INSPECTION PROCEDURE 69001

CLASS II RESEARCH AND TEST REACTORS

PROGRAM APPLICABILITY: 2545

69001-01 INSPECTION OBJECTIVE

To determine if activities at Class II research and test reactors, since the last inspection, were conducted safely and in accordance with regulatory requirements and licensee commitments.

69001-02 INSPECTION REQUIREMENTS

02.01 Organization and Staffing

a. Organizational Changes. Determine whether changes in the licensee's organization meet technical specifications (TS) requirements, and licensee commitments.

b. Shift Staffing. Determine whether the minimum shift staffing composition for operation, including on-call personnel, is consistent with the TS.

02.02 Operations Logs and Records

a. Determine whether operation logs and records are maintained as required by the licensee's administrative procedures.

b. Determine whether significant problems and events identified by review of the operations logs and records are reported, and resolved as required by the TS and the licensee's administrative procedures.

c. Determine whether the measured parameters for one TS-required recorder meet TS requirements.

02.03 Procedures

a. Administrative Controls. Determine whether the licensee's administrative control procedures are consistent with TS, license requirements, and licensee commitments.

b. Current Procedures. Determine whether the procedures in use by the operator are current and reviewed and approved, as required.

c. Procedural Implementation. Determine whether TS required procedures can be implemented to perform the intended functions.

d. Procedural Adherence. Determine whether reactor personnel are observing administrative controls and TS requirements relative to procedural adherence.

02.04 Requalification Training

a. Determine whether the requalification records for licensed operators are maintained as required by the requalification plan.

b. Determine whether the licensee completes the actions required for any disqualified individual not meeting the requirements of 10 CFR 55.53 (e) or the requalification plan.

c. Determine whether the licensee does the following, consistent with the Office of Nuclear Reactor Regulation (NRR) approved Requalification Plan:

1. Discusses and reviews changes in the facility, procedures, and license.

2. Reviews and simulates abnormal and emergency procedures.

3. Assures that operators maintain an active duty status in accordance with 10 CFR 55.53(e).

4. Conducts formal training, e.g., lectures, and seminars.

02.05 Surveillance and Limiting Conditions for Operation

a. Determine whether surveillances meet the TS surveillance requirements and are acceptably conducted for the as-built condition of the facility.

b. Determine whether Limiting Conditions of Operation (LCOs) are maintained in accordance with the licensee's procedural requirements.

02.06 Experiments

a. Determine whether the licensee reviews and approves experiments, and any subsequent changes, in accordance with TS requirements and licensee procedures.

b. Determine if the licensee's experiment review process was in accordance with the requirements of 10 CFR 50.59.

c. Determine whether the licensee identifies hazards that could be associated with experiments and takes remedial action in accordance with licensee procedures.

d. Determine whether the licensee accounts for and controls irradiated items commensurate with regulatory requirements and licensee procedures.

e. Determine whether experiments are constrained as required by the TS and the licensee's procedures.

f. Determine whether experiments are installed in the reactor and removed from the reactor in accordance with experiment authorizations and protocols required by the licensee's procedures.

g. Determine whether the reactivity worth of experiments is evaluated, and verified by measurements in accordance with TS requirements and the licensee's procedures.

h. Determine whether the licensee installs engineering controls to limit radiation exposures, as required by applicable experiment protocols, authorizations, procedures and TS.

02.07 Health Physics

a. Determine whether licensee's dose limits are in conformance with 10 CFR Part 20 and licensee's administrative limits.

b. Determine whether required radiation survey, sampling, and monitoring are performed in accordance with regulatory requirements and the licensee's procedures.

c. Determine whether required calibration of radiological survey, sampling, or monitoring instruments are commensurate with TS requirements and the licensee's procedures.

d. Determine whether the required personnel dosimetry program is conducted in accordance with 10 CFR 20.1501, 20.1502 and licensee procedural requirements.

e. Determine whether the licensee satisfies the requirements for radiological effluent releases specified in 10 CFR 20.1302, Tables 2 and 3 of Appendix B to 10 CFR Part 20, and the TS.

f. Determine whether the use and calibration of instruments used to monitor effluent releases to the atmosphere and liquid effluent releases are commensurate with the requirements of 10 CFR 20.1501, the TS, and the licensee procedures.

g. Determine whether current notices to workers are posted in accordance with 10 CFR 19.11 and licensee procedural requirements.

h. Determine whether restricted areas, as defined in 10 CFR 20.1003, are posted in accordance with the requirements in 10 CFR 20.1902, 10 CFR 20.1903, and licensee procedures.

i. Determine whether appropriate protective clothing is used in accordance with the licensee's procedural requirements.

j. Determine whether personnel working around radioactive materials are instructed in radiation safety as required by the licensee's procedures and by 10 CFR 19.12.

k. Determine whether the principles of As Low As Reasonably Achievable (ALARA) are implemented by the licensee.

l. Determine whether the licensees Radiation Safety Officer (or equivalent) reviewed and approved radiation protection program changes, experiments, and radiation protection related events and conditions in accordance with the TS and licensee procedural requirements.

m. Determine whether the licensee's respiratory protection program meets the requirements of 10 CFR 20.1701-1704.

n. Determine whether planned special exposures were implemented in accordance with the requirements of 10 CFR 20.1206.

o. Where applicable, determine whether the dose to the embryo or fetus of declared pregnant women meets the requirements of 10 CFR 20.1208

p. In accordance with 10 CFR 20.1101, determine whether the licensee has developed, documented and implemented a radiation protection program.

q. Determine whether the magnitude of the annual emission of radionuclides to the ambient air from the licensee's facility meets 10 CFR 20.1101(d) constraint, and if not, determine if the licensee meets 10 CFR 20.1101(d) requirements for reporting.

02.08 <u>Design Changes</u>

a. If design changes were made, determine whether they were reviewed and approved in accordance with 10 CFR 50.59, the TS, and the licensee's administrative procedures.

b. Determine whether the performance of modified equipment meets regulatory requirements and licensee commitments and procedural requirements.

c. Determine whether the licensee reviews and approves procedures related to modified systems in accordance with the TS and the licensee's procedures.

d. Determine whether the licensee changes as-built drawings to reflect the actual design change as required by the licensee's procedures and the design change package.

02.09 Committees, Audits and Reviews

a. Determine whether the safety review committee met in accordance with the TS requirements, since the last inspection.

b. Determine whether independent audits are conducted in accordance with the TS requirements and the licensee's procedures.

c. Determine whether identified problems from the licensee's required reviews are resolved in accordance with the TS requirements and the licensee's procedures.

02.10 Emergency Planning

a. Determine whether the emergency plan and implementing procedures are current and readily available to users as required.

b. Determine whether exercises and drills required by the emergency plan were conducted.

c. Determine whether the licensee conducts training for emergency response personnel as required.

d. Determine whether key emergency response personnel can acceptably respond to emergency conditions as required.

02.11 Maintenance Logs and Records

a. Determine whether maintenance logs and records are maintained as required by the licensee's administrative procedures.

b. Determine whether significant problems and events identified by review of the maintenance logs and records are reported and resolved in accordance with TS requirements and the licensee's administrative procedures.

c. Determine whether maintenance was performed consistent with the TS and the licensee's procedures that govern maintenance activities.

02.12 Fuel Handling Logs and Records. Determine whether the fuel handling logs or activities satisfy the TS requirements and the licensee's procedural requirements.

69001-03 INSPECTION GUIDANCE

General Guidance

If practical, the license, the TS, the Safety Analysis Report (SAR), the as-built description of the facility, the Safety Evaluation Report (SER), and licensee commitments are to be reviewed before inspecting a non-power reactor. If this is not practical, they are to be reviewed during the onsite inspection. These documents may reference standards of the American Nuclear Society (ANS), the American National Standards Institute (ANSI), and the regulatory guides. Appendices A and B list the regulatory guides and standards that provide general guidance for non-power reactors. Additional general guidance may be found in the "Other Regulatory Guides of Possible Interest to Division 2 Recipients" listed as an attachment to the Division 2 Regulatory Guides Table of Contents. Reference to the standards and guides in these appendices is to provide additional general guidance to aid the inspector in the technical evaluation of the licensee's activities. These standards and guides are not to be used as commitments or requirements unless the licensee has committed to them in writing, or the NRC has required the licensee to use the specific guidance document.

Additionally, many requirements are specified in the licensee's written procedures. There may be conditions where licensee procedures are informal and appear to be inadequate for the task, or where written procedures simply do not exist. In these instances, verify licensee activities through performance based inspection and observations. Regardless of the formality or quality of their written procedures, if the licensee is performing the function safely and in accordance with requirements, the inspector is to find this acceptable. If the licensee is not performing the function safely and in accordance with the requirements because of inadequate or non-existent written procedures, the issue is to be brought to the attention of appropriate regional management and the NRR project manager so that an action plan can be established to address the concern.

A facility tour accompanied by licensee management is to be conducted early in the inspection. This tour is to include consideration of plant activities and conditions, with particular emphasis on radiation protection. Direct observation of activities to meet the inspection requirements of this procedure is preferred. If direct observation is not possible, a combination of simplified measurements, walk-throughs, records review, or discussions with licensee personnel is to be used to satisfy the inspection requirements.

Sample sizes and resource estimates recommended in this inspection procedure are provided for broad planning purposes and to define the typical depth of the inspection. They are not intended to be rigid requirements on the inspector.

Specific Guidance

03.01 Organization and Staffing

a. Organizational Changes. During the inspection, the licensee's organizational or administrative records are to be reviewed with cognizant staff and management to determine if any changes were made to the licensee's organization. Only changes since the last inspection need be reviewed. If changes have been made, particular

attention is to be given to (1) organizational structure, reporting chains and lines of succession; (2) responsibilities, authorities and limits of key personnel; (3) availability of key personnel; (4) assignment and qualifications of new personnel; and (5) consistency with the TS and the SAR, and supporting documentation.

b. Shift Staffing. The TS provide the requirements for shift staffing. Where practical, the staffing on two shifts is to be observed. If the facility is shut down, the records associated with two startup operations are to be examined to verify that the licensee had satisfied the TS requirements for staffing. It is important that the records and guidance provided to the operator clearly indicate the specific personnel required at the facility for operations (such as a licensed operator and another individual to contact appropriate personnel in case of an emergency). It is also important that the records and guidance provided to the operator clearly indicate required on-call personnel such as a licensed Senior Reactor Operator. Having both a licensed reactor operator and licensed senior reactor operator at the facility generally satisfies the requirements for onsite operations and on-call personnel.

03.02 Operations Logs and Records. Review selected operations logs and records.

a. A review of about 50 percent of the operational logs and records, and 10 percent of the pre-startup and startup checklists and records, is an acceptable sample for this inspection requirement. The logs and records from several time intervals after the previous inspection are to be reviewed to determine whether there were problems that have not been identified elsewhere.

b. This inspection requirement includes examination of the licensee's evaluation of the cause and implementation of corrective actions prior to returning the reactor to power for all unplanned reactor scrams since the last inspection. It is important that problems be resolved in accordance with licensee procedural requirements. Credit in this area may be taken to satisfy the requirements in Section 03.09 of this inspection procedure.

c. Examination of the records of one TS-required recorder for the two most recent times that the reactor was taken critical is an acceptable sample for this inspection requirement. If possible, the selected parameters are to be varied from those of the previous inspection. At some facilities, only a few TS parameters are recorded. As a result, the parameters can not be varied. If the parameters can not be varied, the same parameters are to be observed. Two examples of such parameters are nuclear power and primary system temperature instrumentation.

03.03 Procedures. Required procedures are specified in either the licensee's TS or administrative procedures.

a. Administrative Controls. The requirements for the licensee's administrative controls may be found in the facility-specific TS and the license. The licensee's administrative procedures are to be reviewed. Licensee commitments may be found in the SAR, SER, and supporting documentation. The licensee's administrative procedures may include, but are not limited to, the following:

1. Operator Responsibilities. The responsibilities listed below are normally addressed in the licensee's administrative procedures or guidance.

   (a) The operator's and senior operator's responsibility to use written procedures. The TS may require that the licensee provide written procedures for malfunctions, radioactive releases and radiological contamination, and emergencies. Further, the TS may require that operators use these procedures.

   (b) The operator's and senior operator's responsibility to adhere to the TS.

   (c) The logging of operating information, including description of the log item, date, time and identification of the individual logging the information.

   (d) The method of shift turnover.

   (e) The operator's responsibility to shut down the reactor when it is felt that the safety of the reactor is in jeopardy.

   (f) In accordance with 10 CFR 50.54 (1) and (m)(1), the operator's responsibility to not return the reactor to power following a scram or unexplained power reduction without the presence and direction of the senior operator.

   (g) The senior operator's responsibility to determine the circumstances, analyze the cause, and correct the fault, before directing the return of the reactor to power after a scram or unexplained power reduction in accordance with the licensee's procedures.

   (h) The operator's responsibility to believe instrument indications until the indications are proven to be incorrect.

   (i) The operator's responsibility to shut down the reactor if the control system does not automatically shut down the reactor when operating parameters exceed the reactor protection set points.

2. Review and Approval Requirements. Requirements for procedural review and approval are normally found in the TS or administrative procedures. If the TS or the licensee's administrative procedures do not describe the requirements for review and approval of procedures, the following method is one of several acceptable alternatives. Before granting final approval, it is important that the licensee sequentially review and walk-through the steps in new procedures, and in significant revisions in existing procedures, to test the effectiveness of the procedure to control the operation. It is also important for persons representing applicable disciplines such as nuclear engineering, health physics, instrumentation, or electrical engineering to concur in procedures after performing a detailed review in their areas of expertise. This may simply be the review and approval by the safety review

committee and reactor supervisor. The safety review committee normally reviews the procedure. The minutes of the review committee meetings will verify that procedures have been reviewed. Each procedure is normally reviewed and approved by an appropriate member of the facility management (usually the facility director or other designated individual) with the approval signature and issue date appear on the procedure.

3. Temporary Changes to Procedures. Licensee procedures normally contain provisions for changing, revising, and updating procedures when deficiencies or discrepancies become apparent while the reactor is operating. If the TS or the licensee's administrative procedures do not describe the requirements, the following example provides an acceptable way for the licensee to make changes to procedures. The supervisor may make changes that do not change the intent of the original procedure, if the supervisor is a licensed senior operator and if a note of the change listing the date and the authorizing personnel is recorded in the operating log or procedures manual. It is important that the operators be informed of all changes. A change is normally reviewed at the earliest convenient time by the review committee and approved by the facility director, or his or her designee. Then in accordance with the licensee's procedures, the change is made permanent through this review and approval process, or deleted.

b. Current Procedures. The review of two procedures is an acceptable sample for this inspection. Procedures are to be reviewed on a rotating basis. Once a procedure is found acceptable, only changes need be reviewed. The procedures to be checked include those for system checkouts, startup, operation, and shutdown. It is important that these procedures be current and up-to-date.

c. Procedure Implementation. This inspection activity is intended to determine whether an operation can be safely accomplished using a required procedure as a guide. This portion of the inspection is to be done in such a manner that operators are not distracted from their duties. Licensee personnel conducting the activities for one TS required procedure related to pre-startup checks, reactor startup, operation at power, power changes, and reactor shutdown is to be observed. The procedure must enable licensee personnel to accomplish the operation within design characteristics and safety review considerations. To evaluate the procedure, the TS (including the LCOs and bases), the SER, the SAR (including the plan and instrument drawings), and the as-built systems drawings or descriptions (including design change and maintenance drawings and descriptions if they differ from the SAR descriptions) are to be used. Particular attention is to be given to the review of major systems and components and their appropriate interlock features. Items such as complete valve lineups need not be verified. If it is not possible to observe the procedure being performed by operators, an adequate functional check would include reviewing selected steps for the as-built condition of the facility.

d. Procedural Adherence. Depending on the complexity of the procedure and the familiarity of the operator, the operators need not have procedures in hand.

Additional guidance may be found in Inspection Procedure 42745, "Class I Non-Power Reactor Procedures."

03.04 Requalification Training. The licensee's records must be in sufficient detail to permit the inspector to verify compliance with the licensee's NRR-approved requalification program, and to evaluate the technical adequacy of examinations that have been administered by the licensee. Review the contents of written examinations taken by licensed operators and management's evaluations of the operator's performance. Written examinations are to be germane to the specific reactor, cover areas required by the requalification program, and demonstrate that the operator has the knowledge to continue to safely operate the reactor facility. The evaluations of operators are to be discussed with the licensee. This may involve detailed discussions with licensee management or simply the observation of startup or shut down operations and respective discussions with the operator. These evaluations may also be verified by a review of licensee records.

Questions concerning the technical adequacy or implementation of the requalification program are to be resolved with appropriate regional management and the responsible NRR project manager. If necessary, the NRR Human Factors Assessment Branch (LHFB) and Operator Licensing Branch (LOLB), may be requested to provide assistance in the resolution of the questions. The LHFB has the responsibility for reviewing operator training programs. The LOLB has the responsibility for administering NRC requalification and initial operator examinations. Resolution of these questions may include the reexamination of an individual licensed operator, a re-review of an area of concern, or the entire requalification program.

a. A review of the records for 50 percent of the licensed operators is an acceptable sample for this inspection requirement. Licensee records are required to be maintained in accordance with the requirements of the requalification plan and associated administrative controls.

b. Requirements are specified in 10 CFR 55.53 (f) for the requalification of licensed operators after disqualification for not maintaining active duty status in accordance with 10 CFR 55.53 (e). Additional requirements for requalification may be specified in the requalification plan. The licensee may report disqualifications to the NRC and is required to report medical disqualifications by 10 CFR 55.25. If reports were filed, were the corrective actions specified in these reports implemented? Reasons for operator disqualification may include, but are not limited to the following:

    1. The operators were inactive as defined in 10 CFR 55.53 (e).

    2. The operators received an unsatisfactory rating in a supervisor's evaluation.

    3. The operators failed an annual examination.

    4. The operators failed to meet medical requirements.

c. A review for 50 percent of the licensed operators is an acceptable sample for this inspection requirement. Licensee requalification activities are required to be

conducted in accordance with the NRR-approved requalification program. Be alert for areas in which, or individuals for whom, training does not appear to be in accordance with the requalification program or the licensee's administrative control requirements. License expiration dates should be checked to verify that operator licenses are current and/or have been renewed as required by 10 CFR 55.57. Also, notification of change in operator or senior operator status is required from the licensee for operators that no longer need or can qualify for a license per 10 CFR 50.74.

03.05 Surveillance and Limiting Condition for Operation. Surveillance is the verification of set points and conditions required by the TS, both on a regular and irregular basis. This includes a wide variety of set points and conditions, such as reactivity measurements that may be required once or twice a year; certain conductivity checks that may be required weekly; and interlocks that must be checked before startup. Although some items may have surveillance frequencies established in more recent TS, some older TS may not have requirements for surveillance frequency. For older TS, if a need is established for the specification of a surveillance requirement, such as determining that a safety significant value or condition has a potential to not be satisfied because of inadequate surveillance, the inspector is to notify appropriate regional management and the NRR project manager for problem resolution.

All surveillance items associated with safety related systems or components are to be conducted in accordance with applicable licensee procedural requirements. Some facilities may not have TS that require the use of procedures. In those cases, consider the need for such requirements based on the results of performance based inspection observations. For example, if personnel do not have procedures, they may calculate rod worth by the positive period method, then by the rod drop method, and then by the 1/M method. Alternating methods in this way may produce different, widely disparate results for the same rod. This wide variation would make the worth measurements meaningless because the values do not result in a uniform basis for determining that core conditions had not changed. Thus, finding inconsistent results that do not meet the intent of a requirement may establish the need for specific procedures. Such discrepancies are to be brought to the attention of appropriate regional management and the NRR project manager for resolution.

Various chart recorder records and logs for the time of the surveillance are to be examined to verify that they support the surveillance results. Charts are normally marked regularly with date and time. Often recorder drives will slip, making it difficult to be precise. The inspector is to avoid looking for small errors in the records relative to time; instead, confirm that the record can be reasonably read and understood.

It is important that surveillances verify that design characteristics and safety review considerations are met. For example, nuclear instrument power calibration on most non-power reactors is simply a verification that safety assumptions have not been exceeded (e.g., assumption of 110 percent power for initiation of transients). If the licensee determines that nuclear instrument calibration was incorrect but the safety assumptions were still satisfied, the safety significance would be minimum. The descriptions in the TS, LCO, SAR (including plan and instrument drawings) and applicable

as-built system descriptions are to be used for this evaluation. Overall system function and the appropriate interlock features for important safety features are to be examined.

The individuals, designated in the licensee's administrative controls, are required to verify satisfactory completion of the surveillance requirements. For example, college students may perform some of the reactivity measurements as class projects. Before accepting the results, the licensee is required to review and approve them in accordance with procedural requirements. Verification of specific parameters is to be varied from the last inspection.

a. The observation of three TS required surveillance activities is an acceptable sample for this inspection requirement. If any design changes have been made, they are to be reflected in licensee surveillance activities.

b. Those values or conditions that have a definite bearing on safety, although they are specified or assumed by the TS and have no assigned surveillance frequency, are to be verified. These include parameters such as the required air flow for the argon-41 exhaust system. Observation of one TS LCO or design condition is an acceptable sample for this inspection requirement.

03.06 Experiments. The observation of 50 percent of the new experiments that have been approved since the last inspection is an acceptable sample for this inspection requirement.

a. Meeting minutes for the safety review committee are to be reviewed. The safety review committee is required to review each experiment or class of experiment prior to its conduct. The need for specific experiment review depends on the degree of its complexity and safety significance. If additional guidance is needed, see Inspection Procedure 69745, "Class I Non-Power Reactor Experiments."

b. If guidance is needed, the inspector is to refer to Inspection Procedure 69745 and the Guidance on 10 CFR in NRC Inspection Manual, "10 CFR 50.59 - Changes, Tests and Experiments."

c. The guidance for this inspection requirement may be found in applicable sections of Inspection Procedure 69745.

d. In accordance with 10 CFR Part 20, irradiated items are to be controlled until disposal, until they decay to an acceptable level or until they are acceptably transferred to another license. Additional guidance for this inspection requirement may be found in applicable sections of Inspection Procedure 69745.

e. Guidance is required for operators relative to any unusual hazards associated with an experiment, and the methods for identifying and responding to them.

f. During an experiment, the installation of items in the reactor and removal of items from the reactor is dependent on regulatory and administrative limits, the level of radioactivity anticipated or measured, engineered safety features and the qualifications of the individuals handling the items.

g. If the regulating rod position has not substantially changed with an experiment inserted, this is an adequate reactivity check for most near zero worth experiments. Are operators able to detect an experiment with an unexpected large worth? For example, does the operator have a conservative cutoff point for regulating rod movement or power level change, so that the value is actually calculated from information that is readily available to the operator? This would effectively assure that constraint limits, shutdown margin, excess reactivity, and individual and total worth of experiments are controlled as required by TS.

h. Engineering controls for experiments, such as temporary shielding, time, distance, or remote handling devices, will effectively limit occupational exposures to the levels required by 10 CFR Part 20, and the licensee's administrative limits. They will also help maintain exposures as low as reasonably achievable (ALARA). Access to areas where radiation is present is required to be posted in accordance with the 10 CFR 20.1902 and 20.1903 and be limited as required by licensee's radiation protection program. To assure that controls are established for the applicable requirements of 10 CFR 20.1601, 20.1602, 20.1901, and 20.1902; special attention is to be given to experiments that involve the use of neutron beam ports, if there is a reasonable potential for a radiation dose to a major part of the body, gonads or lens of the eye. Where applicable, additional guidance can be found in the Guidance Section of Inspection Procedure 69745.

03.07 Health Physics. This section provides guidance for the health physics inspection at Class II non-power reactors. It is not to be used for the inspection of other material licenses, including those of the NRC and if applicable the State. Concerns about other such licenses, are to be brought to the attention of appropriate regional management for resolution.

a. The review of about 50 percent of the dose records for facility personnel [e.g., Thermoluminescent Dosimeter (TLD) or film badge records], since the last inspection, is an acceptable sample for this inspection requirement. Subpart C of 10 CFR Part 20 provides the occupational dose limits for individuals in restricted areas. 10 CFR 20.1207 provides dose limits where minors have access to the facility.

b. Requirements for survey, sampling and monitoring can be found in Subpart F of 10 CFR Part 20, the TS, SAR, and SER. Records keeping requirements can be found in 10 CFR 20.2103. Licensee personnel are to be observed performing radiological surveys of one or two of the potentially higher radiation areas. If actual observations can not be made, the review of records for three radiation survey, sampling or monitoring activities will provide an acceptable sample for this inspection requirement. Radiological surveys may also be performed by the inspector. Areas of potential higher radiation dose include those around beam ports, thermal columns, experimental stations, and ion exchangers for cleanup of primary water, where applicable. Surveys of solid waste material are to be examined. Information Notice 85-92, "Surveys of Wastes Before Disposal from Nuclear Reactor Facilities," (Microfiche Address: 33776-296/33777-071), provides guidance for this activity. Current ongoing radiation measurements are to be compared with recently completed surveys, sampling, or monitoring in the same

area to verify that both measurements meet the requirements of 10 CFR Part 20 and the licensee's administrative limits. These measurements are expected to show reasonable agreement with those in the licensee's records. If not, does the licensee have a reasonable technical explanation for the difference?

c. The review of about 50 percent of the instruments and calibration records that were used for required radiation measurements is an acceptable sample for this inspection requirement. ANSI N323-1978, "Radiation Protection Instrumentation Test and Calibration," provides additional guidance in this area. Do radiation measurement instruments have current calibrations appropriate to the types and energies of radiation to be detected and does the licensee calibrate and maintain this equipment in accordance with manufacturers' recommendations?

d. Normally, the licensee's personnel monitoring program includes provisions for monitoring beta, gamma, and fast and slow neutrons. Monitoring devices include, but are not limited to, film or TLD whole body badges, direct or indirect reading pocket ionization chambers and extremity badges (where appropriate). Have facility personnel been issued appropriate dosimetry and are they wearing it as required? If licensees process their own personnel dosimeters, the process is to be reviewed and evaluated. Regardless of who performs the processing of personnel monitoring devices, the process is required to satisfy the requirements of Subpart F of 10 CFR Part 20.

e. The review of one record for an effluent release to the atmosphere and one liquid effluent release is an acceptable sample for this inspection requirement. The licensee's records will indicate compliance with applicable conditional release limits in 10 CFR 20, Appendix B, the TS, or the license. The licensee may have been authorized by TS or license condition to release concentrations above the limits in Appendix B to 10 CFR 20.

f. The above review of one effluent release to the atmosphere and one liquid effluent release, plus the verification of the location and calibration for one monitoring instrument for each system is an acceptable sample for this inspection requirement. The licensee may use on-line monitoring or grab sampling, as required, to monitor effluent releases. The licensee's procedures normally provide a calibration frequency for effluent monitoring instruments and a schedule for maintenance consistent with manufacturers' recommendations. Are all instruments calibrated and maintained as required? Argon-41 is normally the most common effluent released to the atmosphere. Is monitoring instrumentation calibrated and verified to be accurate for its energy? Further guidance, can be found in the general guidance in ANSI/ANS-15.11. If the licensee calculates Argon-41 generation and release versus measurements, the calculations should be based on a best estimate evaluation for neutron fields, air volumes, and release rates. For example, typical calculations use the average neutron fluence in an experimental facility rather than the maximum nearest the reactor. Liquid effluent releases are usually reactor dependent and can include isotopes of aluminum and silver, as well as, isotopes of cobalt and iron. Isotopes that are expected for a specific reactor may be readily identified by the correct analysis of liquid effluent release samples.

g. No guidance needed.

h. Areas required to be posted include radiation areas, high radiation areas, very high radiation areas, areas where radioactive materials are used or stored, areas where there is airborne contamination, and general access control areas. In addition, sealed sources or devices that produce ionizing radiation, possessed by the licensee under the reactor license, and the areas in which they are stored, are required to be posted as well. Refer to 10 CFR 20.1901 and 1902.

i. In accordance with 10 CFR 19.12, does the licensee provide requirements for protective clothing in the procedures or precautions posted at the entrance to controlled areas? Such protective clothing may include, but is not limited to, gloves, booties, lab coats, coveralls, and plastic or rubber aprons for use with liquids.

j. Particular attention is to be given to experimenters, especially college students, who may not be familiar with radiation control techniques related to their experiment or project. Does the licensee control licensed activities and provide acceptable instruction as required by 10 CFR 19.2? Where required by procedures, this may include "dry runs", demonstrations, formal lectures, films, and testing, and include training on the provisions of Regulatory Guide 8.13, "Instructions Concerning Prenatal Radiation Exposure," where appropriate.

k. Considerations that have been taken to reduce radiological exposure(s) in accordance with 10 CFR 20.1101(b) for a specific activity that provides a significant potential or contribution to the dose of personnel, the public or environment, are to be reviewed and discussed with licensee management. This activity need not be repeated if it was covered in the experiment section of this inspection procedure. If significant cumulative radiological doses arise from multiple specific low dose activities, review and discuss with licensee management the cause of these doses to see if they can be made ALARA.

l. Selected discussions with the Radiation Safety Officer (RSO), or equivalent, relative to their responsibilities, duties, authorities and limits is an acceptable sample for this inspection requirement. Specifically, is the RSO involved in and aware of the reactor facilities total program, as it relates and effects radiation protection activities? This includes not only routine radiation safety activities, but the review of experiments, incidents, unusual occurrences, audit findings, committee activities, and radiation protection procedure changes. Is the RSO responsible for other areas in addition to radiation safety? Required lines of communication, relative to the reporting of radiation safety concerns to licensee upper management, are specified in TS.

m. Requirements for respiratory protection can be found in 10 CFR 20.1701-1704. Guidance on the use of respiratory protection equipment is given in Regulatory Guide 8.15, "Acceptable Programs for Respiratory Protection," and NUREG-0041, "Manual of Respiratory Protection Against Airborne Radioactive Materials" (Microfiche Address: 90209/133-280). Consistent with maintaining the total effective dose equivalent ALARA, 10 CFR 20.1702 requires, when engineering

controls are not practical, that intakes of radioactive material be limited by other means. One of the alternatives is the use of respiratory protection equipment. Question 60 and its answer in NUREG\CR-6204 (Microfiche Address: 79590/226-333), provides additional guidance. Other means of meeting ALARA may also be acceptable. Most Class II research and test reactor licensees are not expected to have airborne contamination requiring the use of respiratory protection equipment for the purpose of protection against radiation. Confirmation of this is acceptable to satisfy this inspection requirement.

n. Although planned special exposures are not normally expected at research and test reactors, they may be necessary under some circumstances. Requirements for planned special exposures can be found in 10 CFR 20.1201(b); 20.1206; 20.2104(b); 20.2104(e)(2); 20.2105; 20.2106; 20.2202(e); and 20.2204. Guidance can be found in the response to comments on the final rule, "Standards for Protection Against Radiation," (56 FR 23371-23372 or microfiche address 58869-132 to 58869-136); 10 CFR 20.1003; and Regulatory Guide 8.35, "Planned Special Exposures." Further guidance is provided in Questions and Answers 8, 20, 24, 63, 135, 136, 137, and 112 in NUREG/CR 6204. Other means of meeting these regulations may also be acceptable. As previously indicated, the application of a planned special exposure to a Class II research or test reactor is not expected and the verification that no such exposures were recorded is acceptable to satisfy this inspection requirement.

o. Requirements for the dose to the embryo/fetus and exposures for declared pregnant women can be found in 10 CFR 20.1208, and 10 CFR 20.1502(a)(2) and (b)(2). Respective record keeping requirements can be found in 10 CFR 20.2106(e) and (f). 10 CFR 20.1003 provides associated definitions. Declaration of pregnancy is voluntary and is required to be in writing; the declaration is revocable by the woman, who does not need to provide any "medical proof" of pregnancy. Where there have been declared pregnant women at the facility, since the last inspection, verification that exposure records meet the preceding requirements for at least one and up to one half of the declared pregnant women would satisfy this inspection requirement. If there have been no declared pregnant women working at the facility since the last inspection, verification that the licensee has appropriately made training available to facility employees relative to the radiation hazards and exposures to the embryo/fetus of declared pregnant women is acceptable to meet this inspection requirement.

The final rule, "Standards for Protection Against Radiation," (56 FR 23372-23374 or microfiche address 58869-137 to 58869-141), and questions and answers 59, 84, 120, 138, 382, 416, 439, 440, 441, 442, and 443 in NUREG 6204 provides guidance in this area. Regulatory Guide 8.36, "Radiation Dose to the Embryo/Fetus," provides an acceptable method for the assessment of the dose to the embryo or fetus. Regulatory Position 2.3 to Regulatory Guide 8.7, "Instructions for Recording And Reporting Occupational Radiation Exposure Data," provides guidance on record maintenance and reports for the embryo/fetus dose. Regulatory Position 4 in Regulatory Guide 8.35, "Planned Special Exposures," provides guidance on exposures to the embryo/fetus of declared pregnant women.

p. The requirements for a radiation protection program can be found in 10 CFR 20.1101. Respective record keeping requirements can be found in 10 CFR 20.2102. It is acceptable for a licensee implementing the requirements of 20.1101(c) to use a combination of reviews and audits each year that cover all aspects of the radiation protection program during a two to three year cycle (rather than a one-year cycle), provided that the combination of these reviews and audits completely covers program content and implementation. In reviews and audits, the following features are important for the assessment of procedural compliance, technical performance, implementation, and the effectiveness of the facility radiation protection program:

1. Periodic observations by facility supervisors of the effectiveness of the staff in such areas as radiological work practices, work monitoring, procedural compliance, and survey adequacy.

2. Audits performed by the radiation safety group in accordance with their program requirements.

3. Safety committee audits and evaluations required by the TS to determine whether the radiation protection program complies with regulatory requirements and licensee commitments.

q. Licensee records are to be reviewed to determine the magnitude of the annual air effluent releases from the licensee's facility and whether they meet 10 CFR 20.1101(d). This regulation applies a constraint of 10 millirem in a year to the exposure resulting from air effluents. The difference between this constraint and the limits in 10 CFR 20.1301 is that exceeding a constraint level does not necessarily result in enforcement action, whereas exceeding a limit always results in enforcement action. Acceptable methods to estimate the dose from air emission, and thereby show compliance, are described in Regulatory Guide 4.20, "Constraint on Releases of Airborne Radioactive Materials to the Environment for Licensees Other than Power Reactors." Licensees may also use their own site-specific methods for showing compliance, subject to NRC approval before use (e.g., SAR methods for effluent dose calculations). In cases where the constraint is exceeded, the licensee is required to notify NRC that the constraint was exceeded, describe the corrective actions to be taken, and the schedule for completion of such actions to ensure the constraint will not again be exceeded. Enforcement action may be taken if such reports are not filed as required by 10 CFR 20.2203 or if corrective action does not prevent recurrence.

03.08 Design Changes. A general review of design changes, since the last inspection, is to be done to determine if there were significant design changes that could affect the assumptions of the safety analyses or affect personnel or public safety in another manner. Requirements can be found in 10 CFR 50.59. Guidance can be found in the "10 CFR Guidance" in the NRC Inspection Manual, "10 CFR 50.59 - Changes, Tests and Experiments," and Inspection Procedure 40745 "Class I Research and Test Reactor Review and Audit, and Design Change Functions." Design changes consider:

a. Any facility change or modification which will require a change to the facility TS or meets the criteria of 1 CFR 50.59(c)(2)i through viii to be reviewed and approved by NRR before the change is made.

b. The requirements for testing are supposed to be in the licensee's design change package, and may require acceptance and preoperational tests to demonstrate that the modified system is consistent with the commitments and requirements in the SAR, SER, and the TS. The test records will provide evidence of approval and acceptance by the appropriate authority as required by respective licensee procedures.

c. Changes may involve operating, maintenance, surveillance testing and radiological procedures. Does the licensee verify that procedures for a revised system can be used to perform their intended function? Walk through one procedure affected by the design change to verify it can be used to perform its intended function. The guidance in Section 03.03.c above can be used for the walk-through. Performance of this part of the inspection can be substituted for one of the procedures to be examined in 02.03 above.

d. Prepared sketches or engineering drawings used to perform design modifications are to be compared with the actual system configuration and the updated as-built drawings to determine consistency. Were the as-built drawings updated in accordance with licensee procedural requirements?

03.09 Committees, Audits and Reviews. This part of the inspection is to determine whether the licensee's committee, audit and review processes assure that license and TS requirements are met and that the licensee has taken ownership and fulfilled their responsibility to assure that NRC regulatory requirements are satisfied. The requirements for committees are normally found in the facility TS. The TS at older facilities may not require independent audits and reviews. Where audits and reviews are required, the reports are to be reviewed to verify that they have been conducted as required. In some facilities it may be difficult to conduct truly independent audits and reviews, because of the limited size of the staff. In such cases, was the individual(s) selected qualified and provided adequate guidance to perform a critical review of the functions examined? Was the examination performed in accordance with licensee procedures? Particular attention is to be given to committee actions and recommendations on audits and facility events, and the respective follow-up actions by the committee and line management.

a. The observation of a safety review committee meeting or the review of 50 percent of the safety review committee meeting minutes, since the last inspection, is an acceptable sample for this inspection requirement. Requirements for meetings are normally found in the administrative section of TS. The safety review group or committee is required to be technically competent and review and approve all significant activities. This includes procedures and changes to procedures, design changes and experiments that may involve 10 CFR 50.59. The committee may collectively review and approve all repetitive experiments that share safety considerations. Were controls for visitor access to the reactor facility for the purpose of performing experiments reviewed by the committee? Does the committee also review the training and qualifications of personnel who perform

safety functions at the reactor facility? This review need not be repeated here if the functions of the review committee were reviewed in the experiment, procedure, or design change sections of this inspection procedure.

b. The review of two audit reports is an acceptable sample for this inspection requirement. Audit requirements are generally in the administrative controls section of the TS, and the licensee's procedures. These requirements may include audit checklists and plans to assure that license and TS requirements are satisfied.

However, the requirements for audits are not uniform and may not be specified in the TS or the licensee's administrative controls, particularly at older facilities. If a safety or non-compliance issue raises the need for NRC required audits, appropriate regional management and the NRR project manager are to be informed to resolve the issue. This resolution process is to strongly consider indicating to the licensee that other licensees have cooperated in peer reviews to evaluate their programs, and that this may be useful for this licensee.

If the licensee's audit function adequately identifies and resolves problems, acknowledge this and give credit to licensee management. The inspection activity is not to stifle a functional audit system. For example, even if the audit identifies problems or violations, care is to be taken so that licensee management understands that an audit system that functions properly has many safety benefits and the use is to be encouraged. Depending on the safety significance of the issue, the NRC strongly considers the use of enforcement discretion as allowed by 10 CFR Part 2, Appendix C; to not penalize the licensee for discrepancies identified in an audit system that functions well.

The licensee may use their own personnel to conduct TS required audits or may use personnel from different non-power reactors. Regardless of who conducts the audits, the means by which audit concerns were resolved are to be discussed with licensee management. Were concerns or problems prioritized, assignments made, and technically adequate corrective actions taken in accordance with licensee procedures?

c. The review, of the licensee's followup and corrective actions for one audit and on one event, is an acceptable sample for this inspection requirement. The safety review committee (or equivalent) normally reviews audit results and events and makes root cause assessments and corrective action recommendations in accordance with licensee procedures. Does licensee management address the audit identified problems and events, and consider safety review committee assessments and recommendations? Required reviews include safety review committee and licensee management reviews of procedures, experiments, and design changes. This portion of the inspection need not be repeated if accomplished under the procedure, experiment or design change sections of this inspection procedure.

03.10 Emergency Planning

a. Verification that the emergency plan and two emergency plan implementing procedures are current, readily available, and have been reviewed and approved is an acceptable sample for this inspection requirement. In accordance with the regulatory requirements and licensee administrative procedures, the implementing procedures are required to be reviewed, approved, and up-to-date. The emergency plan and implementing procedures are to be readily available for use by key emergency response personnel such as, operators, senior operators, the facility emergency director, and health physics personnel. The emergency plan and implementing procedures are normally found either in the control room and in the adjacent facility director's office which serve as emergency response facilities.

b. The types of exercises and drills require the frequencies required for their conduct are specified in the emergency plan. Exercise and drill records are to be reviewed to verify that they were conducted as required, and that appropriate individuals participated in the exercises and drills.

c. Verification of the training for two key emergency response personnel and one individual authorized access to the facility (e.g., experimenter) is an acceptable sample for this inspection requirement. This may be accomplished by record review and discussions with respective personnel. Authorized personnel in the immediate areas of an incident are required to be able to recognize the indicators of the emergency and know the immediate actions to take to minimize the hazard to themselves and to untrained persons in the area and the environment.

d. An event scenario that is credible for the facility and the expected response is to be discussed with key emergency response personnel. Observation of an exercise or drill is also an acceptable sample for this inspection requirement. The following are to be discussed or observed:

1. Key facilities, supplies, equipment, and instrumentation required to be available in accordance with the emergency plan and the licensee's administrative control requirements.

2. The notification rosters and communications systems required to mobilize the licensee's organization to respond as stated in the emergency plan.

3. The licensee's key emergency response personnel required to implement the requirements of the emergency plan and implementing procedures.

4. Related offsite support (such as offsite medical or police support) required to be available in accordance with the emergency plan.

5. The alarm system function as required by the emergency plan. This may be verified either by initiating an alarm (coordinated test, not a drill) or by discussing the calibration or test methods used by the facility to verify operability.

6. The implementation of appropriate licensee plans in the event of a power failure in accordance with the emergency plan and licensee administrative controls.

03.11 Maintenance Logs and Records. Selected maintenance logs and records are to be reviewed.

a. The logs from several time intervals after the previous inspection are to be briefly reviewed to determine if there were problems that have not been identified elsewhere. A review of about 50 percent of the maintenance logs and records, since the last inspection, is an acceptable sample for this inspection requirement.

b. Credit in this area may be taken to satisfy the inspection requirements in the review and audit portion of this procedure. Were problems resolved in accordance with licensee procedural requirements?

c. A review of one maintenance activity is an acceptable sample for this inspection requirement. Tagouts, jumper controls, and authorizations for maintenance are to be examined. Are the level of authority and review required to conduct maintenance on the various systems and conditions specified by the licensee? These records are to be compared with the radiation protection records to determine whether the licensee has acceptably implemented radiation control requirements for maintenance activities.

03.12 Fuel Handling Logs and Records. Actual observation of fuel handling or the review of about 50 percent of the fuel handling logs, since the last inspection, is an acceptable sample for this inspection requirement.

Fuel handling records may be entries in the operator logs, separate drawings and listings of fuel movement and locations, or combinations of these types of documents. It is important that records indicate that the licensee moved fuel to locations designed to prevent inadvertent criticality, such as storage locations specified in SAR. Is the final, actual location of the fuel consistent with that specified in the records? The fuel handling logs will also verify that the licensee accomplished fuel or control rod inspections required by the TS.

If fuel handling is to be observed, the inspection schedule is to be coordinated with the licensee for planned fuel movement activities. Under no circumstances is the licensee to change a planned schedule of fuel movement to accommodate the inspection schedule.

69001-04 RESOURCE ESTIMATE

For planning purposes, the estimated, direct, onsite inspection effort to complete this inspection procedure is 60 hours. Actual inspection at any facility may require more or less effort depending on past inspection history, conditions at the facility, and safety significance of the inspection findings.

69001-05 REFERENCES

Regulatory Guide 2.1, "Shield Test Program for Evaluation of Installed Biological Shielding in Research and Training Reactors," May 1973.

Regulatory Guide 2.2, "Development of Technical Specifications for Experiments in Research Reactors," November 1973.

Regulatory Guide 2.3, "Quality Verification for Plate-Type Uranium-Aluminum Fuel Elements for Use in Research Reactors," July 1976.

Regulatory Guide 2.4, "Review of Experiments for Research Reactors," May 1977.

Regulatory Guide 2.5, "Quality Assurance Program Requirement for Research Reactors," October 1977.

Regulatory Guide 2.6, "Emergency Planning for Research Reactors," March 1983.

ANSI/ANS-15.1, "Development of Technical Specifications for Research Reactors," 1982.

ANSI/ANS-15.2, "Quality Control for Plate-Type Uranium-Aluminum Fuel Elements," 1974.

ANSI/ANS-15.3, "Records and Reports for Research Reactors," 1974.

ANSI/ANS-15.4, "Selection and Training of Personnel for Research Reactors," 1977.

ANSI/ANS-15.6, "Review of Experiments for Research Reactors," 1974. (Withdrawn because of incorporation into ANSI/ANS-15.1.)

ANSI/ANS-15.7, "Research Reactor Site Evaluation," 1977.

ANSI/ANS-15.8, "Quality Assurance Program Requirements for Research Reactors," 1976.

ANSI/ANS-15.11, "Radiological Controls at Research Reactors," 1993.

ANSI/ANS-15.12, "Design Objectives for and Monitoring of Systems Controlling Research Reactor Effluents," 1977.

ANSI/ANS-15.15, "Criteria for Reactor Safety Systems of Research Reactors," 1978.

ANSI/ANS-15.16, "Emergency Planning for Research Reactors," 1982.

ANSI/ANS-15.17, "Fire Protection Program Criteria for Research Reactors," 1981.

ANSI/ANS-15.18, "Administrative Controls for Research Reactors," 1979.
(Withdrawn because of incorporation into ANSI/ANS-15.1.)

ANSI/ANS-15.19, "Shipment and Receipt of Special Nuclear Material (SNM) by Research Reactors."

ANSI/ANS-15.20, "Criteria for the Reactor Control of Safety Systems of Research Reactors."

ANSI N323-1978 "Radiation Protection Instrumentation Test and Calibration."

END