

QA PROGRAM ELEMENT 2.0, QUALITY ASSURANCE PROGRAM

Procedures Evaluated During The Audit:

Compliance with and the adequacy of the following procedures were reviewed:

- OCRWM QARD, DOE/RW-0214. Revision 3
- SNL CSDP PD 4.1, Revision D, "Indoctrination and Training"
- SNL CSDP PD 5.1, Revision C, "Quality Information Reporting"
- SNL CSDP PD 5.6. Revision C. "Quality Program Levels of Effort"
- SNL CSDP PD 5.1. Revision B. "Project Quality Assurance Program Plans"
- SNL CSDP PD 5.9. Revision B. "Surveillance"

Objective Evidence Examined:

- Grading package for Burn-up Credit
- SNL Staff Performance Review procedure
- SNL Personnel Relations procedure

- Qualifications, indoctrination, and training records for the following personnel:

R. Baehr	K. Saeger
M. Brady	R. Reardon

ATTACHMENT 3

List of Objective Evidence Reviewed During the Audit

Objective Evidence Examined: (continued)

- Training records for personnel from the following contractors:

  University of Texas — ANATECH
  Pacific Northwest Labs — University of Denver

- Surveillance Schedules for: FY 1990, 1991, 1992, 1993
- Surveillance of SNL, SNL/MM-S90-1, 7/25/90
- Notification Letter
- Surveillance Plan
- Surveillance Checklist
- Surveillance Report
- Surveillance of University of Denver, UOD-S92-1, 4/7/92
- Notification Letter
- Surveillance Plan
- Surveillance Checklist
- Surveillance Report

TECHNICAL SPECIALIST OBJECTIVE EVIDENCE EXAMINED:

Document No.	Title	Rev	Date
TTC-1222 SAND 92-7289	Sensitive Parameters Affecting Spent Fuel Assembly STs	None	8/18/92
Correspondence	Letter from K.D. Seager and T. L. Sanders to W.H. Lake	None	8/18/92
Report	Phase I Fuel Data Experimental Plan	None	6/28/91
Journal Article	A methodology for Probabilistic Assessment of Spent Fuel Cladding Failure	None	3/31/93
Journal Article	A methodology for Estimating Residual Contamination Contribution to the Source Term in SFTC	None	9/23/93
Correspondence	DOE letter from DOE to SNL	None	8/12/91
Correspondence	DOE letter from DOE to SNL	None	6/2/92
Correspondence	DOE letter from DOE to SNL	None	8/29/93
Status Report	SNL letter from SNL (T.L. Sanders) to DOE (Mings)	None	7/15/93
Correspondence	SNL letter from SNL to DOE	None	9/30/91
Correspondence	SNL letter from SNL to DOE	None	3/31/93
Correspondence	ANATECH letter from ANATECH to SNL	None	7/6/93
Correspondence	ANATECH letter from ANATECH to SNL	None	8/5/93
Correspondence	ANATECH letter from ANATECH to SNL	None	8/27/93

ATTACHMENT 3

List of Objective Evidence Reviewed During the Audit

TECHNICAL SPECIALIST OBJECTIVE EVIDENCE EXAMINED: (continued)

Document No.	Title	Rev	Date
Correspondence	ANATECH letter from ANATECH to SNL	None	10/11/93
TTC-0811 SAND 88-1358	Estimate of Crud Contributing to Shipping Cask Containment Requirements	None	1/91
TTC-1019 SAND 90-2406	A method for determining the Spent Fuel Contribution to Transport Cask Containment Requirements	None	11/92
TTC-1020 SAND 90-2407	A methodology for Estimating the Residual Containment Contribution to the Source Term in a Spent Fuel TC	None	9/91
TTC-1021 SAND 90-2408	A Source-Term Method for Determining Spent-Fuel Transport Cask Containment Requirements in Executive Summary	None	2/93
QA Program Report TTC-1090	STACE: Final Software Design Description	None	
QA Program Report	STACE Project QA Plan	2	10/91
QA Program Report	STACE Software Requirements Specifications	3	8/30/91
QA Program Report	STACE Project Verification and Validation Plan	2	7/9/91
QA Program Report	Preliminary STACE Software Test Plan	0	5/26/92
Correspondence	SNL Letter from M.C. Brady to W. J. Mings	None	9/23/93
Report	STACE: An Integrated Code for Performing Source Term Analyses for Containment Evaluations	None	9/23/93
Report	STACE: Source Term Analysis for Containment Evaluations of Transport Casks	None	None
Report K.D. Seager et al	ANSI N14.5 Source Term Licensing of Spent Fuel TC Containment	None	None
Report TTC-114 SAND91-2528C	A Spacer Analysis Grid Hysteretic Model for the Structural Analysis of SD Assemblies Under Impact	None	None
Report TTC-112 SAND91-2526C	STACE: An Integrated Code for Evaluating Spent Fuel Transport Cask Cont.	None	None
Report ANS Nuc. Tech V198	Estimate of the CRUD Contribution to Shipping Cask Containment Requirements	None	5/92
Correspondence	SNL letter from SNL to DOE	None	3/31/92
Correspondence	SNL letter from SNL to DOE	None	6/28/91
Correspondence	SNL letter from SNL to DOE	None	9/30/91

ATTACHMENT 3

List of Objective Evidence Reviewed During the Audit

QA PROGRAM ELEMENT 4.0

Procedures Evaluated During The Audit:

Compliance with and the adequacy of the following procedures were reviewed:

SNL CSDP PD 2.3, Revision B
SNL CSDP PD 3.2, Revision D

Objective Evidence Examined:

Document No.	Title	Date
TDS 93-01	Task Definition Statement, Univ. of Texas	10/92-9/93
TDS 93-02	Task Definition Statement, ANATECH	10/92-9/93
TDS 93-04	Task Definition Statement, Gram, Inc.	10/92-9/93
TDS 93-33	Task Definition Statement, Univ. of Texas	10/92-9/93
TDS 94-02	Task Definition Statement, ANATECH	10/93-9/94
TDS 94-03	Task Definition Statement, Univ. of Texas	10/93-3/94
TDS 94-05	Task Definition Statement, P.C. Reardon	10/93-9/94
TSDD/CSDP	Quality Level Assignment Checklist WBS 4.01.1.6.1.4	11/90
AG-3483	RFQ for Services of Phillip Reardon	9/30/93
TTC-1019	SAND Report # 90-2406 w/DOE Approval	3/13/91
TTC-1031	SAND REPORT #90-28785 w/DOE Approval	3/13/91
66-0162	Task Description Statement (93-02)	5/93
Letter	Comment Resolution to Mr. Rahimi Tess	9/14/93
Letter	Comment Resolution to Mr. C. Marotta to K. Seager	9/29/93
SNL Memo	Comment Resolution to C. Drumm to K. Seager	9/2/93
SNL Memo	Comment Resolution to T. Parish to M. Brady	6/7/93
TDS 93-02	Task Description Statement to ORNL	10/92-9/93
TDS 94-06	Task Description Statement to ORNL	10/93-9/94
TDS 94-07	Task Description Statement to PNL	10/93-9/94
TDS 93-43	Task Description Statement to SNL Internal	6/93-9/93
TTC-1138	Comment Resolution on SAND Report 91-2669A	6/29/92
TTC-1196	Comment Resolution on SAND Report 92-0548J	3/23/92

ATTACHMENT 3

List of Objective Evidence Reviewed During the Audit

QA PROGRAM ELEMENT 5.0

Procedures Evaluated During the Audit:

Compliance with the following procedures was reviewed:

- PD 1.1, Rev. C, Preparation and Control of Program Directives
- PD 2.7, Rev. E, Test Control
- PD 3.3, Rev. C, Document Control

Objective Evidence Examined:

PD 1.1

- Various approved PDs
- Copies of marked-up PDs

PD 2.7

- PSC Punch Test Procedure Rev. 0; 9/8/92
- 120 Foot Impact Test Procedure Rev. 1; 3/11/93
- QAP-XI-I, Rev. A, Test Plan/Procedure Format, Content and Control; 6/1/88

PC 3.3

- CSDP QAPP and PD distribution lists
- 92-OQD-003, SNL Environment & Transportation Programs Support Office Audit; 11/5/92

QA PROGRAM ELEMENT 6.0, DOCUMENT CONTROL

Procedures Evaluated During The Audit:

Compliance with the following procedure was reviewed:

- PD 3.3, Rev. C, Document Control

ATTACHMENT 3

List of Objective Evidence Reviewed During the Audit

Objective Evidence Examined:

PD 3.3

- Program Management Plan, Rev. 0, 6/90
- Configuration Management Plan, Rev. 0, 6/90
- Distribution Lists for PDs, 10/13/92
- Various Transmittal Receipt Acknowledgement Forms

QA PROGRAM ELEMENT 7.0

Procedures Evaluated During the Audit:

Compliance with and the adequacy of the following procedures was reviewed:

- SNL CSDP PD 2.2, Revision B
- SNL CSDP PD 3.2, Revision D

Objective Evidence Examined:

Document No.	Title	Date
02-8441A	Purchase Order of Univ. of Texas	4/1/91
02-8441A	Amendment No. 1 to Purchase Order	8/30/91
02-8441A	Amendment No. 2 to Purchase Order	10/25/91
02-8441A	Amendment No. 3 to Purchase Order	4/22/92
02-8441A	Amendment No. 4 to Purchase Order	10/22/92
02-8441A	Amendment No. 5 to Purchase Order	3/30/93
02-8441A	Amendment No. 6 to Purchase Order	9/20/93
Letter	Sole Source Justification For Using Univ. of Texas	10/2/90
Memo	Univ. of Texas to K. Seager Acknowledging TDS Req.	10/18/93
RFQ 66-1916	Purchase Order to ANATECH	10/89
RFQ 66-1916	Amendment No. 1 to Purchase Order	4/13/90
RFQ 66-1916	Amendment No. 2 to Purchase Order	11/30/90
RFQ 66-1916	Amendment No. 3 to Purchase Order	1/9/91
RFQ 66-1916	Amendment No. 4 to Purchase Order	4/29/91
RFQ 66-1916	Amendment No. 5 to Purchase Order	6/26/91
RFQ 66-1916	Amendment No. 6 to Purchase Order	10/30/91
RFQ 66-1916	Amendment No. 7 to Purchase Order	8/11/92
RFQ 66-1916	Amendment No. 8 to Purchase Order	2/18/93

ATTACHMENT 3

List of Objective Evidence Reviewed During the Audit

Objective Evidence Examined: (continued)

Document No.	Title	Date
RFQ 66-1916	Amendment No. 9 to Purchase Order	10/1/93
Letter	Sole Source Justification for ANATECH	11/10/89
67-7833	Purchase Order to Gram Inc.	10/1/91
67-7833	Amendment No. 1 to Purchase Order	12/16/91
67-7833	Amendment No. 2 to Purchase Order	1/21/92
67-7833	Amendment No. 3 to Purchase Order	3/19/92
67-7833	Amendment No. 4 to Purchase Order	6/11/92
67-7833	Amendment No. 5 to Purchase Order	7/28/92
Letter	Sole Source Justification for Gram Inc.	7/15/91
ANA-A91-1	Annual Audit of ANATECH	3/26/91
ANA-A92-1	Annual Audit of ANATECH	5/21/92
ANA-A93-1	Annual Audit of ANATECH	6/22/93
UOT-A91-1	Annual Audit of Univ. of Texas	
UOT-A92-1	Annual Audit of Univ. of Texas	
UOT-A93-1	Annual Audit of Univ. of Texas	
Report	PNL Monthly Report for Sept. 1993	9/27/93
Report	PNL Monthly Report for Aug. 1993	9/2/93
Report	PNL Monthly Report for June 1993	7/8/93
Report	ORNL Monthly Report for Sept. 1993	10/11/93
Report Draft	Benchmark Data.... Criticality Calculations	10/93
Memo	Comment Resolution for Validation of Scale-4	7/30/93

QA PROGRAM ELEMENT 8.0, IDENTIFICATION AND CONTROL OF ITEMS

Procedures Evaluated During the Audit:

Compliance with the following procedure was reviewed:

- SNL CSDP PD 2.7, Revision E, "Test Control"

Objective Evidence Examined:

There has been no implementation of this program element or the relevant portions of PD 2.7 to date on this project.

ATTACHMENT 3

List of Objective Evidence Reviewed During the Audit

QA PROGRAM ELEMENT 15.0. CONTROL OF NONCONFORMING ITEMS

Procedures Evaluated During The Audit:

SNL CSDP PD 5.8, Revision D. "Control of Nonconforming Items"

Objective Evidence Examined:

- Nonconformance Log
- Blank Nonconformance tags

There has been no implementation of either this program element or PD 5.8 since 1989.

QA PROGRAM ELEMENT 16.0. CORRECTIVE ACTION

Procedures Evaluated During the Audit:

- PD 5.2. Rev. C. Significant Quality Reporting & Corrective Action: 9/24/90
- PD 5.10. Rev. A, Trend Analysis: 6/29/90

Objective Evidence Examined:

PD 5.2

- Corrective Action Report Log
- CAR 91-1
- CAR 92-1

PD 5.10

- Trend Reports for 1991. 1992. & 1993

QA PROGRAM ELEMENT 17.0. QUALITY ASSURANCE RECORDS

Procedures Evaluated During the Audit:

Compliance with and effectiveness of the following procedures was reviewed:

- SNL CSDP PD 1.5. Revision B. "Incoming Program Correspondence"
- SNL CSDP PD 3.4. Revision C. "Records Management"
- SNL CSDP PD 3.5. Revision B. "Operation of the TSDD Records Management Center"

ATTACHMENT 3

List of Objective Evidence Reviewed During the Audit

Objective Evidence Examined:

Reports of audits conducted on SNL CSDP activities:

- 1991, performed by MACTEC
- 1992, performed by DOE/Albuquerque
- Condition of the Records Management area
- Records storage areas
- SNL Contract document number 18-4703, dated 4/11.91, with Los Alamos Technical Associated for dual storage of records
- 75 randomly selected SNL CSDP QA records (for submittal requirement)
- Records Management Center Authorized Access List
  - April 1992
  - October 1992
  - January 1993
- Records Management Center sign-out cards
- Out-going records log
- SNL CSDP Milestone Report, dated 10/8/91

QA PROGRAM ELEMENT 18.0, AUDITS

Procedures Evaluated During The Audit:

Compliance with and effectiveness of the following procedure was reviewed:

- SNL CSDP PD 5.3, Revision C, "Quality Audit"

Objective Evidence Examined:

Task Definition Statements for:

- University of Texas
- ANATECH

Examined the following records:

- Audit plans
- Audit reports

ATTACHMENT 3

List of Objective Evidence Reviewed During the Audit

Objective Evidence Examined: (continued)

- Written replies
- Records of completion of corrective action
- Audit close-out

for the following SNL audits of:

- University of Texas. UOT-A93-01
- University of Texas. UOT-A92-01
- Oak Ridge National Lab. ORNL/CVP-A92-1
- Oak Ridge National Lab. ORNL/CVP-A93-1
- Pacific Northwest Labs. PNL/SB-A92-1
- Pacific Northwest Labs. PNL/SB-A93-1
- ANATECH. ANA-A91-1
- ANATECH. ANA-A92-1
- ANATECH. ANA-A93-1
- MACTEC. MAC-A93-1

QA PROGRAM ELEMENT 19.0

Procedures Evaluated During the Audit:

Compliance with and the adequacy of the following procedures were reviewed:

- SNL CSDP PD 2.1. Revision B
- SNL CSDP PD 2.4. Revision B

Objective Evidence Examined:

Document	Title	Rev.	Date
N/A	Preliminary STACE Software Test Plan	0	5/26/92
N/A	STACE Project QA Plan	2	7/9/91
TTC-1090	STACE Final Software Division Description	None	None
N/A	STACE Project Verification and Validation Plan	2	7/9/91

ATTACHMENT 3

List of Objective Evidence Reviewed During the Audit

Objective Evidence Examined: (continued)

Document	Title	Rev.	Date
N/A	STACE Software Requirements Specification	3	8/30/91
N/A	STACE Final Software Design Description Review	None	11/8/93
N/A	STACE Preliminary Software Design Description Review	None	11/8/93
N/A	STACE Software Requirements Specification Review	None	11/8/93
N/A	STACE Critical Design Review	None	11/8/93

ATTACHMENT 3

List of Objective Evidence Reviewed During the Audit

Source Term Technical Issue Resolution Program
Performance Based Audit Flowchart

Flowchart Element *What are the critical steps is the process?*	**Objective** *Why is it important to do this?*	**Measurement Criteria** *How can we know if we are meeting the objective?*
I. Prerequisites		
a. Personnel		
1. SNL	Provides the primary integration of the source term program including feasibility assessments, sensitivity analyses, STACE code development, and experimental validation activities.	- CYTP, MYWEP - Acceptance by DOE of milestone documents - Monthly reports - Publication of reviewed SAND reports, journal articles, and conference papers - Audits of source term program
2. ANATECH Research Corp.	Primary developer of mechanical and cladding breach analysis sequences and database module within STACE	- Task Definition Statements - Annual Audits - Quarterly progress meetings - Monthly progress reports
3. GRAM, Inc. key person - Philip Reardon)	Primary developer of thermal and release analysis sequences and the control module that integrates the sequences and the database within STACE	- Task Definition Statements - Quarterly progress meetings - Monthly progress reports
4. Univ. of Texas at Austin	Developer of the thermal hydraulics code TEXSAN which is used in the STACE thermal analysis sequence	- Task Definition Statements - Annual audits - Monthly progress reports

ATTACHMENT 3

List of Objective Evidence Reviewed During the Audit

Flowchart Element *What are the critical steps is the process?*	**Objective** *Why is it important to do this?*	**Measurement Criteria** *How can we know if we are meeting the objective?*
b. Identify sensitive parameters	Prioritize importance of specific models to source term evaluation	- Calculations were made in spent fuel, crud, and residual contamination reports using models that were developed using existing experimental data
c. Analytical codes	Determine if existing codes satisfy requirements or of development of new codes are required	- Software Requirements
II. STACE Code Development	Apply applicable QA requirements to the development of STACE	- STACE Project Quality Assurance Plan (FY 90) - STACE Software Requirements Specification (FY 90) - STACE Preliminary Design Description (FY 91)
III. Verification of analytical models used in STACE	Demonstrate replication of results for given models and assumptions	- STACE Verification and Validation Plan (FY 91) - STACE Preliminary Software Test Plan (FY 92) - TEXSAN documentation (FY 92, 93, 94) - B Testing of STACE (FY 95)

ATTACHMENT 3

List of Objective Evidence Reviewed During the Audit

Flowchart Element *What are the critical steps is the process?*	**Objective** *Why is it important to do this?*	**Measurement Criteria** *How can we know if we are meeting the objective?*
IV. Validation of STACE models against experimental data	Demonstrate physical accuracy of results for given models and assumptions	- Source Term Experimental Validation Program Plan (FY 92) - Specific experiments for validating models used in STACE mechanical, cladding breach, and release analysis sequences given in Source Term Experimental Program: Phase 1 Experimental Plan (FY 93)
V. Documentation	Provide peer-reviewed records of activities and results	- Four published SAND reports (FY 91, 92, 93) - One published journal article (FY 92) - Two draft journal articles (FY 93) - 14 Conference papers presented (IHLRWM, PATRAM, SMIRT, ASME PV&P)
VI. Technology Transfer	Provide information to CSDP cask contractors and regulatory bodies	- Publish and distribute SAND reports - Containment Workshop attended by DOE, national labs, private companies, universities, and CSDP cask contractors (FY 92) - Presentation to TRB of source term program (9/91)

ATTACHMENT 3

List of Objective Evidence Reviewed During the Audit

Burnup Credit Analytical Studies
Performance Based Audit Flowchart

Flowchart Element *What are the critical steps is the process?*	**Objective** *Why is it important to do this?*	**Measurement Criteria** *How can we know if we are meeting the objective?*
(1) Prerequisites - Personnel	Trained/experienced. knowledgeable	- Resumes - Qualifications
- Code Selection	Appropriate type Range of applicability Probability validation	- Feasibility Study - NRC
- Identification of Sensitive parameters/fuel characteristics	Key issues Technical/political Define scope of task	- Feasibility Study - Independent analysis
- Identification of Spent Fuel Samples	Provide QI-1 validation data Confirm alternate data (other)	- OCRWM/MCC
- Selection of Validation Data - isotopics - fresh fuel criticals - MOX criticals - reactor restart criticals	Validation of models/methods/ data specific to application	- Others and OCRWM/MCC (10CFR71, 10CFR72, 10CFR50)
(2) Development of Models - Depletion model	Accurately predict fuel content	- Validation vs. exp. - Verification vs. ind. analyses
- Criticality model	Accuracy in fuel performance in cask conditions	- Validation vs. exp. - Verification vs. ind. analyses
(3) Verification of sensitivities/ model results via independent analyses	Demonstrate replication of results/assumptions/models	- Completion of results - Agreement - Resolution of discrepancies
(4) Validation of Models vs. Experiments	Demonstrate physical accuracy of results/assumptions/models	- Comparison of results - Agreement - Resolution of discrepancies
(5) Documentation	Traceability Results	- Technical - Peer Review
(6) Technology Transfer to Cask Vendors	NRC	- Feedback

ATTACHMENT 4

Information Copies of CARs

OFFICE OF CIVILIAN
RADIOACTIVE WASTE MANAGEMENT
U.S. DEPARTMENT OF ENERGY
WASHINGTON, D.C.

[1] CAR NO -2-94-001
DATE 1/24/93
PAGE ___ OF ___
QA

CORRECTIVE ACTION REQUEST

[1] Controlling Document	[2] Related Report No.
SNL CSDP QAPP PD 1.4, PD 3.2, PD 5.1	HQ-94-01
[3] Responsible Organization: SNL CSDP	[4] Discussed With: [5] Sam T. Mills

[6] Requirement:

1. SNL CSDP QAPD, Para. 1.3 and PD 1.4, Para. 3.2.2 describe, or provide reference to SNL CSDP organization charts.
2. SNL CSDP PD 5.1 Para. 3.0 requires Quality Assurance Program Management Information Reporting and Tracking.

[8] Adverse Condition:

1. The actual organization of SNL CSDP does not agree with the organization described and shown in the documents.
2. There was no objective evidence presented to indicate that the required reporting and tracking system has been implemented.

[9] Does a significant condition adverse to quality exist? Yes__ No_X_ If Yes, Circle One: A B C	[10] Does a stop work condition exist? Yes__ No__. If Yes - Attach copy of SWO If Yes, Circle One: A B C D	[11] Response Due Date: 1/14/94

[12] Required Actions: [X] Remedial [ ] Extent of Deficiency [X] Preclude Recurrence [ ] Root Cause Determination

[13] Recommended Actions:

[14] Initiator: Thomas R Dwight for Kenneth McFall	Date 12/8/93	[15] Issuance Approved by: QADD [illegible]	Date 12/20/93
[16] Response Accepted: CAR	Date	[17] Response Accepted: QADD	Date
[18] Amended Response Accepted: CAR	Date	[19] Amended Response Accepted: QADD	Date
[20] Corrective Actions Verified: CAR	Date	[21] Closure Approved by: QADD	Date

ATTACHMENT 4

Information Copies of CARs

OFFICE OF CIVILIAN
RADIOACTIVE WASTE MANAGEMENT
U.S. DEPARTMENT OF ENERGY
WASHINGTON, D.C.

[1] CAR NO -2-94-002
DATE 12/8/93
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QA

CORRECTIVE ACTION REQUEST

[1] Controlling Document: CARD DOE RW-0214 Rev. 3, SNL CSDP QA Manual Rev. E
[2] Related Report No.: HQ-94-01
[3] Responsible Organization: SNL CSDP
[4] Discussed With: [4] C. Bradv/K. Seagem/R. Baenn/T. Mills

[5] Requirement:

1. SNL CSDP PD 1.4, Para. 3.3.17 requires the CSDP QA Coordinator to establish and maintain current the CSDP QA Manual.
2. QARD, Para. 2.8 requires the development of position descriptions for tasks involving quality affecting work and requires the verification of education and experience of personnel performing quality affecting work.
3. RW-0214, Para. 6.1 states in part: "In addition to the elements identified in NQA-1 Supplement 6S-1, Section 2, the control system for document preparation, review, approval, and issuance shall include:"
   a) Resolution of review comments considered mandatory by the reviewing organization.
   b) Documentation, resolution, and maintenance of review comments. (Continued on Page 2)

[6] Adverse Condition:

1. The CSDP QA Manual has not been kept current and does not meet QARD 214, Rev. 3
2. Contrary to the above requirements, SNL CSDP has not developed detailed position descriptions or verified the education and work experience of personnel performing quality affecting work. There is not a procedure requiring verification of relevant education and experience.
3. Department 6320 "Report Procedures" Rev. Nov. 1991 is not under the SNL QA Program for review, approval, and issuance as a quality affecting procedure. The subject document fails to meet the QARD requirements in the following areas:
   - Qualification of review personnel.
   - Specification of review criteria.

(Continued on Page 2)

[7] Does a significant condition adverse to quality exist? Yes x No__ If Yes, Circle One: A B (C)	[10] Does a stop work condition exist? Yes__ No x ; If Yes - Attach copy of SWO If Yes, Circle One: A B C D	[11] Response Due Date: 1/14/94

[12] Required Actions: [X] Remedial [X] Extent of Deficiency [X] Preclude Recurrence [X] Root Cause Determination

[13] Recommended Actions:

1. The CSDP Manual should be revised to reflect current SNL practices and conform to DOE/RW-0333P, Rev. 0 requirements.

(Continued on Page 2)

[9] Originator: Thomas R. Swift Date 12/8/93	[14] Issuance Approved by: CADD R.W. Clark Date 12/20/93
[15] Response Accepted: CAR Date	[15] Response Accepted: CADD Date
[17] Amended Response Accepted: CAR Date	[18] Amended Response Accepted: CADD Date
[19] Corrective Actions Verified: CAR Date	[20] Closure Approved by: CADD Date

ATTACHMENT 4

Information Copies of CARs

OFFICE OF CIVILIAN
RADIOACTIVE WASTE MANAGEMENT
U.S. DEPARTMENT OF ENERGY
WASHINGTON, D.C.

CAR NO -2-94-002
DATE 2/4/93
PAGE 2 OF
QA

CORRECTIVE ACTION REQUEST (Continuation Page)

[8] Requirement (continued)

3. (cont) SNL QA Manual section 6.7 states: SAND documents are subject to review in accordance with SNL Dept. 6320 procedures.

PD 3.3, Para. 6.0 states that CSDP controlled documents including document reviews are to be maintained as QA records.

4. NQA-1 basic requirement 16 requires conditions adverse to quality to be identified and corrected.

5. The QARD states that NQA-1 Basic Requirement 7 and Supplement 7S-1 apply with amplifications.

6. NQA-1, Supplement 17S-1, Section 4.4 requires that QA records be stored to prevent damage or destruction from natural disasters, environmental conditions, and biological agents.

7. CSDP PD 1.5 Paragraph 3.3.3 requires that the *Transmittal Form* be use when records are forwarded to the Records Management Center.

[9] Adverse Condition: (Continued)

3.
- Processing mandatory and non-mandatory comments.
- Retention of review comments and resolutions.
- Review of documents for adequacy, completeness, and correctness prior to approval and issuance. (NQA-1: 6S-1).
- Identification of QA records.

4. PD 5.2 is only used to correct significant conditions adverse to quality. There is no formal process to correct conditions adverse to quality which are not considered significant. Consequently, repetitive occurrences cannot be monitored.

5. The CSDP QA Program (PD) does not address NQA-1 verification criteria for methods of acceptance or Certificate of Conformances or Receipt Inspection records. (QARD Para. 7.3)

6. Storage requirements as required by the QARD and NQA-1 are not identified in SNL CSDP documents.

7. The Transmittal Form is not being used.

[10] Recommended Actions: (Continued)

2. Develop and implement procedures for developing position description and verification of education and experience.

3. Only "Remedial" and "Preclude Recurrence" actions are required for Adverse Condition 3. As noted in the audit report SNL is performing many of these actions for technical reports and procedures. In addition to revising the procedure to meet all requirements, SNL needs to incorporate and implement the requirements under their QA program.

4. Only "Remedial", "Extent of Deficiency", and "Preclude Recurrence" actions are required for Adverse Condition 4. Revise procedures to incorporate requirements and evaluate past activities to determine if any conditions adverse to quality exist.

5. Only "Remedial" and "Preclude Recurrence" actions are required for Adverse Conditions 5 and 6. For Adverse Conditions 5 and 6 incorporate QARD requirements into the applicable procedures.

6. Only "Remedial" and "Preclude Recurrence" actions are required for Adverse Condition 7.

ATTACHMENT 4

Information Copies of CARs

OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
U.S. DEPARTMENT OF ENERGY
WASHINGTON, D.C.

[6] CAR NO. ~Q-94-003
DATE: ~1/24/93
PAGE: ~ OF ~
QA

CORRECTIVE ACTION REQUEST

[1] Controlling Document: SNL CSDP PD 1.4, 3.2, 5.2, 5.3, 5.9 and QARD RW-214, Rev 3

[2] Related Report No.: HQ-94-01

[3] Responsible Organization: SNL CSDP

[4] Discussed With: R. Baehr/T. Mills

[5] Requirement:

1. SNL CSDP PD 1.4, Para. 3.3.20 requires the QA Coordinator to conduct surveillances in accordance with CSDP PD 5.9, Surveillances. SNL CSDP PD 5.9, para. 2.1 requires surveillances to be conducted to assess the quality of items or activities and to verify compliance with quality-related aspects and programmatic considerations of the CSDP.

2. SNL PD 5.3, Para. 3.1.1 requires that the SNL CSDP QA Program and external organizations be audited annually.

[6] Adverse Condition:

1. There have been only 2 surveillances performed on CSDP OCRWM quality affecting work and activities since mid 1990 which is not sufficient to assess quality.

2. Contrary to "Requirement 2", Gram, Inc. has never been audited and no CSDP QA audit was performed in FY '993.

[9] Does a significant condition adverse to quality exist? Yes x No__
If Yes, Circle One: A B (C)

[10] Does a stop work condition exist? Yes__ No x ; If Yes - Attach copy of SWO
If Yes, Circle One: A B C D

[11] Response Due Date: 1/14/94

[12] Required Actions: [X] Remedial [X] Extent of Deficiency [X] Preclude Recurrence [X] Root Cause Determination

[13] Recommended Actions:

1. Perform surveillances as required to supplement the audit program or provide documented rationale for not performing surveillances.
2. Evaluate the acceptability of previous Gram Inc. services.

[14] Initiator: Thomas R Swift for Kennem McFall — Date 12/8/93

[14] Issuance Approved by: QADD R.W. Catlin — Date 12/20/93

[15] Response Accepted		[16] Response Accepted	
QAR	Date	QADD	Date
[17] Amended Response Accepted		[18] Amended Response Accepted	
QAR	Date	QADD	Date
[19] Corrective Actions Verified		[20] Closure Approved by:	
QAR	Date	QADD	Date