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Operational Readiness Review Savannah River Replacement Tritium Facility

February 1993

U.S. Department of Energy
Assistant Secretary for Defense Programs
Operational Readiness Review Team
Washington, D.C. 20585

MASTER

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Feb 1993

USDOE Assistant Secretary for Defense Programs, Washington, DC (United States). Operational Readiness Review Team

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EXECUTIVE SUMMARY

The Operational Readiness Review (ORR) is one of several activities to be completed prior to introducing tritium into the Replacement Tritium Facility (RTF) at the Savannah River Site (SRS). The Secretary of Energy will rely in part on the results of this ORR in deciding whether the startup criteria for RTF have been met.

The RTF is a new underground facility built to safely service the remaining nuclear weapons stockpile. At RTF, tritium will be unloaded from old components, purified and enriched, and loaded into new or reclaimed reservoirs. The RTF will replace an aging facility at SRS that has processed tritium for more than 35 years. RTF has completed construction and is undergoing facility startup testing. The final stages of this testing will require the introduction of limited amounts of tritium.

The U.S. Department of Energy (DOE) ORR was conducted January 19 to February 4, 1993, in accordance with an ORR review plan which was developed considering previous readiness reviews. The plan also considered the Defense Nuclear Facilities Safety Board (DNFSB) Recommendations 90-4 and 92-6, and the judgements of experienced senior experts. The review covered three major areas: (1) Plant and Equipment Readiness, (2) Personnel Readiness, and (3) Management Systems. The ORR Team was comprised of approximately 30 members consisting of a Team Leader, Senior Safety Experts, and Technical Experts. The ORR objectives and criteria were based on DOE Orders, industry standards, Institute of Nuclear Power Operations guidelines, recommendations of external oversight groups, and experience of the team members.

This report contains Findings and Observations. A Finding is defined as a concern requiring completion of corrective action prior to tritium introduction, and an Observation is a concern requiring corrective action but which may be completed after tritium introduction.

The ORR Team has concluded that RTF can introduce tritium to support completion of the startup test program and can then be safely operated, after verifying correction of the Findings that are described in this report and after other Findings from previous reviews are corrected. Continued operation of RTF also requires timely correction of the Observations listed in this report.

This report indicates the level of review recommended for verification of the closeout of each Finding. Completion of corrective action by Westinghouse Savannah River Company (WSRC) for observations is not required until after tritium introduction. In this regard, it is recommended that a DOE Headquarters appraisal be conducted of the corrective action for Observations about 6 months after introducing tritium into RTF.

DEPARTMENT OF ENERGY
OPERATIONAL READINESS REVIEW
OF THE
SAVANNAH RIVER SITE
REPLACEMENT TRITIUM FACILITY
233-H

1.0 INTRODUCTION

Secretary of Energy Notice (SEN) SEN 16B-91, "Approval for Restart of Facilities Shut Down For Safety Reasons and For Startup of Major New Facilities," dated November 12, 1991, defines the process for obtaining approval for the startup of a facility and includes the requirement for the conduct of the Department of Energy (DOE) Operational Readiness Review (ORR) and resolution of any identified issues. The purpose of this DOE ORR was to comply with the above guidance and verify the readiness of the Savannah River Site (SRS) to safely introduce tritium and startup the Replacement Tritium Facility (RTF) by evaluating whether Westinghouse Savannah River Company (WSRC) and the DOE Savannah River Field Office (SR) have in place those programs, procedures, and controls which ensure the safe operation of the facility.

The DOE conducted the ORR in conformance with an ORR review plan which was developed based on previous readiness reviews conducted at DOE facilities, recommendations of the Defense Nuclear Facilities Safety Board (DNFSB), and the judgements of experienced technical experts. The Assistant Secretary for Defense Programs selected an ORR Team Leader who in turn selected the Group Leaders, Senior Safety Experts, and approved the Technical Experts for the ORR. The Team members developed the DOE ORR review plan including the Scope, Schedule, and Criteria and Review Approach Documents (CRADs). In accordance with SEN-16B, the ORR review plan was transmitted to the Office of Nuclear Safety (NS) and the Assistant Secretary for Environment, Safety and Health (EH) for their review and comments; discussed with the staff of the DNFSB; and was approved by the Team Leader on December 31, 1992. The Secretary of Energy approved the start of the ORR on January 15, 1993. The ORR was conducted from January 19 through February 4, 1993.

1.1 BACKGROUND

The SRS is a government-owned, contractor-operated facility that is part of the nation's nuclear weapons complex. WSRC is the contractor responsible for the operation of this facility. The Replacement Tritium Facility at SRS processes tritium, a vital component in nuclear weapons technology. At the RTF, tritium, a radioactive isotope of hydrogen, is unloaded from old components, purified and enriched, supplemented by tritium from the SRS reactors, and loaded into new or reclaimed reservoirs. The building itself covers one acre underground. The RTF incorporates state-of-the-art metal-hydride technology to ensure a safe and efficient supply of tritium to the weapons complex through the twenty-first century.

1.2 SCOPE AND OBJECTIVES

The ORR Team Leader, Group Leaders, and Senior Safety Experts developed the ORR inspection strategy based on results of previous readiness reviews and professional technical judgments. An ORR plan was written including the ORR Scope, Objectives, and detailed Criteria and Review Approaches that were assigned to team members. In addition, the plan contained the schedule, administrative requirements, and the proposed staffing plan. The ORR plan was distributed in draft to WSRC, Defense Programs (DP) Headquarters line management, SR, NS, EH, and to the DNFSB for review and comment. The ORR plan was approved on December 31, 1992.

The Objectives of this DOE ORR were as follows:

The configuration of facilities and equipment in RTF, including safety systems, is consistent with approved plant safety documentation. (H.1)

The condition and operability of safety systems are adequate to support the safe startup of tritium operations. (H.2)

Operational support service facilities and equipment are available including those for training, maintenance, waste management and environmental protection, industrial safety and hygiene, radiological protection and health physics, emergency preparedness, fire protection, quality assurance, and engineering. (H.3)

There are sufficient numbers of qualified tritium operations personnel, supervisors, shift technical advisors, and managers to support safe tritium operations. (P.1)

As a minimum, one DOE person trained and qualified in plant operations will be stationed in RTF during operations that involve tritium. (P.2)

Sufficient numbers of qualified personnel are provided for operational support services, including training, maintenance, industrial hygiene, radiological protection and health physics, emergency preparedness, fire protection, quality assurance, and engineering. (P.3)

Personnel exhibit an awareness of safety and environmental protection requirements and through their actions, demonstrate a commitment to comply with these requirements. (P.4)

There are adequate procedures and safety limits for operating and maintaining RTF systems. (M.1)

Training and qualification programs for tritium operations personnel have been established, documented, and implemented. (M.2)

Safety systems are defined and a system to maintain control over their design and modification is established and implemented, as appropriate, for their safety significance. (M.3)

A system is in place to confirm and periodically reconfirm the condition and operability of safety systems. (M.4)

A process has been established to identify, evaluate, and resolve deficiencies and recommendations made by oversight groups, official review teams, audit organizations, and the operating contractor. (M.5)

A baseline compliance status review of specified DOE Orders has been performed. Noncompliant items have been addressed. (M.6)

Management systems are established to ensure operational support services (e.g., maintenance, waste management, environmental protection, industrial safety and hygiene, radiological protection and health physics, emergency preparedness, fire protection, quality assurance, and engineering) are adequate for tritium operations. (M.7)

A program is established to promote a sitewide culture that places the highest priority on safety and the protection of the environment. (M.8)

The results of the WSRC review verify the readiness of hardware, personnel, and management systems for tritium operations. (M.9)

An adequate startup test program has been developed and implemented. (M.10)

Management authority, responsibility, and accountability are defined, understood, and implemented to ensure line organization control of safety. (M.11)

The DOE Savannah River Field Office has established adequate oversight programs to ensure the safety of tritium operations. (M.12)

The implementation status for DOE 5480.19, Conduct of Operations Requirements for DOE Facilities, is adequate for tritium operations in RTF. (M.13)

1.3 METHODOLOGY

The ORR Team consisted of a senior DOE Manager who was the Team Leader, Senior Safety Experts, Group Leaders, and Technical Experts. The Team also had an Administrative Assistant and was supported by secretaries.

The Senior Safety Experts were chosen by the Team Leader and assisted the Team Leader in the disposition of the technical issues raised. Each of the Senior Safety Experts had extensive experience in the nuclear Navy and/or commercial nuclear field. In addition, each Senior Safety Expert had significant management experience and familiarity with the DOE review process. The Senior Safety Experts assisted the Team Leader in the definition, classification, and assessment of the significance of issues raised in the review process. Each Senior Safety Expert signed the final report, concurring in the disposition of the issues raised.

The four Group Leaders were also chosen by the Team Leader to manage the efforts of the Technical Experts assigned to the four functional groups. The

background and experience of the Group Leaders was similar to that of the Senior Safety Experts. In addition to managing the efforts of the Technical Experts within the group, the Group Leaders were responsible for coordinating issues which were common between the groups.

The Technical Experts were selected by the Group Leaders and approved by the Team Leader. Based upon their expertise, each Technical Expert was placed in one of four functional groups:

- Operations - included organization; operator competency; conduct of operations; operating and emergency procedures; safety culture improvement; accident management; and system and component adequacy.

- Maintenance, Testing and Surveillance - included organization, planning, procedures, training, and culture improvement; corrective and preventive maintenance; post maintenance testing; quality assurance associated with maintenance activities; conduct of maintenance; and surveillance inspections and testing.

- Engineering and Technical Support - included organization, technical staff competency, and safety culture improvement; plant modifications including post-modification testing; onsite engineering and technical support; procedures and documentation; document control; the building safety envelope development, documentation, and control; occupational safety and industrial hygiene; and fire protection.

- Management and Organization- included safety culture; responsibility of the operating contractor's organization; emergency preparedness; staffing; SR technical vigilance; operating experience; quality assurance; corrective action; self-assessment; radiation protection and health physics; environmental protection; and the overall training program, including operator training and qualification.

The Technical Experts were assigned responsibility for the review of selected criteria in accordance with approved approaches as directed by their Group Leaders. For each published criteria and review approach, one individual was assigned primary responsibility for the review. In many cases, support from other groups was directed. These assist assignments were made by the supporting Group Leaders.

During the onsite portion of the ORR, the documentation of strengths or weaknesses of the review and the assembly of objective evidence of operational readiness was the responsibility of the Technical Experts in accordance with specific assignments and directions given by the Team Leader and Senior Safety Experts. Each Technical Expert's views resulting from his or her review were documented on a standard worksheet (Form 1). The expert's views were submitted to the Team Leader and Senior Safety Experts via the Group Leader as the ORR progressed. At the completion of the onsite portion of the ORR, the Technical Experts completed all of their assigned criteria and review approaches and submitted the associated Form 1's to the Team Leader. The Group Leaders and Senior Safety Experts reviewed and discussed the contents of the Form 1's and assisted the Team Leader in developing recommendations

regarding the readiness to startup RTF. All of the Form 1's have been made available to the public and provide the detailed bases for this report.

The ORR Team conducted internal meetings and briefed DOE, WSRC, and oversight organizations daily during the ORR. It was not the intent to close-out each specific deficiency provided in the forms. These deficiencies were provided to point out the programmatic weaknesses in the SR and WSRC programs. The ORR Team expects SR and WSRC to not only correct the specific deficiencies cited, but to correct the causes for these deficiencies. No Findings or Observations were recorded in these forms.

This final report is a distillation of the information contained in the forms used to record review activities. In the following sections of the report, the functional areas summarize the information into a discussion covering each objective, with Findings and Observations listed with the applicable objective. For this report, a Finding is defined as a concern requiring corrective action completion prior to startup. An Observation is a concern requiring corrective action but which may be completed after startup. The Senior Safety Experts, Group Leaders, and Team Leader used the criteria of Appendix E of the Headquarters Procedure for the ORR at RTF in making a determination of significance of each weakness noted; whether it should be a Finding or Observation, or only contained in the Form 1 for the record. For each finding identified in this report, the ORR Team also recommended which office should have the responsibility for closure with annotation after each Finding. The recommended assignment of the office to verify the closure is as follows: SR means the DOE Savannah River Field Office; SR/TS means SR with Technical Support, HQ means the DP Headquarters line office.

The final report is signed by the Senior Safety Experts and the Team Leader. Each Technical Expert was provided a copy of this report for review and was given an opportunity to provide a statement of any differing technical opinion(s) for attachment to this report.

Permission to start up RTF will be requested from the Secretary of Energy when both SR and the Principal Deputy Assistant Secretary for Facilities agree that the criteria for startup have been met.

1.4 OVERALL ORR RESULTS

The ORR Team review concluded that startup of RTF can be accomplished and that RTF can be safely operated after satisfactory verification of correction of Findings that are described in this report, the open Findings from the WSRC ORR, and startup items currently tracked and scheduled by WSRC.

The ORR Team also concluded that corrective actions to meet the Observations contained in the report may be completed after startup.

If desired, and upon DOE request, individual members of the ORR Team will provide assistance in the closure of Findings.

2.0 RESULTS, FINDINGS, AND OBSERVATIONS

2.1 PLANT AND EQUIPMENT READINESS (H)

2.1.1 Summary

Plant and Equipment Readiness was divided into three objectives which were used to evaluate the readiness for startup based on:

- The configuration of facilities and equipment in RTF, including safety systems, is consistent with approved plant safety documentation.
- The condition and operability of safety systems are adequate to support safe tritium operations.
- Operational support service facilities and equipment are available; including those for training, maintenance, waste management and environmental protection, industrial safety and hygiene, radiological protection, quality assurance, and engineering.

The RTF Final Safety Analysis Report (FSAR) and supporting documents were the bases for evaluating the configuration of the facility and equipment. It was noted that the Seismic Detection and Isolation System (SDIS) is being redesigned. Also, seismic and soil related issues are being resolved. These issues are being addressed through the FSAR approval process, and therefore, were not considered by the ORR Team.

RTF systems and component configuration were inspected to verify the plant configuration with the design drawings. One inspection revealed deficiencies caused by a drawing for the seismic stack monitoring system foundation not being classified as a nuclear safety drawing.

Systems were inspected to verify the physical condition and operability of the system. The operability review included reviews of open paperwork against these safety systems. This review determined that 93 of 560 work packages were not field complete, and 198 work packages were field complete but must be closed prior to tritium introduction. Additionally, an improperly supported N_2 evacuation line is significantly deformed at several joints. Other potential safety violations were identified in Building 233-H overhead.

2.1.2 Discussion

Objective H.1 **The configuration of facilities and equipment in RTF, including safety systems, is consistent with approved plant safety documentation.**

Results

The review for this objective consisted of three phases. The first phase included the identification of the safety systems and the verification of installation of those systems in RTF. The second phase reviewed equipment

identification and labeling of safety systems. The final phase reviewed safety system installations against approved documentation.

Three identified safety systems were selected for a detailed review which included all phases: (1) the seismically qualified stack monitor, (2) a primary stripper system, and (3) the mix tank system.

The safety system classification process is based on the site Engineering Manual, Section 2.12, "Functional Classifications," and the Quality Assurance Manual, QAP 2-1. Under the RTF classification process, the safety class items described in DOE 6430.1A are classified as nuclear safety items. The RTF classification process results in the classification of each individual component which makes up a system, with the highest classification of any component in the system determining the overall system classification. A Master Equipment List has been developed which identifies the classification of each equipment item. The classification of all nuclear safety and critical protection components has been completed.

RTF systems and component configuration were inspected during facility tours and during the system walkdown of the mix tank system, the primary stripper system, and the stack monitoring system. Drawing accuracy with respect to system and component configuration is adequate with the exception of the integrated system drawing for the air monitoring system which did not include the seismic stack monitoring system.

The structural supports for the seismic stack monitors were not installed in accordance with drawing M-M6-H-4767. The anchor bolts are required to be anchored to the floor and the stand secured to the anchor bolts by installing two hex nuts. Only one hex nut was installed on each anchor bolt. The cognizant system engineer subsequently identified that the installation work package for the stand had not been closed out. Consequently, the installed configuration of the anchor bolts and lock nuts had not yet been inspected nor accepted by the design authority. Review of the work package used for installing this stand (Work Package T912-C-006-E1) revealed that the installation was being performed using the controls for a production support system instead of using the controls for a nuclear safety system.

The second phase of this review consisted of a comparison of the RTF labeling with the guidance of DOE 5480.19 and comparable industry standards. This phase also included a facility inspection of major portions of selected systems, including components and support systems. Labels on local control and display devices were inspected for readability and adequacy of lighting. Also, the facility was inspected for the adequacy of emergency lighting and any other equipment used to identify safety systems in an emergency.

The RTF labeling procedure is consistent with the requirements and guidance of DOE 5480.19 and industry standards. While some systems need to have independent verification of the installed labels performed, only one system, still under construction, has not completed the labeling process. The current schedule is projected to support permanent label placement and verification on nuclear safety and critical protection systems prior to tritium introduction into RTF.

RTF system and component tagging, labeling, and marking were also inspected. The referenced drawings were compared with the installed system components and their associated labels. With few exceptions, actual component labeling was consistent with the RTF labeling procedure. Labels were present on all instrumentation and operable equipment items, as well as on other major component items such as tanks, pumps and piping.

Component labels were missing for the primary stripper heater, the pressure transducer immediately downstream of the primary stripper heater, and the primary stripper purge stripper isolation valve. The RTF labeling coordinator presented formal documentation illustrating that the missing labels had previously been installed. The components in question had recently been replaced. An engineering review indicated that the missing labels were not transferred to the new equipment after installation. The Work Package procedures do not include steps to require labels removed from items to be reinstalled upon work package completion.

During these reviews, it was noted that the facility has not satisfactorily completed the Emergency Lighting System Functional Test, Standard Operating Procedure (SOP)-AP-233-00363. This issue is further addressed in Objective M.7.

The final phase consisted of an assessment of drawing accuracy. It was performed by comparing drawings of the three identified systems with the actual installation. These differences are identified above.

Finding

H.1-1 The drawing for the seismic stack monitor foundation (M-M6-H4767) was not classified as a nuclear safety drawing. (H.1.1.2) - SR

Observations

H.1-A The air monitoring integrated system diagram does not show the seismic exhaust monitor. (H.1.3.1)

H.1-B There is no formal process to ensure the reinstallation of previously installed equipment tags which are removed for maintenance or modification activities. (H.1.2.1)

Objective H.2 The condition and operability of safety systems are adequate to support safe tritium operations.

Results

A physical verification of safety system operability was conducted by reviewing technical bases, operational limits, and surveillance requirements of Technical Safety Requirements (TSRs) and performing walkdowns of selected nuclear safety systems. The functional requirements defined by the TSR and implemented by the Limiting Conditions for Operation (LCO) are adequate for

the prevention and/or mitigation of those accidents and abnormal events considered and analyzed for the facility.

Selected procedures were reviewed against industry standards, performance of procedures was witnessed, and completed work packages were reviewed.

The startup test program administrative procedures are well defined, controlled, and consistent with industry standards. There were about 169 tests identified requiring completion prior to deuterium introduction, with 4 tests not yet closed. Tritium introduction requires 70 tests with 15 yet to be performed and an additional 22 tests not yet fully accepted and closed.

The monthly surveillance tests for the Uninterruptible Power Supply (UPS) system batteries, the Seismic Switch Surveillance, and the Tritium Stack Monitor Functional Check were reviewed. With one minor exception, performance was adequate in all areas. Three completed work packages were reviewed. One package had deleted four quality assurance (QA) hold points which were marked as "not applicable." Memorandum, Nuclear Materials Processing (NMP)-TRQ-92-0153 permits such deletions, which is inconsistent with industry practice and normal practice at RTF. This issue is discussed in Objective M.7.

The procedures and programs controlling the maintenance backlog were reviewed with particular attention to nuclear safety and critical protection systems. Maintenance activities are being aggressively pursued, and there is an awareness throughout the various levels of management of maintenance issues and concerns. The controls for administering the maintenance backlog are comprehensive and adequate; however, there are about 500 work packages identified as field work completed but not yet closed out. One hundred and ninety-eight of these packages are required to be closed out before introduction of tritium. Three of these 198 packages involve nuclear safety components. In addition, 93 of the 560 prework packages (field work not completed) are required to be closed out prior to introduction of tritium. Three of these packages involve nuclear safety components.

Housekeeping practices and procedures are adequate, and no deficiencies of consequence were found in the walkdown of 15 rooms. However, during a walkdown of the overhead, significant deficiencies were found including excessive dirt and dust with significant construction debris (angle iron, tile, sheet metal, piping) throughout the overhead and an improperly supported N_2 evacuation line with significant deformation at several joints. The hazard analyses of 22 rooms have been completed by the industrial hygienist; however, the review and approval process is not yet complete. With the exception of the overhead, the present program meets the criteria for housekeeping and control of hazardous materials.

Measuring and test equipment calibration, including the control and the availability of tools and equipment to support maintenance, was reviewed and found adequate. One minor exception involved the calibration and maintenance of the digital hydrometers.

Findings

H.2-1 Numerous field work complete packages have not been closed. (H.2.2.2) - SR

H.2-2 Numerous housekeeping deficiencies and potential safety violations were identified in Building 233-H overhead area. (H.2.3.1) - SR

H.2-3 An improperly supported N_2 evacuation line is significantly deformed at several joints. (H.2.3.1) - SR

Observation

H.2-A The digital hydrometers are not calibrated or maintained on the measuring and test equipment calibration schedule. (H.2.1.1)

Objective H.3 Operational support service facilities and equipment are available, including those for training, maintenance, waste management and environmental protection, industrial safety and hygiene, radiological protection and health physics, emergency preparedness, fire protection, quality assurance, and engineering.

Results

Operational support service facilities and equipment were evaluated to determine availability and adequacy of support to the RTF. Specifically, the training, maintenance, waste management, environmental protection, industrial safety and hygiene, radiological protection and health physics, emergency preparedness, fire protection, quality assurance, and engineering areas were reviewed. All operations support areas were determined to adequately support the startup of the RTF.

The functions of required support service equipment and facilities were reviewed to assess applicable performance criteria. Calibration criteria were determined to exist for health protection, environmental monitoring, and industrial hygiene, such as portable air monitoring equipment. Calibration of the various equipment was reviewed and determined to be adequately defined and maintained. Program reviews conducted in each of the support areas concluded that equipment and facilities were being maintained sufficiently to support process operations and to satisfy applicable DOE Orders. No significant deficiencies were identified for support equipment or support facilities, with the exception of the stack monitoring system.

Equipment required for compliance with the stack monitoring National Emission Standards for Hazardous Air Pollutants (NESHAPs) permit is not operational (i.e., the operability tests and calibration checks have not been performed). However, necessary test and calibration procedures have been developed. While inspecting the installation, the ORR Team noted several material deficiencies affecting the operability of the system that were not being tracked as tritium introduction items.

Findings

None

Observations

None

2.2 PERSONNEL READINESS (P)

2.2.1 Summary

Personnel Readiness was divided into four objectives that were used to evaluate the readiness of WSRC and DOE personnel to support RTF startup activities. Three of these objectives addressed the adequacy of staffing levels and qualifications for:

- o Tritium operations personnel, supervisors, shift technical advisors, and managers.
- o DOE personnel to be stationed in RTF during tritium operations.
- o Operational support personnel, including training, maintenance, industrial hygiene, radiological protection and health physics, emergency preparedness, fire protection, quality assurance, and engineering.

The fourth objective examined personnel awareness of and commitment to safety and environmental protection requirements.

Training and qualification programs for RTF operations and operational support personnel were assessed through reviews of program documentation and records, observations of training and evaluation processes, and interviews with line personnel and management. In general, these programs were found to be well documented and consistent with operational requirements and applicable DOE Orders. Although most aspects of the training and qualification programs have been successfully implemented, deficiencies were identified with regard to the effectiveness of the RTF program for training on new or revised procedures. Deficiencies were also noted with regard to the qualification of some Shift Technical Advisors (STAs). An insufficient number of AOs were qualified to meet minimum staffing levels. Numerous deficiencies were noted during observation of a fire drill, both in terms of drill conduct by the WSRC Emergency Response Organization and in the ability of RTF personnel and supporting organizations to respond to the casualty.

Qualification programs and staffing levels for DOE Facility Representatives (FRs) were evaluated through reviews of program documentation, interviews with personnel and facility walkthroughs. The qualification and staffing level requirements have been formally established and are adequate. The scope and content of training programs for FRs are adequate for preparation of oversight duties. During facility walkdowns, FRs demonstrated familiarity with RTF programs, systems, operations, and personnel. However, reviews of examinations and interviews confirmed earlier DOE findings that weaknesses existed in knowledge of TSRs and the unreviewed safety question (USQ) program. Remedial training in these areas was determined to be weak. A review of records indicated that not all FRs have completed training necessary for qualification.

Awareness of safety and environmental protection requirements was assessed through interviews, reviews of training requirements and materials, and field

observations. Reviews of various program documentation and policies provided evidence of emphasis on safety and environmental protection. Interviews with facility management confirmed awareness of these programs and specific examples of management involvement were identified. Safety and environmental protection requirements are also addressed in a number of training courses required for tritium employees.

2.2.2 Discussion

Objective P.1 **There are sufficient numbers of qualified tritium operations personnel, supervisors, shift technical advisors, and managers to support safe tritium operations.**

Results

Training and qualification programs were reviewed to evaluate the adequacy of the coverage of technical fundamentals, and operations personnel were interviewed to assess their understanding of fundamentals. These programs were also evaluated to determine the extent of emphasis on procedural compliance and TSRs. Finally, an evaluation was conducted to determine whether qualification requirements were formally established, staffing requirements met, and whether the qualification process included practical demonstrations of proficiency.

A review of training requirements and course materials indicated that the operator training program does include a significant amount of training in areas of technical fundamentals. Oral qualification boards have identified some weaknesses in operator knowledge that are being remediated through additional fundamentals training. Records for operations personnel were reviewed, and it was verified that operators have completed required fundamentals training through Phase III of their qualification program. A review of the technical content was made by ORR operations experts who concluded that the training required through Phase III was adequate for tritium introduction. To determine whether operations staff had an adequate understanding of technical fundamentals, the ORR Team interviewed staff members. Additionally, oral board examinations were observed, and an adequate understanding of technical fundamentals was demonstrated.

The ORR Team reviewed the RTF program for ensuring that training is based on the latest version of procedures. This is accomplished through two processes. This program includes routing of all new and revised procedures to the Training Department for review. Managers then identify any requirements for modifying training programs under their control. Also, instructional developers and on-the-job training (OJT) instructors are required to obtain the latest copy of any procedures to be used in course development or delivery.

The ORR Team also reviewed the RTF procedure training program that provides for familiarizing personnel with revisions or new procedures. Training of this type is normally performed through conduct of shift briefings provided either by the Training Department, the line organization, or the procedure developer. To determine whether operators were receiving timely training on

procedure revisions, the ORR Team reviewed training files for ten RTF operations procedures. Deficiencies were identified with nine of these operating procedures providing evidence that the procedure training program is not effective. These deficiencies included instances in which training specified by line organizations had not been developed or completed by designated personnel. In some cases, insufficient lead time was provided before procedure implementation.

The ORR Team reviewed a number of training materials including lesson plans, examinations, and course outlines. Instructors were also interviewed and observed in OJT sessions. The ORR Team identified numerous examples of emphasis on procedural compliance and safety. Examples included the General Employee Training (GET) examinations taken by the ORR Technical Expert which had several questions pertaining to procedural compliance. Another example observed was the Facility Event Training class for RTF operators. In this course, the causes of actual facility events are examined stressing the importance of "thinking compliance" to prevent future errors. In reviewing the lesson plan for OJT instructors, it was also noted that instructors are specifically taught to explain the potential consequences of deviating from procedural steps. In observing OJT sessions, several instances of instructor emphasis on procedural compliance and safety were noted. Overall, training materials, including examinations, place a heavy emphasis on safety.

Interviews were conducted with operations staff to verify understanding of procedural compliance and its importance. Situational questions were posed which challenged operator knowledge of procedural compliance rules. Operators demonstrated adequate understanding during these interviews, but the ORR Team observed performance of selected procedures in the field and noted weaknesses in procedural compliance. This issue is addressed in Objectives M.1 and M.13.

The ORR Team reviewed RTF program documentation for formal qualification requirements. Procedures are in place that establish formal education, experience, and training requirements (SOP-PP-233-40014) as well as medical and proficiency requirements (SOP-PP-233-40013). The requirements are consistent with job duties as well as requirements of DOE 5480.20. Training requirements are established in the applicable Training Program Description for each position.

Qualification status reports were reviewed to assess adherence to training requirements. Records indicated that two STAs had not completed required training in operational safety requirements (OSRs)/TSRs even though they had been allowed to take oral board evaluations. Two STAs had also not completed the Material Control and Accountability course that is required in the Technical Staff Training Program in which STAs must be qualified. The fact that there is no programmatic guidance clearly stating the requirements for completing training prior to board evaluation is seen as a weakness.

The operator qualification process was reviewed, and the ORR Team found that proficiency is assessed for all tasks taught through OJT. Examples of these OJT evaluations were observed, and while weaknesses were noted in evaluations performed by one instructor, other sessions were very thorough. In addition, oral board exams are required for CROs, and walkthroughs are required for AOs.

The oral boards and walkdowns are very thorough and are seen as program strengths.

Program Descriptions were reviewed for each operations position to determine whether training programs adequately provide initial and continuing training. These descriptions include a task-to-training matrix that maps each task to the required type of training session. A systematic process had been used to identify training requirements (see Objective M.2) and to ensure that the resultant training program for operations personnel adequately addressed facility and system operational requirements. A review of selected training materials by ORR operations experts led the Team to conclude that the materials provided adequate coverage of specific subject matter. Although there is a requirement for continuing training identified in the Operator Program Description, the specific requirements and contents of the program have not yet been defined.

The ORR Team also reviewed training records for operations staff. Training in job-specific tasks and procedures has been completed as required through Phase III of the qualification program, which includes all training requirements determined by RTF to be required prior to tritium introduction. As noted above, a review of the technical content showed that the required Phase III training is adequate for tritium introduction.

Interviews were conducted with operators and oral board examinations were observed to determine operator understanding of how to operate safely within the RTF safety envelope. Interviews indicated that the concept of the "RTF Safety Envelope" was not clearly understood in numerous cases, although a verbal commitment to procedural compliance and adherence to TSRs was noted.

The ORR also included observation of a major fire and emergency preparedness drill. This exercise involved a fire, failure of the glovebox containment, rupture of the tritium filling lines, and simulated injury of one operator. The drill required radiological control personnel response, radiological field monitoring, fire department and ambulance response, building evacuation, and first aid. The drill was developed and controlled by the WSRC Emergency Preparedness Organization.

The WSRC Emergency Preparedness Organization is responsible for the preparation of emergency drills. This organization also leads the control, conduct, and critique of exercises for the areas. Formal drill manual preparation procedures are in place along with procedures for conduct of drills. Controllers and evaluators are briefed in advance of the drills as to their responsibilities. A graded approach is used for the degree of briefing given to players, based upon whether the drill is for training or performance evaluation purposes.

The exercise lasted approximately 2 hours and ended with a declaration of a successful suppression effort, first aid rendered to the victim and transported for medical care, securing of the sprinkler system, and restoration of all alarm circuits. A formal debriefing and critique was held with participants, WSRC and SR observers, and controllers. A formal report on the drill was prepared by WSRC Emergency Preparedness.

The following deficiencies were noted:

o Fire Suppression

- Lack of radioactive contamination protective clothing for the fire department response team.

- Fire responder queried the Security Inspector relative to the door to stairwell 2 being open (a 10 minute delay to obtain confirmation), rather than physically trying the door first (which was in fact open).

- Lengthy briefing by RTF radiation protection personnel prior to entry unreasonably delayed fire suppression and the Facility Emergency Coordinator (FEC) failed to take positive control of the situation.

o Medical Assistance

- A delay at the RTF gate caused by security entry confusion at the Central Alarm Station (CAS), which resulted in a waiting period of 12 minutes and the eventual redirection and entry through the Tritium Facility gate.

- The victim was not examined by the entering fire department hose team upon entry into the incident area (these individuals have emergency medical technician (EMT) training) prior to their attack of the fire.

- Radiological Control Technician attention to the potential of tritium contamination on the victims protective suit to the near exclusion of regard for his injuries and unconscious condition.

o Numerous simulation deficiencies were noted.

Other aspects of the conduct and control of the drill from an emergency preparedness standpoint are described in detail in Objective M.7. Additional drills and improved formality and training are needed by both RTF and emergency support organizations to demonstrate adequate casualty control prior to the introduction of tritium.

Findings

P.1-1 The process for training on new and revised procedures is not effective. (P.1.2.2) - SR

P.1-2 Some STAs were designated as qualified without completing all required training. (P.1.5.1) - SR

P.1-3 Sufficient numbers of qualified AOs are not currently available to meet minimal staffing requirements. (P.1.5.2) - SR

P.1-4 Satisfactory response to facility casualties has not been demonstrated. (M.7.5.1) (M.7.11.1) (M.13.1.2) - HQ

Observations

P.1-A Some OJT and practical factors evaluations did not provide a thorough evaluation of operator knowledge. (P.1.5.3)

P.1-B Requirements and content for continuing training have not been fully defined and documented. (P.1.6.1)

Objective P.2 **As a minimum, one DOE person trained and qualified in plant operations will be stationed in RTF during operations that involve tritium.**

Results

Qualification requirements and staffing levels were reviewed to verify whether adequate bases and criteria were established. The adequacy of the DOE FR training program was evaluated, including the required qualification program. A review was conducted to determine whether the FRs are adequately familiar with the facility, operating procedures, and the WSRC managers.

The adequacy of established staffing and qualification bases and criteria was reviewed. These bases and criteria are not documented; however, discussions with the Replacement Tritium Facility Program Office (RTFPO) Program Manager indicated that training requirements were developed from an informal needs analysis. The resultant training requirements were reviewed against the FR responsibilities and are adequate. The bases for establishing the FR staffing level were also evaluated and are adequate. The staffing requirements for the introduction of tritium and the bases are adequately documented in RTFPO documents and are understood by the RTF personnel. The number of assigned FRs, considering expected absences, is adequate.

The FR training program was evaluated to determine the adequacy in preparing trainees to fulfill their oversight requirements. Various training and qualification documents were reviewed, including the oral board package that consisted of the questions asked and the results. Based on document reviews and interviews with the FRs, some areas of weakness were identified in the FRs knowledge. These weaknesses had also been identified by the DOE oral board process and remedial training has been initiated. The remedial training was evaluated and is weak in the areas of the USQ program, TSR program, and tritium radiological controls. Training records were reviewed and indicate that one of the three assigned FRs has completed all the training and qualification requirements. The remaining two FRs are required to successfully complete the interim qualification process, and all three FRs need to complete remedial training prior to the introduction of tritium.

Facility walkthroughs were conducted with two FRs. The FRs were asked to locate key equipment, to explain its operation, and to discuss its potential safety significance during facility operations. The FRs demonstrated an ability to locate facility equipment and an understanding of system operations and related safety significant requirements. They are also very familiar with WSRC personnel and acted professionally at all times. Additionally, they

demonstrated adequate knowledge regarding their oversight roles and responsibilities during simulated normal and abnormal operations.

Finding

P.2-1 All of the FRs assigned to provide oversight of RTF operations have not completed the necessary remedial training and qualification requirements. (P.2.2.1) (P.2.2.2) - HQ

Observations

None

Objective P.3 Sufficient numbers of qualified personnel are provided for operational support services, including training, maintenance, industrial hygiene, radiological protection and health physics, emergency preparedness, fire protection, quality assurance, and engineering.

Results

Training programs for operational support positions were reviewed to evaluate coverage of technical fundamentals, and support personnel were interviewed to assess their understanding of fundamentals. Training and qualification programs were also evaluated to ensure that they were based on the latest revisions of procedures and that support personnel were trained on procedural revisions. An evaluation was conducted to determine whether qualification requirements were formally established and met, and whether the qualification process included "hands-on" demonstrations of proficiency. Finally, training program documentation and records were reviewed and operational support staff were interviewed to determine whether the level of knowledge achieved during qualification was adequate. Further discussion of the adequacy of staffing and qualification of the operational support services personnel is provided in the objectives addressing the individual support areas.

The ORR Team reviewed lesson plans and course outlines for training required for operational support positions to evaluate the adequacy of training in technical fundamentals. Instructors were interviewed and training facilities were toured. The ORR Team determined that technical fundamentals are covered by the required training programs. No technical deficiencies were noted in the training materials; however, the lack of a fundamentals course in RTF-specific systems for systems engineers was identified as a weakness. The engineering staff currently assigned to RTF have become knowledgeable of systems during the pre-startup period. An RTF system course is currently in preparation.

The ORR Team reviewed qualification status reports and individual training records for several positions in the Maintenance and Technical Staff organizations to determine whether operational support personnel had completed required fundamentals training. All maintenance personnel had completed fundamentals training, with two exceptions. These exceptions were discussed

with the Maintenance Training Manager, and the ORR Team verified that these individuals would not be considered qualified until all requirements were completed. Sufficient numbers of maintenance staff are qualified.

The ORR Team interviewed individuals from support organizations including: Engineering, Technical Support, Fire Protection, Industrial Hygiene, and Maintenance to assess their impressions of materials used in their training and their knowledge in these areas. The interviews verified that training materials were relevant to their jobs and appropriate to their educational levels. Individuals were generally enthusiastic about the training; however, there was some concern expressed by Engineering staff regarding the lack of formal training in Federal codes and standards provided to date. There were no deficiencies identified in their understanding of fundamentals.

The ORR Team reviewed qualification status reports and individual training records for several operational support positions to determine whether these personnel had completed training on procedures they perform. Since technical staff do not train to specific tasks or procedures, this review focused on maintenance training. For maintenance personnel, training on a task (or procedure) typically includes successful completion of classroom training in a related subject as well as OJT and completion of a job performance measure demonstrating mastery of the task itself.

The ORR Team reviewed documentation establishing requirements for qualification of operational support staff. The team verified that formal education, experience, and training requirements have been established (SOP-PP-233-40014) as well as medical and proficiency requirements (SOP-PP-233-40013). Requirements were determined to be consistent with requirements specified in DOE 5480.20.

Specific training requirements for each position are described in the respective Training Program Descriptions and were reviewed by the ORR Team. These programs were generally well documented and determined to be consistent with job duties and requirements stated in DOE 5480.20. Training programs based on these requirements, however, have not been fully implemented for supervisors, managers, and technical support staff.

The ORR Team also evaluated the qualification program to determine whether "hands on" or OJT evaluations of support personnel were required. Such a program does exist for maintenance personnel for tasks they perform and parallels the program in place for operations staff. Observations consisted of one session of OJT on Calibration of Rosemount Pressure Transmitters and hands on evaluations for performing a Diesel Fuel Oil Storage Level Switch Loop Check. Although the program in general was determined to be adequate, some weaknesses were noted in the specific sessions observed related to a lack of thoroughness in the evaluation. Technical inaccuracies with the procedure in use for the evaluation were not identified by the instructor or the trainees. Additional training has been developed for OJT instructors and evaluators with the intention of improving consistency among instructors.

Job-specific training requirements as described in the Program Description documents for selected support positions were reviewed for breadth of coverage

and to assure that operational requirements were addressed. The Training Program Description was also reviewed to assess continuing training and compare program requirements to the requirements identified in DOE 5480.20. Selected materials were reviewed to verify adequate coverage of specific subject matter.

Initial training for maintenance personnel entails training in basic maintenance fundamentals, as well as systems and equipment. Training requirements were determined through a job analysis that is consistent with the systematic approach required by DOE 5480.20. Currently, a more detailed task analysis is being conducted to further refine these requirements, which is seen as a strength. Extensive OJT is provided, including evaluations involving job performance measures. In addition, training includes shift briefings and required reading assignments. Areas identified are generally consistent with the requirements of DOE 5480.20 and reflect operational requirements.

Requirements for technical staff training have also been established, with six "core" courses that all technical staff are required to complete as well as numerous additional courses specified for each job. Although requirements are established, the training program for technical support staff has not progressed to the same level of implementation as have the programs for maintenance and operations. Although a significant number of training requirements have been identified, only a small portion of the courses have actually been developed and implemented, and only a very limited number of technical staff courses are being required for engineering staff prior to tritium introduction. Full implementation of the remaining technical support staff training is not scheduled until 1994. Neither the specific courses required for tritium introduction nor the full implementation schedule are identified in the Technical Staff Training Program Description.

The ORR Team also reviewed requirements for continuing training for operational support personnel. Although general topic areas have been identified for continuing training, this program has not yet been developed and therefore, cannot be adequately evaluated. Also, there is not a requirement for annual retraining on abnormal and emergency procedures or drill training as specified in DOE 5480.20.

The ORR Team reviewed qualification status reports and individual training records to determine if the required training had been completed. RTF's training program calls for completing training of maintenance personnel through Phase II of the training program prior to tritium introduction and completion of remaining training requirements (Phase III) prior to war reserve production. A review of the training records indicated that required Phase II training had been completed for those individuals whose records were examined. The ORR Team reviewed the assignment of specific courses for Phase II and Phase III training and determined that requirements prior to tritium introduction were adequate.

RTF has identified four technical staff training courses that are required prior to tritium introduction. Although, for the individuals whose records were examined, these courses had been completed, the RTF Training Department

reports that not all technical staff have completed the training. A goal of 80 percent complete has reportedly been established and met. Individuals will not be considered fully qualified until the required training is complete. Two of the five STAs are included in the group that has not completed all required core courses. Concerns related to STA qualification status are discussed further in Section P.1.

Interviews were conducted with various members of operational support organizations including Maintenance, Fire Protection, Industrial Hygiene, and Industrial Safety to assess retention of technical knowledge. Managers were also interviewed and questioned regarding the technical knowledge of individuals working under their supervision. The level of knowledge of operational support personnel is adequate for tritium introduction.

Findings

None

Observations

P.3-A The training program for technical support personnel has not been fully developed, and only a minimum set of courses have been implemented. (P.3.1.1) (P.3.4.1)

P.3-B Some practical factors evaluations for maintenance personnel did not provide for thorough evaluation and did not identify inaccuracies in the procedure being used. (P.3.3.3)

P.3-C A continuing training program for operational support personnel has not been defined. (P.3.4.1)

Objective P.4 Personnel exhibit an awareness of safety and environmental protection requirements and through their actions demonstrate a commitment to comply with these requirements.

Results

This evaluation was performed by conducting interviews at all levels of the organization from the Tritium Manager to operators and maintenance personnel. Training requirements and materials were reviewed, and demonstration of an awareness of safety and environmental protection requirements were evaluated by the ORR Team during interviews, observation of work in progress, and facility walkdowns.

Emphasis on safety and environmental protection is clearly stated in RTF programs and policies. The results of interviews with the RTF Program Manager and the WSRC Tritium Facilities Manager indicate that they are familiar with these policies and programs, and that they have given them attention during RTF startup. Specific examples of management involvement include participation in the monthly safety meetings; participation in critiques of safety and environmental protection incidents; participation in the RTF Issues

Council program; issuance of a memorandum from the RTF Program Manager to managers emphasizing the need to focus on safety and environmental protection issues; and participation in the conduct of operations training program. Based on a review of the conduct of operations training material, it was determined that adequate emphasis was given to safety and environmental protection requirements. Additional emphasis is given to safety and environmental protection requirements through Hazard Communications (HAZCOM), Spill Control, and the Resource Conservation and Recovery Act (RCRA)/Waste Minimization training programs.

A few isolated incidents were noted where proper personnel safety precautions were not taken or environmental-related samples were not taken as required during the conduct of field observations. Overall, the RTF personnel are aware and understand the need to comply with safety and environmental protection requirements.

All personnel assigned to RTF are required to participate in the Tritium Facilities Employee Training (TFET) Program. The TFET training courses considered to be most applicable to this objective are: Conduct of Operations, RCRA/Waste Minimization, HAZCOM, and Spill Prevention and Control. The lesson plans and training material for these courses were reviewed in detail and are adequate (i.e., the learning objectives and course content gave adequate attention to those areas considered important to worker safety and protection of the environment). The RTF departmental policy on environmental and waste management says that training in this area will consist of:

- Briefings on general environmental laws which are applicable to the RTF in order to build environmental awareness.
- Briefings on National Pollution Discharge Elimination System (NPDES) Permit requirements and limits on all liquid discharges from the RTF.
- Annual RCRA training for all personnel involved in the management of hazardous, radioactive, and mixed waste at the RTF.
- Waste minimization training.
- Spill control training.

Training courses have not been developed for the first two training elements listed above and do not appear to be covered as a specific topic of any existing course. The last three training elements are covered by existing courses. Although some weaknesses were noted above, they do not appear to be programmatic in nature. A number of courses have been developed that emphasize safety and environmental protection requirements. These courses have been attended by the necessary personnel with few exceptions.

Findings

None

Observation

P.4-A Training courses have not been developed for two of the areas required by the RTF departmental policy for environmental and waste management. (P.4.1.2)

2.3 MANAGEMENT PROGRAM READINESS (M)

2.3.1 Summary

This section of the report documents the results of the ORR inspection regarding WSRC and SR programs designed to manage plant and personnel readiness, detect and accurately report conditions adverse to quality and safety, operate in a conservative manner within established limits, and continue to improve operations. Management systems of groups assigned directly to RTF and those of supporting groups were examined. Managers, technicians, and operators were observed in the performance of their assigned activities and interviewed to determine knowledge and skill levels and effectiveness of training programs. Programs reviewed include:

- Radiological Protection
- Waste Management
- Quality Assurance
- Issue Management
- Emergency Preparedness
- Training and Qualification
- Industrial Hygiene and Safety
- DOE Order Compliance
- Configuration and Work Control
- Fire Protection
- Safety Documentation and Technical Safety Requirements
- Startup Test
- SR Oversight
- Conduct of Operations
- Maintenance
- Environmental Management

The ORR Team assessed the effectiveness of management systems and programs through a combination of documentation reviews, field verifications and walkdowns, interviews, and performance-based inspections of planned evolutions and drills.

The RTF TSRs, including the LCOs and their bases were reviewed. The management systems designed to implement these requirements in some cases are incomplete, and in other instances these systems have not been adequately implemented. This is a significant issue and will preclude tritium introduction until the system is fully implemented to the satisfaction of DOE Headquarters. Specifically, some TSRs have not been adequately incorporated into procedures, some preventive maintenance checks satisfying surveillance requirements were not marked as such, some TSR surveillances are not based on measurable parameters, the program for continued compliance with TSRs is not effective, and some technical bases for TSRs were not implemented into surveillance requirements.

Major deficiencies exist in the Radiological Controls Programs. Contamination control practices are inadequate, and procedural and training deficiencies need to be addressed before tritium introduction. The work force did not

demonstrate a radiological awareness of the consequences of introduction of tritium to the facility.

Deficiencies in environmental management were identified that must be corrected prior to tritium introduction. These include NESHAP Permit discrepancies, provisions not in place for periodic compliance reports, multiple failures to take samples of environmental discharges, and a lack of facility-specific radioactive/mixed waste procedures.

Emergency preparedness deficiencies were noted. Not all emergency response organization personnel are trained. The emergency response organization responsibilities and response team composition are not clearly defined. Performance was observed during emergency response drills. Discrepancies were noted regarding the conduct of emergency drills in RTF, the length of time needed to account for personnel in RTF during an evacuation exercise, the lack of preparation of emergency response teams, and lack of command and control by shift management during emergency situations. The Tritium Manager has committed to completion of a phased approach to startup that should resolve these concerns.

Configuration control of RTF is adequate and meets requirements of DOE Orders and industry QA standards. One finding in this area concerns the failure to meet the TSR requirement for reviews of Unreviewed Safety Questions Determinations (USQDs). The implementing USQD Procedure for RTF does not meet the requirements of the TSR.

RTF has implemented most aspects of DOE 5480.19, Conduct of Operations. There are several areas needing improvement prior to tritium introduction. These include: operating procedures, shift routine and operating practices, control area activities, communications, control of equipment and system status, and independent verification. There are two chapters of the RTF implementing procedure for Conduct of Operations that are not approved or implemented yet; Chapter 2, Shift Routine and Operating Practices and Chapter 13, Operations Aspects of Facility Chemistry and Unique Processes.

Deficiencies were identified in the RTF Procedure system. Some RTF procedures are not technically adequate, are not sufficiently detailed, and the process used to make temporary changes is weak.

Training and Qualification Programs were generally adequate; however, TFET which includes facility emergency response training, has not been completed for all RTF employees who have unescorted access to RTF.

Three life safety issues were identified. One involves inadequate emergency lighting, another concerns failure to meet tornado safety requirements for exit doors, and the final one concerns ventilation system line-ups that prohibit easy exit from stairwells due to excessive pressure drops across exit doors.

Industrial health (IH) and industrial safety (IS) programs were generally adequate except that there is no workplace hazards monitoring program as required by DOE 5480.10.

The Quality Assurance program meets DOE Order requirements and generally meets industry standards. One noted exception is a RTF Quality Assurance Memorandum which permits the deletion of QA Hold Points in previously approved documents (e.g. work packages) without proper review. This was used to delete hold points in at least one work package, which is counter to standard industry practice.

The current SR oversight program does not provide adequate coverage of some aspects of long-term facility operations, and the process for conveying safety issues to WSRC is informal.

The majority of the findings regarding management systems and related issues described in this section are a result of programs not being fully implemented. The commitment and attitude of both management and the work force towards operating in a disciplined safety culture guided by DOE Orders was evaluated through multiple interviews and is excellent. It is expected that full implementation of management systems at RTF will provide a team that is ready for tritium operations in a facility operated and maintained such that the public, worker, and environment is protected.

2.3.2 Discussion

Objective M.1 There are adequate procedures and safety limits for operating and maintaining RTF systems.

Results

The adequacy and accuracy of the procedures and safety limits for operating and maintaining RTF systems were assessed. This assessment included a review of the program for the development, review, approval, revision, and implementation of those procedures. Technical accuracy, accuracy with respect to actual plant configuration and plant modifications, useability, and procedure compliance were reviewed. Emphasis was placed on TSR development, technical basis, and integration into the procedure program.

Operating and maintenance procedures were reviewed. It was determined that the procedures support and are consistent with the existing plant configuration and that the modifications program has adequate controls to ensure that required procedure changes are identified and submitted.

The administrative procedures and guidance for the preparation of operating and maintenance procedures support compliance with the TSRs. Normal and abnormal events are adequately incorporated in the procedures.

The program for determining the adequacy of operating and startup procedures was assessed, including the review process, the validation program, and demonstration of procedures when feasible. Most RTF procedures undergo a formal and rigorous development and review process in accordance with SOP-PP-233-12000, Procedure Handling System. Startup test procedures and special procedures (SPs) are specifically exempted from the administrative controls for procedure handling and validation. The differences in the administrative

controls between these categories of procedures could potentially affect the level of review performed and validation of startup tests and SPs.

The program for validation of tritium operation procedures was assessed. RTF's policy states that a walkdown validation is preferred over tabletop or simulation, except in cases where as low as reasonably achievable (ALARA), safety, or plant status renders equipment inaccessible. Contrary to this policy, some operations procedures were verified using a tabletop review without sufficient justification. Weaknesses in the validation program contributed to observed deficiencies and the large number of Temporary Procedure Changes (TPCs) generated.

Although the development program does not require that operating procedures be demonstrated during equipment operability checks, they were included whenever practical in the startup test procedures, thus providing for demonstration of the operating procedures.

Operating and maintenance procedures were reviewed, and various activities were observed to determine whether procedures were clear and sufficiently detailed. Numerous procedure weaknesses were observed, such as steps with multiple actions with only one sign off, an incorrect valve number listed in step 7.2.6.4 of procedure SOP-AP-233-52015, T131, Purge Stripper System Startup, and equipment omitted from procedure restoration steps which should have been included. The large number of TPCs processed during the ORR was further evidence of the need for continued improvement. Most instances where procedures were not followed could be attributed to individuals attempting to compensate for poorly written or misleading steps. In these cases, the intended actions were taken, and no cases of unsafe or reckless actions were observed. This subject is also discussed in Objective M.13.

The programs for the periodic review of procedures and the temporary procedure change process were reviewed. Periodic reviews are being conducted as required; however, there are no administrative guidelines which detail that review process. The TPC program provides for an effective procedure change process; however, some procedures have more than five TPCs, several handwritten TPCs are difficult to read, and other procedures had TPCs that were more than 6 months old. TPCs not developed in RTF, but in use in RTF (e.g., tritium facility procedures) do not undergo the same controls or technical review as required by RTF administrative procedures.

The development program for the Safety Analysis Report (SAR) is comprehensive and consistent with the requirements of DOE 5480.5. The need to upgrade the SAR to the requirements of DOE 5480.23 was recognized and planned for accomplishment. Several technical issues remain to be resolved with the RTF SAR and are properly identified in the DOE Safety Evaluation Report (SER). TSRs were developed using a multidisciplined approach with adequate involvement of operations and engineering personnel. There is a basis provided for each of the sections and subsections of the TSR. The TSRs have been appropriately cross-referenced to accidents and abnormal events analyzed in the SAR. With some minor exceptions, the bases contain the technical rationale and supporting information for the requirements in the TSRs.

Findings

M.1-1 Some RTF procedures are not technically adequate and are not sufficiently detailed. (M.1.3.1) (P.1.6.3) (M.1.6.2) (H.2.1.1) - HQ

M.1-2 Weaknesses were noted in the TPC process. (M.1.8.2) (H.2.1.1) (M.1.8.3) - SR

Observation

M.1-A Special Procedures are excluded from the administrative control requirements for other RTF procedures. (M.1.5.2)

Objective M.2 Training and qualification programs for tritium operations personnel have been established, documented, and implemented.

Results

In evaluating this objective, four supporting objectives were reviewed in detail. Programs were reviewed for ensuring that plant changes are incorporated into training programs. An evaluation was conducted of primers addressing technical fundamentals, including their accessibility to staff. An evaluation was also made of initial and continuing training, job-specific training, and GET. Finally, an assessment was made of the processes for incorporating post-training feedback, internal evaluations, and operating experience into training programs.

The ORR Team conducted an evaluation of the RTF program for ensuring that plant changes are incorporated into training. Program documentation was reviewed and interviews with responsible individuals were conducted. Although a system is in place and is adequately defined by procedure, it has only recently been formally implemented and could not be adequately judged for effectiveness. Design change forms have only recently been provided to the Operational Experience Review Coordinator for review and determination of training needs. Before December 1992, the program consisted of reviews conducted on an ad hoc basis. To date, no plant changes have been identified as having an impact on the training program.

The ORR Team evaluated the use of primers at RTF by reviewing the process used to determine requirements for primers, the technical accuracy and applicability of the content, and the accessibility of primer documents to operations staff. Fourteen primer documents are currently available to RTF operations personnel, including primers on tritium chemistry and radiation. Many of these primers were initially developed for other areas at SRS and modified, as appropriate, to reflect information directly relevant to the RTF. Five primers were reviewed for technical accuracy as well as appropriateness of style and content to the job. There were no problems identified with regard to the accuracy of the technical content.

To verify the appropriateness of technical content of the primers, results of the operator training needs analysis were compared to the subjects for which primers were available. In general, the topic areas covered by the primers were consistent with the tasks, systems, and fundamentals identified as requirements in the analysis. The primers appear to be written at about a high school reading level, which is consistent with the minimum educational level required for CROs and AOs. Appropriateness of technical content and educational level was confirmed during interviews with operators. Evidence was also observed of ongoing revision of the primers to enhance their relevance to RTF.

In order to assure availability, each CRO, AO, and STA is provided a personal set of primer documents. Staff are encouraged to review primers during lunch breaks or downtime. Copies of selected primers are also provided to maintenance personnel as part of their scheduled training. Primers are available to any other personnel by request through the Tritium Training Department.

The ORR Team reviewed documents describing the procedures for training development at RTF and interviewed training development personnel to determine whether a performance-based approach was used. Selected operator and maintenance tasks were compared to training requirements to verify that these tasks were addressed. Procedures contained in the Nuclear Materials Processing Training Manual, TA-205, describe a systematic approach to training analysis, design, development, implementation, and evaluation that is consistent with the characteristics of a performance-based program. To develop initial training programs for RTF operators, maintenance personnel, and technical support staff, a job analysis was performed using a round-table process to identify tasks that personnel would perform and to determine fundamental knowledge areas required for the job. While this approach was systematic and resulted in training programs that adequately reflect job requirements, the method of analysis was not as detailed as is prescribed in the training manual and was not documented.

Currently, an effort is underway to perform a more thorough analysis of each operations and maintenance task and revise training programs accordingly. This analysis will identify skills and knowledge specifically required for each task and subtask (element). The results of this analysis, which so far has been completed for the stripper system operations and about 50 percent of maintenance tasks, has not identified any significant omissions, but has resulted in more effective and efficient structuring of curricula. The current job task analysis is seen as a program strength.

To determine the adequacy of training and qualification programs, the ORR Team reviewed RTF procedures establishing the requirements, and interviewed individuals responsible for their implementation. Requirements and procedures are consistent with requirements specified in DOE 5480.20 and interviews verified compliance with these procedures.

Specific training requirements for each position are described in the program descriptions for operations, maintenance, and technical support positions. These program descriptions define the requirements for qualification in each

position based on job duties and requirements of DOE 5480.20. The qualification process involves extensive classroom as well as OJT. Written examinations are required for all classroom training and operational evaluations are required for OJT. Oral examinations and walkdowns are required for operators.

Qualification records were examined for operators and support personnel and provided evidence of general compliance with the qualification program. Objective P.1 discusses specific deficiencies related to qualification of STAs. Operational evaluations, walkdowns, and oral boards were observed, and it was determined that the procedures for performing these qualification processes are implemented.

The ORR Team also reviewed documentation describing the requirements for sitewide GET as well as TFET. The ORR Technical Expert attended the WSRC GET class. Training records for selected employees and contractors assigned to the RTF were also reviewed.

Completion of an 8 hour sitewide GET course is required for all SRS Westinghouse and contractor employees within 1 month of employment and prior to radiation exposure. Retraining must be completed biennially. A review of training records for contractors and employees assigned to RTF indicated that this training had been received as required. The course is very general in nature, however, and by itself, does not adequately address all of the topics stated in DOE 5480.20 as they pertain to the RTF. Although these topics are supposed to be covered by the additional TFET training that personnel are required to receive upon assignment to the tritium area, training in all topics has not been completed by all RTF personnel. These topics include Nitrogen Safety, Radiological Safety, Fire Occupant Training, Hazard Communication Standard, Hearing Conservation, TFET General (overview of processes), and Emergency Response. According to the Tritium Training Manager, only completion of Nitrogen and Radiological Safety will be considered a requirement for unescorted access upon tritium introduction. This policy is not consistent with the requirements of DOE 5480.20 or the procedure for TFET training, which requires training in these topics upon assignment to the area. Of particular concern is the lack of completed training in tritium area emergency response.

Various programs for incorporating feedback into training were reviewed. One such program entails performance of in-training evaluations that include collection and assessment of course critiques by trainees upon completion of each course. Interviews with training staff members and reviews of completed evaluation forms confirmed that this process is being followed. To determine the effectiveness of the program, comments and recommendations received for selected courses were reviewed, and their disposition was assessed. Through inspection of course files and interviews with training staff, it was determined that, in general, feedback had been adequately considered and several course revisions were noted. The lack of formal action plans or a comment tracking mechanism, however, hindered tracking the disposition of all specific comments and is seen as a program weakness.

The evaluation program also includes post-training evaluations of RTF courses that are performed by the Nuclear Materials Processing Training Department. These evaluations are conducted between 3 and 6 months after completion of the course and involve surveying trainees and their supervisors to assess the usefulness and effectiveness of training back on the job. Examples of post-training evaluation reports were reviewed and provide useful information to improve training courses.

An additional mechanism for improving training through feedback exists in the form of Training Review Committees. These committees include members of various RTF operational organizations (e.g., Operations, Maintenance) as well as the RTF Training Managers responsible for each program and provide a forum for communicating operational needs to the Training Department. The Operations Training Review Committee provided input to the Training Department regarding generic weaknesses that were observed in the oral board examinations and resulted in the development of several additional courses.

The RTF program for incorporating operating experience into training was evaluated. Examples of informational notices and revisions to training resulting from this program were reviewed. This program, as implemented, includes review of incident reports at SRS as well as other DOE facilities by the Operating Experience Coordinator. When determined to be applicable, summary notices are forwarded to appropriate managers (including training) for review and disposition. Informational sources include, but are not limited to, DOE Operating Experience Weekly Summaries, weekly bulletins from SRS's Facility Safety Evaluation Section, and Nuclear News. Assessment is made as to the need for special training, as well as modifications to present training.

The individual serving as Operating Experience Coordinator has extensive, relevant plant experience and the quality of incident screening and summary preparation appears to be high. A monthly summary of operating experience is published and distributed to plant personnel in the form of a newsletter. This is, in addition to individual notices, distributed to managers.

Programs for performing internal evaluations of training were also reviewed. Such evaluations are conducted as part of the Independent Assessment and Development (IAD) Process. The Tritium Training Manager has established an annual plan for each training manager that includes conducting in-class evaluations of training under their purview. Examples of IAD plans and completed training evaluation forms were reviewed by the ORR Team. Oversight evaluations are also performed by the WSRC Training Integration Group and the QA Group.

Finding

M.2-1 Tritium Facility Employee Training, including Emergency Response Training, has not been completed for all RTF employees who have unescorted access. (M.2.3.3) - SR

Observations

None

Objective M.3 **Safety systems are defined, and a system to maintain control over their design and modification is established and implemented, as appropriate for their safety significance.**

Results

The design control program at RTF was evaluated through the conduct of interviews, review of governing procedures, and review of completed modification packages. The RTF technical and engineering managers were interviewed regarding their design control and work control administrative systems.

The procedures used to maintain design control of safety systems at RTF were reviewed for programmatic compliance with DOE 4700.1, Project Management System, and DOE 5700.6C, Quality Assurance, Attachment I, Criterion 6, "Design." The design control program requires that all "proposed activities" be screened for impact on the facility. Screening involves a SAR compliance assessment, technical limit compliance assessment, Process Hazards Review (PHR) compliance assessment, USQD, and system classification within four design classes: Nuclear Safety, Critical Protection, Process Support, and General Services.

Once an activity is identified as a design change, it is controlled by use of the Design Change Form (DCF), which is the heart of the design control/change control system at RTF. It is implemented by WSRC Engineering and Projects Divisional Procedure E&P-DP-313, "Design Change Form." The DCF is used to request, originate, or document a change to design documents after they have been issued for use. Different types of DCFs are used and are arranged per organization and approval requirements that carry unique designations.

The DCF system in use at RTF provides for control of design requirements, inputs, processes, outputs, changes, records, and organizational interfaces. It also provides for independent verification of the design change and appropriate assignment of responsibilities between the design authority and design agent.

The technical review program requires operating and maintenance procedures to be reviewed and updated, system diagrams to be reviewed and updated, SAR changes to be identified, and PHR changes to be identified as part of the DCF process.

During the review of the design control program, a discrepancy was noted between a TSR and the USQ procedure. This is discussed in Objective M.8.

Two work packages were reviewed for compliance with internal procedures and DOE Orders. Some aspects of the packages that were reviewed included the USQ screening and USQD, Nonconformance Report (NCR) processing, drawing changes,

safety-related calculations referenced in the USQD, and implementation of the manufacturer's specifications for approved materials and equipment.

No significant discrepancies were noted during the review of one work package. The review of the second work package, however, revealed a discrepancy between the torque values required by the work instructions and those recorded on the data sheets used on the job site. This difference was due to using an updated manufacturer's specification without modifying the work instructions. This failure was not identified by the workers or the quality control inspectors during the performance of the work package, and the package had been closed out without identification of the discrepancy.

In addition, during the review of the design change program, it was observed that most drawings examined were not current because they had outstanding changes (multiple DCFs against the drawings). While the packages had been properly processed and the required submissions had been made to document control to update the drawings, they had not yet been updated.

In order to assess the document control program, a broad-based evaluation of over 60 procedures and documents was conducted. The documents reviewed included SOPs, Emergency Operating Procedures, Alarm Response Procedures, SPs, Administrative Guidelines, forms and logsheets, drawings and diagrams, and vendor documents. Controlled safety system information is readily available for use by plant personnel. Results from interviews with over 30 people from several different departments and working levels also indicated that safety system information is readily available.

Overall, the document control program provides for proper control, distribution, and update of procedures and controlled documents. All procedures selected were available at the Document Control Satellite Station and were the latest approved revisions. Document control clerks were extremely knowledgeable about procedures and requirements.

Interviews with operations personnel (operators, supervisors, and managers) revealed weaknesses in knowledge of length of time a working copy is valid, how working copies are revalidated, and how a diagram is verified against DCFs. Also, the location of an uncontrolled copy of the master index in the control room has led some operators to believe they can verify procedure copies against this uncontrolled copy. SOP-PP-233-12000, "Procedure Handling System," provides special directions for facility personnel when revisions may affect technical limits. Special symbols are used in the margin to designate those limits (e.g., T, @, L, P); however, operators are not aware of the meaning of these symbols.

The RTF document handling procedure also requires the Procedure Group to have an internal system of audits for Procedure Compliance, Procedure Completion and Filing, and Field File versus Procedure Master Index. These internal audits are not being completed.

During the review of document control procedures, it was observed that the control of SPs, while meeting the requirements of SOP-PP-233-12000, does not meet the intent of DOE 5480.19, which requires procedure preparation,

verification, and validation to receive high-level attention. The SP procedure does not require external reviews other than those deemed necessary by the procedure writer, nor are there any independent reviews required. In addition, the guidance within the procedure is contradictory: paragraph 7.7.1 dictates SPs are used ". . . for nonroutine activities," while paragraph 7.7.2 indicates only that "A special procedure for a job that is done frequently might be more suitable as a new procedure. . . .". Paragraph 7.7.2 leaves the issue open to interpretation by the originator.

The procedures governing the control of alarms were also reviewed, and personnel interviews were conducted to assess the controls that are established to ensure that alarms are available and functioning. During individual interviews, procedural requirements for the administration of the alarm deactivation program were discussed with the operators. The operators' knowledge of program requirements and responsibilities is adequate. The operators demonstrated an understanding of the prior approvals required before deactivation, shiftly review requirements, the need for compensatory actions for deactivated alarms, and potential safety aspects of not controlling deactivations properly. Records of numerous alarm deactivations were reviewed in the control room and they meet procedural requirements and controls. The Inhibited Distributed Control System (DCS) Alarm Log contains the required approvals, and the DCS-Inhibited Alarm Report coincides with the manual log.

Review of work control procedures indicated that the procedures do not address approval requirements for deactivation of alarms, but they do require the implementing work group to brief the Shift Manager on the work scope and impact on operations when obtaining his authorization to start work per a work package. Operations procedures require the Shift Manager to approve all alarm deactivations, and further, to inform shift operators before authorizing the deactivation of an alarm. Once the need to disable an alarm is identified to Operations, the deactivation is controlled by well-defined procedures, and the deactivation appears to be adequately authorized, tracked, cleared and documented. Recent changes to work package instructions also require that personnel conducting maintenance activities per a work package notify operators each time an alarm is tripped during the maintenance.

Finally, a review was conducted to verify that one-line drawings needed to ensure compliance with TSRs are kept current. This was accomplished through a review of the RTF drawing walkdown program, walkdown of selected one-line drawings, and review of the RTF QA verification of one-line drawings.

Drawings for RTF structures, systems, and components are handled as controlled documents. System engineers, who were interviewed in the process of conducting the drawing walkdowns, are aware of the need to obtain all outstanding changes not already incorporated on a drawing before relying on the information contained on the drawing.

To verify drawing adequacy, RTF has performed a drawing walkdown program. Of the approximately 10,000 RTF drawings, 2,000 system diagrams and piping and instrumentation drawings were selected by the RTF Technical and Engineering Group for walkdown verification. These drawings, which include drawings from

all safety categories, were "released for walkdown" by incorporating all outstanding DCFs against them.

The walkdown of these drawings was performed using a procedurally controlled process. Certain aspects of the drawing details were not included in this walkdown process because they were covered by other formal programs. For example, electrical wiring connections were not included because separate power energization testing was required and this testing would validate the drawing information in the area of electrical connections. Drawing changes identified during the walkdown process were processed according to the design change control procedures. The walkdowns for all the selected drawings have been completed.

Training records for the walkdown personnel were reviewed, as were completed walkdown package records. The walkdown program adequately verified drawing accuracy.

RTF QA has an ongoing program for evaluating design drawings and operating procedures for adequacy relative to the as-built condition of RTF. As part of this program, a QA surveillance was performed in November 1992 to evaluate the effectiveness of the RTF programmatic controls for ensuring that one-line drawings and procedures are consistent with the RTF configuration. Due to changes in the classification of certain items during the course of the surveillance, the drawing walkdown portion of the surveillance was deferred and is currently in progress. The scope of this effort appears adequate to satisfy the intent of this criterion; however, the surveillance has not yet been completed.

Findings

None

Observations

M.3-A In-process work controls, including work package revision instructions, quality control inspections, and package closeout, failed to identify and correct a discrepancy between work package instructions and actual work performance for a safety-related work package. (M.3.1.3)

M.3-B Weaknesses were observed in the understanding of working copy validity, verification of outstanding DCFs against a diagram, and understanding of the technical limit symbols in procedures. (M.3.2.2)

M.3-C Internal audits of the document control system are not being performed, as required by the RTF procedure. (M.3.2.2)

Objective M.4 **A system is in place to confirm and periodically reconfirm the condition and operability of safety systems.**

Results

The purpose of this objective was to review plans and programs that are in place to ensure the continued viability of the safety systems at RTF. This review concentrated on the bases for and technical adequacy of surveillance requirements required by the TSR section of the SAR; the adequacy of the documentation, scheduling, and execution of associated surveillance procedures for safety systems; and the basis, technical adequacy, and implementation of procedures for testing alarms and instrumentation.

Although the main focus of the review was to determine the overall acceptability of the surveillance program for RTF safety systems, a discussion of all reviews conducted by the DOE ORR Team to evaluate the overall surveillance program is included for continuity (e.g., review of SAR/TSR requirements, engineering analyses, surveillance requirements/surveillance procedures). Accordingly, reviews completed to support criteria M.1.2, M.1.6, and M.7.6 are also included in the discussion of this objective.

TSRs were reviewed to verify that a basis was provided for each TSR in the SAR. The current TSRs do not contain any safety limits or limiting control settings. Consequently, only the operational limits and surveillance requirements of TSRs were reviewed against the bases contained in the TSRs.

Each surveillance requirement was reviewed and compared to the applicable basis in the TSR. In addition, a review of the SAR and the SER was conducted to provide background for the accidents and abnormal events that were analyzed. The SER provides a cross-reference matrix linking accident and abnormal event scenarios to TSRs and active and passive systems that are credited in the safety analysis. Additionally, the facility provided a matrix that ties the TSR requirement to the applicable SAR section.

A basis is provided for each of the sections and subsections for the TSR. The bases contain the technical rationale and supporting information for the requirements in the TSRs. However, some of the bases for TSR surveillance requirements lack completeness in the specification of technical requirements necessary to ensure continued functioning of the affected equipment. Examples include:

- The bases for standby diesel generator operability specify that the diesel fuel oil quality must be sufficient to ensure that the diesel generator will perform as designed; however, the TSR does not contain a surveillance to sample and analyze the diesel fuel oil.

- The bases for the diesel generator starting batteries state that the monthly surveillance check should include voltage and amperage, terminal corrosion, and termination verification; however, these checks are not sufficient to demonstrate the operability of a lead calcium battery in this service.

The technical bases supporting the acceptance criteria for safety system alarms and instrumentation were reviewed and are satisfactory. A technical review program exists that requires independent review of procedures and technical reviews performed by system engineers. However, a standardized methodology for performing technical reviews is not covered by the technical review program, nor is it discussed in technical review program training for system engineers.

A review was conducted to determine whether TSR surveillance requirements incorporate vendor recommendations. Available vendor information was reviewed by WSRC and factored into the development of the surveillance requirements and associated procedures. Also, surveillance frequencies are conservative when compared to vendor requirements, but not to the point that they create an unmanageable burden on the maintenance workload. Some safety system components lack extensive vendor documentation. This potentially weakens the bases for the surveillance requirements and procedures, since WSRC had to rely more on "sound engineering judgement/experience" when developing procedures for requirements for the affected systems.

An evaluation of the technical adequacy of surveillance procedures was conducted. Although surveillance procedures are in place for all surveillance requirements, some procedures may not adequately address their associated requirements. For example, one reviewed procedure did not include all applicable plant equipment on its associated data sheet; some procedures are not properly annotated to indicate which steps constitute entering into a LCO and what action should be taken as a result; some procedures do not technically fulfill the surveillance requirement; and some procedures (e.g., roundsheets that document daily requirements) provide either inadequate or no documentation of the completion of a surveillance requirement.

The technical review of surveillance procedures was complicated by an excessive number of TPCs that made procedures confusing, and an ongoing procedure revision process that significantly changed many of the procedures reviewed during the course of the ORR.

The implementation of the surveillance program at RTF was evaluated and involved two major areas: the development and maintenance of the RTF Tickler System and the proper completion of surveillance work packages.

The RTF Tickler System database procedure was reviewed to verify the adequacy of the program to implement the surveillance requirements. This procedure establishes a program that will use a database to track and document the scheduling and completion of the TSR surveillances. It also establishes the position of the RTF Tickler Coordinator with overall responsibility for maintaining the database, coordinating the scheduling and documentation of surveillances, and preparing surveillance status reports. The procedure contains steps for scheduling surveillances through issuance of ticklers, notification of the responsible departments, generation of overdue notices, generation and approval of deferrals, and update of the database. It also requires trending and analysis of system information generated from the surveillance tests, as well as an annual evaluation of the program.

The RTF Tickler System and its associated scheduling system are not currently complete, but are scheduled to be completed by the end of February 1993. Not all data have been entered into the system. Of the effective surveillances, only two were scheduled, and these were completed without use of the tickler sheets.

The ORR Team observed the completion of numerous surveillance procedures by maintenance department personnel and also reviewed several completed surveillance work packages to determine the facility's readiness to adequately accomplish and document surveillances once the program is implemented. The maintenance department demonstrated an adequate level of readiness and expertise to support the completion of surveillance procedures. Maintenance personnel have incorporated excellent work control practices into all areas of work package completion and documentation, and they are knowledgeable of, and demonstrate an adequate ability to comply with surveillance/LCO requirements. Their ability to successfully perform surveillances is hindered, however, by the numerous procedure and setpoint changes being entered into support documentation during the surveillance/LCO implementation process. This is discussed in Objective M.7.

During the review of compliance with TSR's, the following was noted:

- Surveillance Requirement 4.2.3.1 required a weekly verification that sealpot level is within the required operating range. No range is shown on the sealpots.

- O_2 instrument calibration requires the instrument to "stabilize;" stabilization is not defined.

- Preventive Maintenance Work Packages RTF-10G-SKER4 and SKER5 in fact support LCO's but were not marked as such.

Although a program has been created to trend and analyze completed surveillance data, the number of entries in the database is not sufficient to support proper implementation. Therefore, the effectiveness of this program cannot be evaluated.

The surveillance program should be subjected to an audit by WSRC management when fully implemented and then validated by a DOE review to assure that the implementation is satisfactory.

Finding

M.4-1 The Technical Safety Requirements (TSRs) have not been fully implemented. - (HQ)

- **Some bases were not incorporated into surveillance requirements. (M.1.6.3) (M.1.6.4)**

- **Some TSRs have not been adequately incorporated into procedures. (M.1.2.2) (M.1.6.3) (M.4.2.2) (M.7.6.1)**

- **Some Preventive Maintenance checks satisfying surveillance requirements were not marked as such. (M.4.2.2) (M.7.6.1)**

- **Some TSR surveillances are not based on measurable parameters. (M.1.6.2) (M.4.2.2)**

- **The program for continued compliance with TSRs is not effective. (M.1.6.3).**

Observation

M.4-A Surveillance performance is hindered by numerous setpoint changes being entered into support documentation during the LCO/surveillance implementation process. (M.4.2.4) (M.7.6.1)

Objective M.5 **A process has been established to identify, evaluate, and resolve deficiencies and recommendations made by oversight groups, official review teams, audit organizations, and the operating contractor.**

Results

The purpose of this objective was to determine whether a satisfactory process has been established to identify, evaluate, and resolve deficiencies and recommendations made by oversight groups and internal sources. Four supporting objectives were evaluated: processes for identifying and reviewing issues, prioritizing and tracking deficiencies, identifying startup issues, and dispositioning startup issues.

Several administrative procedures exist that provide a means to identify and document issues. Issues resulting from abnormal occurrences are identified, documented, and tracked to resolution through RTF SOP TRIT-6130, "Critique and Occurrence Reporting." Issues resulting from nonconforming conditions are covered by a Nuclear Materials Processing Division (NMPD) policy. Another process designed to identify issues raised by employees, including safety issues, has been implemented through SOP-PP-233-10006, "RTF Issues Council." While different processes are in place to identify and document specific issues, formal procedures that establish an integrated RTF issues management program with a trained support staff have not been established.

Review of RTF procedures indicated that a process for tracking corrective actions is established by SOP TRIT-1154, "Tritium Facility Commitment Tracking System." This procedure establishes a centralized database and provides a means to maintain status of all pending commitments. After the DOE ORR started, SOP-PP-233-10073, "Evaluation of Routine Work Initiators," was issued to implement a process for prioritizing work activities. The procedure establishes a review committee made up of representatives from each work group and provides six priority codes for performing proposed work. There are no specific criteria for applying priority codes to work activities. The DOE ORR Team could not evaluate the effectiveness of implementation.

Criteria exist for identifying startup issues, although a formal issues management program does not exist. WSRC management has initiated a Tritium Introduction Checklist, which is a listing of items that must be completed prior to introducing tritium into RTF. Criteria for determining when actions are satisfactorily completed are provided in terms of specific deliverables. Individual WSRC managers are assigned responsibility to review and ensure that requirements are satisfactorily met and that the necessary information is presented to the Test Review Board for independent review and approval. While a formal long-term program does not exist, discussions with DOE and WSRC management indicate that sufficient startup criteria exist for tritium introduction and that management is actively involved in discussing startup issues and making decisions on the required corrective actions. Both DOE and WSRC management are adequately involved in applying the startup criteria presented in the Tritium Introduction Checklist.

The Tritium Introduction Checklist documents the issues identified for resolution prior to tritium operations. The checklist is in the process of being finalized. As corrective actions and associated deliverables are completed, the assigned WSRC manager reviews the deliverables for adequacy and then presents the completed issues to the Test Review Board for independent review and approval.

Discussions with RTF management indicate that while not formal, a process does exist for ensuring restart issues are properly reviewed, prioritized, and assigned for resolution. For example, WSRC ORR issues identified by a DOE review team were reviewed by management to determine the significance and priority warranted by each issue and were assigned to appropriate RTF managers for resolution and closure with DOE. Daily management involvement ensures that these and other startup-related issues are reviewed and given a status in a timely manner. Management representatives from all responsible groups participate in daily and weekly status meetings and startup issues and commitments are tracked real-time on status boards maintained in the war room. While this and other similar examples appear to have been effective for managing short-term issues related to startup, the lack of a formal and systematic program does not ensure that safety issues which may be raised during tritium operations will be managed properly. Also, issues that have been raised but determined to be post-startup have not been properly prioritized, and it is unclear whether appropriate action has been taken.

Findings

None

Observation

M.5-A A formal process for managing issues, including systematic review and prioritization, has not been fully implemented at RTF; consequently, a process for ensuring proper resolution of post-startup issues is not established. (M.5.4.1)

Objective M.6 **A baseline compliance status review of specified DOE Orders has been performed. Noncompliant items have been addressed.**

Results

The DOE Order compliance program was reviewed to verify that a formal program exists and that all noncompliance issues were adequately addressed by DOE-approved Compliance Schedule Approvals (CSAs) or exemptions. The ORR Team also reviewed plant management involvement in ensuring that approved compensatory measures and compliance schedules are effectively implemented.

The WSRC RTF Order compliance assessment has been ongoing for more than 1 year. The WSRC RTF Order compliance program uses a formal process to identify and document compliance and noncompliance with applicable requirements contained in DOE Orders. The initial Order compliance assessment was conducted by WSRC in accordance with WSRC NMP-RTF-920381, Revision 0, "DOE Order Compliance Plan," and was completed in June 1992. NMP-RTF-920381 is based on WSRC Management Requirements and Procedures (MRP) 3.02, Revision 1, "DOE Directives Administration," and MRP 3.33, Revision 0, "Performing DOE Directive Compliance Self-Assessments and Generating Associated Documentation Submittals."

A subsequent assessment was performed using the revised procedures contained in the Supplement to WSRC RTF "DOE Order Compliance Plan." The revised procedures require the use of the DOE HQ Requirements and Self-Assessment Database as a basis for review. MRP 3.33 defines the documentation requirements for WSRC compliance assessments and other associated submittals for DOE Orders (CSAs, short-term compliance statements, and exemptions) to support DOE's baseline compliance activities. MRP 3.33 applied to Level I Orders issued by DOE prior to January 1991 (about 85 Orders). Level I Orders issued after that time have been handled in accordance with MRP 3.02. MRP 3.02 establishes the use of Compliance Assessment Reports, which document WSRC's compliance with the DOE Orders, identify a plan and schedule for achieving compliance, or request a permanent exemption from the requirement.

The ORR Team selected 15 orders to review for approval of CSAs, exemptions, or other documentation. Some discrepancies were found and are noted in the Findings and Observations. RTF management personnel demonstrated an understanding of their responsibilities in achieving DOE Order compliance and the importance of implementing compensatory measures during the interim. In general, RTF is adhering to the commitments delineated in the compliance schedules.

A review of NMP-RTF-920381 and its Supplement revealed several administrative deficiencies. For example, the Supplement is ambiguous as to the specific sections of NMP-RTF-920381 which are superseded, causing confusion and possible conflict. Section 5.0, Responsibilities, in NMP-RTF-920381 tasks the RTF Program Manager with providing final approval of each Compliance Assessment Report, however, he has not approved any of the assessment reports.

The SR review of WSRC's Order compliance assessment has been underway for about 1 month. Presently, no WSRC Order Compliance Package has received approval. Numerous packages have been reviewed and returned to WSRC for

corrections. A deficiency with the DOE Order Compliance Review Plan is that it states that a minimum of 10 percent up to 100 percent of the contractor mandatory requirements will be verified line-by-line. No justification is given as to why this range (10 to 100 percent) of verification is acceptable. In addition, no criteria exist to determine the degree of verification to be completed. The reviewer can subjectively decide on any percentage in the 10 to 100 percent range.

The SR RTF Order compliance assessment was conducted prior to the DOE ORR. The assessment of 46 DOE Level I Orders was completed in 2 days and was inadequate. The remaining DOE Level I Orders (about 52) were not assessed. The SR procedures used for the assessment did not provide clear direction on the process to be employed. No review or approval of the completed assessment packages was required. Interviews revealed several of the Order Compliance Review Team members were assigned to review Orders that were outside their area of expertise. Recognizing the need for more effective Order compliance assessments, SR has initiated sitewide efforts to develop formal comprehensive assessment procedures and conduct additional reviews.

Findings

M.6-1 The SR RTF Order compliance assessment conducted prior to the ORR was inadequate. (M.6.1.1) - HQ

M.6-2 RTF is not in full compliance with DOE 5483.1A, "Occupational Safety and Health Program for DOE Contractor Employees at Government-Owned Contractor-Operated Facilities" and the CSA has not been approved. (M.6.2.1) - HQ

Observations

M.6-A The DOE Order Compliance Review Plan requires clarification/guidance for determining the degree of line-by-line requirement verification of the WSRC Order compliance program. (M.6.1.1)

M.6-B RTF has not met the 9-month window to develop and approve procedures implementing requirements of DOE 5480.21. (M.6.2.1)

Objective M.7 Management systems are established to ensure operational support services (maintenance, waste management, environmental protection, emergency preparedness, industrial health and safety, fire protection, quality assurance and health physics) are adequate for tritium operations.

Results

The conclusions reached in this section are based on an extensive review of the RTF facility as well as relevant procedural documentation and interviews with management and the work force associated with supporting organizations. Facility tours were conducted with WSRC management and interviews conducted with the work force to assess knowledge and perspectives on their specific

areas of responsibility. Performance-based analyses were used to evaluate knowledge and skills required to accomplish assigned tasks such as hazards assessment and worker safety actions, fire protection, radiological protection, quality assurance programs, emergency preparedness, maintenance activities, waste management, and environmental protection.

Fire Protection

Surveys were conducted of RTF for the purpose of evaluating fire protection features and potential hazards. The WSRC Fire Protection Engineer and Fire Protection Coordinator displayed a strong knowledge of the general facility operations and design of fire protection systems for the plant. In addition to the RTF, surveys included the 200-H water supply system and associated process pumps and tanks, and the primary fire station responsible for response to RTF. Two fire drills were observed.

Interviews were conducted with supervisors and workers in RTF to determine their perceptions and understanding of fire safety. Also, document reviews were conducted to establish the level of fire protection program development and design features provided for the facility. A sampling of the use of representative procedures was conducted in the field. In general, these procedures are comprehensive and are being implemented in a timely and effective manner.

A fire emergency preplan has been developed by the fire department for RTF and has been reviewed by cognizant safety and fire protection professionals for acceptance. The details of this plan have been exercised jointly by RTF and the fire department. Testing has been completed within RTF, which confirms that fire department radio communication can be reliably achieved throughout the facility.

The WSRC Fire Protection Program Manual is the implementing policy for DOE Orders and required codes and standards. Procedures for RTF are being developed for fire protection impairment handling, cutting and burning activities, testing and maintenance of fire protection systems, inspection and testing of fire doors and dampers, fire protection periodic surveillance and inspection, housekeeping, and control of transient combustibles and flammables. In the interim, many of the draft procedures are being used for maintaining fire safety in the plant. This is considered to be a satisfactory series of controls for fire prevention and is a major action toward a comprehensive fire protection program.

There are three major deficiencies within the life safety arrangement at RTF. The first condition involves emergency lighting for the path of egress. On January 15, 1993, an emergency lighting test was conducted for the battery-powered lighting provided in RTF. Through a review of the test results, it was determined that the lighting as installed could not fully meet the requirements of National Fire Protection Association (NFPA) 101 for duration or for minimum level of illumination at the floor.

The second life safety issue involves the interaction between the RTF ventilation system and safe egress from the facility stairwells. There has

been at least one abnormal ventilation lineup where the pressure differential between the stairwells and the corridors was such that opening of the exit doors was prevented. Personnel were then trapped for a time in the facility until the condition was corrected. RTF is in the process of implementing administrative control to prevent the fan condition which caused this situation. RTF has agreed to expedite resolution of this condition and ensure conformance with NFPA 90A relative to pressurization of stair towers under fire conditions, through design review and formal documentation.

The third life safety issue involves the exit doors of the RTF currently not meeting requirements for tornado safety. WSRC Engineering has proposed a design change to install magnetic shear locks to meet the needs for securing the door during an emergency. This approach has been accepted and approved by SR.

A series of equivalencies and exemptions has been requested from life safety requirements of NFPA 101 and 29 CFR 1910. These involve issues such as corridor widths, exit distances being in excess of the maximum length, and stair tread widths smaller than required.

While a draft fire hazards analysis (FHA) has been completed for the RTF, it does not fully meet DOE requirements in several areas. The FHA is considered to be adequate for the startup of RTF.

Industrial Health and Safety

A review of selected documents of the Industrial Hygiene Manual (4Q), Industrial Safety Manual (8Q), and the Medical Department Policies and Procedures Manuals (3Q) was performed in order to determine whether required policies and programs were established and that requirements exist to ensure that all employees are informed of their rights and responsibilities concerning safety and health at the RTF. Additionally, reviews of training requirements, procedures, and records were performed in order to ensure that workers were trained accordingly and that this training was appropriately scheduled, tracked, and recorded. Other supporting organizations procedures were reviewed to determine if the same level of safety awareness was prevalent. Reviews of chemical control and handling procedures and personal protective equipment were also conducted.

The review of the IS, IH, and medical programs resulted in an overall positive conclusion of the effectiveness of the programs. Written policies and procedures covering IS and IH are in place. Improvement is needed and should be accomplished as the programs are more extensively implemented.

Most of the employees interviewed were very knowledgeable of site hazards and were able to respond properly to alarms and emergency conditions. Personnel were able to demonstrate a sufficient level of awareness of their workplace hazards. While not all program elements are in place, a satisfactory level of safety exists. Necessary actions have been identified to bring the IH programs into full compliance, which are being accomplished through existing management systems. There is a lack of full compliance with DOE 5480.10 and

5483.1A in that the IH program does not have an approved plan for workplace hazards monitoring.

A review of the previous 12 month Injury/Illness Reports was performed in order to assess the seriousness of the occurrences and the responses by safety and medical, including the adequacy of the investigations and the completeness of the reports. All occurrences appeared to be minor. Followup appeared to have been appropriately conducted by the area safety engineer, and the On-The-Job Injury/Illness Analyses were complete. A review of the Recordable Injury and Illnesses statistics provided by the Manager, Occupational Safety and Hygiene Department, demonstrated the awareness of senior management to site conditions and areas needing attention.

Interviews were conducted with the Area Industrial Hygienist, the Area Safety Engineer, and the Manager of Medical Administration with respect to these policies and procedures. Interviews were conducted with individuals from the RTF training staff and the Chemical Coordinator to verify their knowledge of IH and IS training requirements. An interview was conducted with the RTF Hazard Communications trainer to discuss the hazard training being given. Questions were asked to determine whether current policies and procedures are being followed and to determine what, if any, future procedures were being developed. Other interviews with craft personnel were conducted to determine whether safety and health policies and procedures were being implemented. During craft and engineering interviews, several issues were raised that provided positive reinforcement that individual, supervisor, and lead engineering reviews are able to determine the readiness and qualifications required to perform specific operations.

A draft baseline hazards assessment document was provided and reviewed. While it does list many of the major hazards, some were not included such as confined spaces and high pressure locations. The responsibilities for the confined space program are split among three organizations. Health Protection performs the entry monitoring, IS identifies the confined spaces, and IH provides technical support. This arrangement was not well defined in the procedures and may result in confusion over who should be contacted for confined space issues. Two confined spaces were observed and posting was present; however, posting needs to be improved throughout the site.

Overall organizational development and structure was well identified and most major program areas were covered. The management representatives that were interviewed were very knowledgeable of their areas and could provide information as to strengths and weaknesses of their respective programs. The qualification of the departmental staff, with specific emphasis on IH, met or exceeded industry standards.

Quality Assurance

The evaluation of the QA program included a review of the line management participation in and ownership of quality-related issues; the independence of the QA organization; adherence to requirements of DOE 5700.6B and American National Standards Institute (ANSI)/American Society of Mechanical Engineers

(ASME) Nuclear Quality Assurance (NQA)-1, specifically the QA audit program and the corrective action and trending program.

The WSRC and RTF QA programs were reviewed against DOE 5700.6B and NQA-1 instead of DOE 5700.6C. The full implementation of DOE 5700.6C is scheduled for September 30, 1994. The existing WSRC program, as delineated in WSRC 1Q, has been revised to comply with NQA-1 and DOE 5700.6B requirements. The RTF QA program and its implementation was evaluated against the requirement in WSRC 1Q. The RTF QA program is functionally in compliance with the WSRC QA program but has not yet achieved 100% implementation. The remaining items of implementation are minor and are primarily administrative. Quality Assurance Procedure (QAP) 3-2, Design Control-Category II Projects, and QAP 3-3, Design Control for Division Managed Tasks, are not currently applicable to the RTF Project and will be implemented prior to war reserve production. RTF expects to have fully implemented the applicable portions of the WSRC program by the early part of February 1993, prior to tritium introduction. A compliance review of RTF with respect to DOE 5700.6C was completed on January 13, 1993, by the facility. The review found that with the exception of the areas concerning management and independent assessments, RTF conforms to the intent of DOE 5700.6C. Formal implementation of DOE 5700.6C will commence after the issuance of a revised WSRC 1Q. In anticipation of that event, RTF has already begun implementing many of the requirements of DOE 5700.6C.

Organizationally, there are clear and open lines of communication within the QA organization and other RTF organizations. The QA organization has the authority and organizational independence to perform its job.

One audit was performed at RTF in fiscal year (FY) 1992 and five are scheduled for FY 1993. This does not meet the intent of WSRC 1Q, which requires facilities to be audited with a frequency commensurate with the status and importance of ongoing activities. The audit in FY92 evaluated only one portion of the QA program, test control. The WSRC Environment, Safety, Health and Quality Assurance (ESH&QA) Division is conducting an assessment of the RTF QA program's implementation of WSRC 1Q, but this is just a continuation of the WSRC ESH&QA Division's effort to assess the implementation of WSRC 1Q at all SRS facilities. There are plans to initiate a NMPD audit program, but it is not in place yet. Since very few audits were performed of RTF activities, a review of the surveillance program was conducted. This review indicated that the RTF QA organization performed more than 80 QA surveillances in FY92, covering a wide range of QA activities. The scope and depth of these surveillances mitigates the lack of an aggressive audit program.

The RTF process to track, trend, and correct conditions adverse to quality is adequate. The programs used to implement this process are effective and actively pursue the correction of conditions adverse to quality. The trending program effectively apprises management of trends and potential conditions adverse to quality.

Environmental Protection

The purpose of the evaluation in this area was to determine that WSRC has obtained the necessary permits to ensure compliance of RTF operations with the

requirements of the Clean Air Act (CAA) as implemented by the state of South Carolina and the requirements of the Clean Water Act (CWA) as administered by the state of South Carolina. In addition, programs and procedures were reviewed to determine if hazardous and radioactive wastes generated at RTF are handled in accordance with RCRA, DOE 5820.2A, and DOE 5400.3.

RTF has the necessary permits to comply with the CAA; however, the implementation of the NESHAP permit requirements is incomplete. Specifically, some of the requirements and specifications associated with the primary monitoring system, the secondary monitoring system, and the permanent sampling system are not being met. In addition, insufficient information was provided during the ORR to justify the source term that is identified in the permit application.

The Environmental Coordinator and cognizant design engineer for the tritium stack monitor were interviewed to determine the status of compliance with the requirements of the NESHAP permit. The complete NESHAP permit application was not available to the RTF Environmental Coordinator, and he was not knowledgeable of all the permit requirements. The as-built configuration of the primary and secondary stack monitors are not consistent with the permit applications. In addition, the permit application states that a "permanent sampling system will be installed for stack emissions." This sampling system has not been installed. The permit makes it clear that RTF shall be designed, constructed, and operated as described in the permit application. No documentation exists to show that these deviations have been approved. The installation reflects improvements in design and monitoring capabilities since the permit application was submitted; therefore, from a monitoring standpoint, the installation is adequate. Therefore, it is difficult to demonstrate compliance with the NESHAP permit.

The RTF Environmental Coordinator was not familiar with the plans and procedures that will be used for capturing the stack release data and making the necessary quarterly reports. Responsibility for making the quarterly reports, as described in the permit, was assumed to exist with other tritium personnel. However, the cognizant personnel and procedures for making quarterly reports could not be identified during the course of the review.

The permit application assumes that the annual tritium releases from RTF will be 5,000 curies per year. Based on this assumption, the dose calculations contained in the permit application show that the maximum dose received by any member of the public will be less than the 10 mrem per year limit specified in 40 CFR Part 61.92 and DOE 5400.5. However, the RTF Environmental Coordinator and RTF management have not taken any action to monitor the cumulative release quantities from the facility to determine whether actions should be taken to control future emissions.

The dose calculations contained in the NESHAP permit application assume a removal efficiency of 90 percent for the purge stripper system. The basis for this removal efficiency is not clear. Some experimental work was done at the Savannah River Laboratory (SRL) to determine the removal efficiency of the type of bed that is used in this system. However, the experimental conditions

under which the bed was tested do not appear to be consistent with the operational conditions under which the bed will be used.

As noted in Objective H.3, none of the stack monitoring equipment is considered to be operational.

The necessary permits to demonstrate compliance with the CWA have been obtained. However, there are a number of weaknesses that could result in future operations causing an out-of-compliance condition.

Various maintenance chemicals are allowed to be used in cooling water systems provided certain limits are not exceeded at the outfall measuring points. To demonstrate that the limit for the corrosion inhibitor, Betz 25K, is not exceeded at outfall H-002, RTF has decided to take daily samples of the cooling water tower discharge. The sample logs for December 20, 1992, to January 22, 1993, for the cooling tower were reviewed. During this period, nine daily samples were not taken. The responsibility for taking these samples resides with the auxiliary watchstander. It was also discovered that the roundsheet used by the auxiliary watchstander did not have an entry for performing the required analysis. Thus, there was no documented method for ensuring that the analysis was being performed.

The sample procedures for the process lift station and the Mechanical Equipment Room (MER) sump (SOP-AP-233-20045 and SOP-AP-233-20048) did not contain any sample requirements for ethanol, freon, or other cleaning solutions. The permit prohibits the discharge of these constituents.

The sample procedure for the Mechanical Equipment Room (MER) sump (SOP-AP-233-20048) had the following additional deficiencies: the incorrect limit for corrosion inhibitor was listed; the sample results sheet contained the incorrect limits for oil and grease and required the operator to indicate if freon was present although no analysis method for freon is specified; and a technique for determining the total quantity of tritium release is not provided.

The chemical feed tanks and expansion tanks for the heating, ventilation, and air conditioning (HVAC) and process chill water systems drain directly to outfall H-002. These systems contain a corrosion inhibitor called DREWGARD 315. This corrosion inhibitor is not allowed to be discharged to outfall H-002. The procedure to control the addition of chemicals to these systems contains adequate controls to ensure that the DREWGARD 315 is not released to outfall H-002. However, a procedure does not exist to control the draining of the expansion tanks. The associated drain valves for the process chill water system had caution tags, but the associated drain valves for the HVAC chill water system were not tagged.

A drain verification study required by the SR Manager has not been conducted at RTF nor have as-built drawings or other certified documents been used to positively identify all the drains within the facility and determine whether they discharge into the correct sump or lift station. It is not clear what plans exist or actions will be taken to conduct such a verification.

The RTF is not a "treatment, storage, and disposal" facility as defined by the RCRA and, therefore, is not a RCRA permitted facility. However, RTF will generate various hazardous and mixed wastes and, therefore, must comply with various provisions of 40 CFR Part 262. The procedures and programs used for handling and disposing of hazardous waste onsite are contained in the Waste Disposal Manual, the Waste Acceptance Criteria Manual, and the Environmental Compliance Manual. These manuals were reviewed and adequately address the RCRA regulations contained in 40 CFR Part 262. In general, the Waste Management (WM) Group is responsible for implementing these procedures; however, the RTF has responsibilities for carrying out portions of these procedures and developing its own procedures where needed. A review of this area within the RTF determined that procedures have not been developed for change out of the U-Bed cartridges, decontamination (DECON) operations at the finishing line, or the transfer of radioactive wastes to other tritium facilities such as Building 234-H. In addition, these procedures are not being tracked as tritium introduction items. Procedures have not been developed for handling expected mixed wastes. Because procedures have not been developed for expected waste generating operations, operator training has not been conducted in these areas.

Emergency Preparedness

The review of the emergency preparedness program included a document review to ensure that the emergency plan, implementing procedures, and administrative procedures for RTF and applicable portions of the site plan complied with DOE 5500.3A, 5000.3A, other DOE Orders, and State and industry standards. In general, the quality and content of the emergency preparedness implementing and administrative procedures appear adequate for the conduct of emergency operations.

Walkdowns and assessments were performed of RTF emergency response facilities and equipment. In general, the facility and equipment were found to be satisfactory, although the Operational Support Center was overcrowded and used as an office area. Two-way radios should be made available to Health Protection for emergency activities.

The RTF hazards assessment was reviewed as the basis for the emergency management system. The hazards assessment does not meet all the requirements of DOE 5500.3A in that the Hazard Assessment does not contain the detail required by the Order. WSRC had previously recognized these deficiencies.

The emergency preparedness training program for all RTF employees and specific emergency training for response teams and RTF personnel was reviewed. Tritium-facility-specific training is provided, but is mostly of an overview nature. Procedure/position-specific-training does not exist for emergency response organization personnel.

The composition and responsibilities of emergency response teams are not clearly defined in administrative procedures. Three emergency drills were observed to demonstrate accountability, evacuation, contaminated injured person response by Health Protection (HP), radiological field sampling team proficiency, and conduct of drills.

Issues raised in the area of conduct of drills included lack of complete contingency messages in the drill scenario; lack of attendance by all controllers, evaluators, and observers at pre-drill briefings; and weaknesses in controller activities, including controller observations of drill activities and instances of coaching drill participants. Evacuation/ accountability activities were inconsistent. Continuous accountability was not maintained for drill participants and controllers. HP response demonstrated weaknesses in contamination control and communications. No policy exists for fighting fires in contaminated areas in the tritium area. The offsite field monitoring team demonstrated adequate survey techniques.

Radiological Controls

The ORR evaluation of the radiation protection program involved interviews with HP managers, supervisors, and inspectors; management personnel; operators; technical support personnel; training personnel; and SR personnel. Selected records, procedures, and documents were reviewed. HP and other work activities were observed, and walkthroughs of the facility were conducted. Training and performance of HP personnel were evaluated, along with the interaction between and quality of direction provided by HP management and technical support personnel. Responses by HP personnel during two emergency drills were also evaluated. Since RTF is a new facility without tritium in its systems, applicable systems and records at the operating tritium facility were reviewed to provide insight into doses, facility radiological conditions, and HP problems.

The HP organization, administration, and facilities appear adequate. Procedures are in place and training is being completed on recently approved/revised procedures. Interactions with other departments, most notably Operations, Maintenance and Works Control, appear adequate. The staffing levels are adequate for facility operations, but the lack of at least one tritium experienced HP individual on each of the five shifts is a concern. Self-assessments are performed by an Internal Appraisal Group and past, current, and planned assessments appear adequate. The ALARA program is in place, but has a few weaknesses with regard to RTF, including a lack of a dedicated tritium area ALARA coordinator and a tritium area ALARA committee.

The HP training and qualifications program is generally adequate. HP inspector training is weak on tritium-specific information primarily as it applies in the work environment. Many HP personnel have not received Area Emergency Operations training, and a few individuals still require training on self-contained breathing apparatus. Support of RTF HP operations for routine operations and emergency situations is not yet in place, primarily as a result of RTF-specific training not being completed for Buildings 232-H and 234-H personnel.

Exposure control, including bioassay and RWP programs, contamination control, radiological postings, and air monitoring were reviewed. Weaknesses were found in a number of areas as demonstrated in practice work evolutions and emergency response activities. These areas included donning and removal of protective clothing, contamination controls (contamination boundaries and controls, work enclosures, air flows), radiological work practices, and

housekeeping. There is no technical basis for the location of Kanne tritium air sampling points in the rooms. Airflow pattern studies need to be performed to assess the representativeness of these air sampling locations.

Maintenance

A review of the maintenance organization was conducted to ensure that management systems are in place at RTF to provide an effective maintenance program in support of tritium operations. The review consisted of an examination of written procedures for maintenance activities, formal work control methods, and post-maintenance testing. The review also examined the methods being used by the facility to manage and control the backlog of maintenance work, and the involvement of the engineering department in maintenance activities.

A comprehensive review of the RTF maintenance program was conducted, including programmatic reviews and observations of preventive maintenance (PM), corrective maintenance (CM), and troubleshooting. The review also included the predictive maintenance program, work package preparation and implementation, and post-maintenance testing. Interviews of workers, first-line supervisors, and senior managers were also conducted.

The maintenance program is effectively implemented. Maintenance programs are based on adequate written instructions for each maintenance area, and adequate documentation is available to track completions of maintenance activities and to verify satisfactory completion of required testing. RTF programmatic procedures that govern work control, PM, troubleshooting, and post-maintenance testing contain adequate guidance for the conduct of the activities.

RTF has not yet implemented a predictive maintenance program in accordance with DOE 4330.4A. The RTF Maintenance Implementation Plan has identified this deficiency, and the RTF work control coordinator stated that the predictive maintenance program will be implemented by August 1993.

Observation of the PM activities resulted in the identification of a number of weaknesses that are applicable to the surveillance program. The two PM work packages that were observed were prepared as PMs to perform loop checks on mix tank pressure transducers. However, with the implementation of LCO 3.6.1 on January 31, these PMs were actually scheduled and credited as surveillances to support surveillance requirement 4.6.1.2. As a consequence of this oversight, the work packages did not indicate that the PM activities were being conducted to satisfy the surveillance requirement. For example, there were no procedural steps discussing the LCO, no steps annotated with the LCO symbol (#), and no requirements to inform the Shift Manager upon failure of the "PM."

When the loop accuracies specified in the PMs were changed to reflect the accuracies in the setpoint control documentation, the pressure transducers both failed the loop check. However, subsequent investigation by the facility showed that the setpoint accuracy had been relaxed (and the loop check would have passed) by an approved design change form (DCF) that had not yet been entered in the setpoint control document. The resulting out-of-calibration notices documenting the PM failures were not reviewed by the Shift Manager

within the required 1 hour time frame. Finally, the maintenance personnel performing the PMs could not explain the red "LCO-SR" that was stamped on the work packages or what, if any, actions were required to be taken for the failed PMs that were stamped in this manner. Also, no action was taken to log an LCO or otherwise track the failure of the quarterly surveillance.

Followup discussions with facility management indicated that the setpoint control document in the Satellite Document Control Station (SDCS) was out of date. The setpoint control document in use was revision 7. Engineering personnel were aware of the number of outstanding DCFs against this document, and indicated that revision 8 had been issued in December 1992. This revision was not in use in the SDCS during the ORR in late January/early February 1993. Maintenance personnel indicated that discrepancies between work package setpoint specifications and the setpoint control document are a recurrent problem.

During observation of the PMs, it was also noted that QA personnel had invoked local instructions that allowed QA to decline participation in the PMs because they were not being performed on "safety" components. This determination was made in spite of the fact that QA participation was specified in a number of procedural steps.

The RTF Work Control Post-Work Package Status was then reviewed. This document lists all work packages that are field work complete, but are not completely closed out. This list provides the current status of Post-Maintenance Testing, Work Acceptance, and Work Package Review. There are 502 work packages on this list. Of those 502 work packages, 198 are required for tritium introduction into RTF.

The list of the remaining 304 work packages was reviewed to determine their impact on tritium introduction, environment, health, and safety. The review indicated that none of the work packages would affect the safe operation of systems in RTF.

The conclusion of the review of the maintenance backlog is that adequate controls are in place to control and minimize the backlog. Also, the proper priorities are being assigned to those work packages relating to environment, health, and safety.

Finally, the involvement of engineering and quality assurance, and the implementation of ALARA principles and configuration management practices in maintenance activities, was evaluated through interview and observation.

The evaluation revealed that both engineering and maintenance organizations are totally involved in the final stages of construction and testing and in the commencement of facility operations. There is a proper and professional relationship between the two organizations, and dialogue, both formal and informal, ensures that identified problems are resolved. Maintenance personnel provide feedback to engineering for improvements to procedures and processes.

Review of maintenance procedures showed that QA hold points have been specified in the procedures and that ALARA practices have been factored into the instructions. Cognizant managers recognize that tritium introduction will necessitate the use of lessons learned to improve the ALARA program.

Findings

M.7-1 RTF emergency lighting does not meet the minimum illumination and duration requirements of NFPA 101. (M.7.11.1) (H.1.2.2) - SR

M.7-2 Loss of exhaust fans from some ventilation line-ups in RTF can result in a pressure differential in the stairwells which prevents the ready opening of exit doors in an emergency per NFPA 101. (M.7.11.1) - HQ

M.7-3 RTF exit doors do not meet requirements for design basis tornado. (M.7.11.1) - SR

M.7-4 There is no approved workplace hazards monitoring plan per DOE 5480.10. (M.7.9.1) - SR

M.7-5 The stack monitoring system has several material deficiencies and discrepancies when compared to the NESHAPS permit. - SR

- **The system is not operational. (H.3.1.3)**
- **Testing of the system is incomplete; some required tests were not scheduled for completion prior to tritium introduction. (H.3.1.3)**
- **The as-built configuration is not consistent with the permit application. (M.7.8.1)**

M.7-6 There are regulatory compliance deficiencies in the environmental program: - SR

- **The NESHAPS permit was not available nor used to verify compliance. (M.7.8.1)**
- **Provisions are not in place for making quarterly reports. (M.7.8.1)**
- **Administrative controls are not in place to ensure permit assumptions are met. (M.7.8.1)**
- **The outfall monitoring procedures do not contain all the provisions necessary to ensure compliance with the permit. (M.7.8.2)**

M.7-7 An administrative system for ensuring daily cooling water tower samples for a corrosion inhibitor are obtained is not in place. (M.7.8.2) - SR

M.7-8 Facility-specific radioactive waste/mixed waste procedures have not been prepared. (M.7.8.3) - SR

M.7-9 Emergency preparedness program deficiencies were noted. (M.7.5.1) - HQ

- Not all emergency response organization personnel are trained. (M.7.5.1)
- Emergency response organization responsibilities and response team composition and responsibilities are not clearly defined. (M.7.5.1)
- Performance during emergency response drills and drill control were not satisfactory. (M.7.5.1)

M.7-10 Radiological control practices and procedures are not adequate for tritium introduction. (M.7.10.1) - HQ

M.7-11 The setpoint control document in the SDCS is not the most current revision. (M.7.6.1) - SR

M.7-12 The QA organization used local instructions to authorize QA personnel to disregard the QA hold points in a surveillance procedure. (M.7.6.1) - SR

Observations

M.7-A The draft Fire Hazards Analysis does not fully comply with the Memorandum Guidance of November 1992 from DOE-EH Headquarters Senior Fire Protection Engineer. (M.7.11.1)

M.7-B Formal concurrence has not been provided from the Headquarters Program Office for the Maximum Potential Fire Loss (MPFL) condition (exemption request) which exceeds the DOE 5480.7 limit. (M.7.11.1)

M.7-C Designated locations of some chemicals in RTF are not specific and do not meet the intent of a rigorous chemical control/inventory program. (M.7.9.1)

M.7-D Personal protective equipment storage and control program implementation is lacking as evidenced by multiple examples where items were of undetermined status and/or use. (M.7.9.1)

M.7-E The carcinogen control procedure fails to list all required carcinogens. (M.7.9.1)

M.7-F An industrial pressure safety program needs to be defined and implemented. (M.7.9.1)

M.7-G Current Hazards Assessments do not include a listing of confined spaces or sources of high pressure. (M.7.9.1)

M.7-H RTF and NMPD do not have a QA audit program which meets the intent of NQA-1. (M.7.7.3)

M.7-I The stated removal efficiency of the stack purge stripper system in the permit application is not technically supported. (M.7.8.1)

M.7-J There is no detailed plan for fighting fires in RTF. (M.7.5.1)

M.7-K Radiological Hazards assessment does not meet requirements of DOE 5500.3A. (M.7.5.1)

M.7-L RTF does not have a tritium ALARA committee and a dedicated ALARA coordinator. (M.7.10.1)

M.7-M Air flow pattern studies have not been performed to ascertain appropriateness of Kanne air sampling locations. (M.7.10.1)

M.7-N Tests conducted at Underwriter Laboratories for the fire resistance of seal materials and configuration used for sealing penetrations at RTF have not been formally documented. (M.7.11.1)

M.7-O Deficiencies in the design and arrangement of fire alarm, detection, and suppression systems pose conditions where the Maximum Credible Fire Loss could exceed the maximum limits of DOE 5480.7. (M.7.11.1)

Objective M.8 **A program is established to promote a site-wide culture that places the highest priority on safety and the protection of the environment.**

Results

There are two aspects to the achievement of this objective. The first is the establishment of policies, plans, and procedures that can reasonably be expected to foster the highest priority on safety and the protection of the environment. The second aspect is management commitment to safety including a self-assessment program, lessons learned program involving safety occurrences, and identification and resolution of USQs.

RTF policies and programs adequately emphasize safety and environmental protection requirements as confirmed by interviews conducted with RTF operations personnel. It is evident that personnel are familiar with these policies and procedures and associated implementing documents.

Five procedures important to ensuring that the RTF mission is successfully carried out were reviewed. These procedures clearly require and support good conduct of operations, and interviews with WSRC managers reinforced this conclusion.

RTF procedures and policies informing employees of their responsibility to question or suggest improvements to safety or environmental programs were reviewed. RTF management has taken several steps to notify personnel of safety responsibilities and to provide a means to collect and process issues. For example, the Program Manager established an Issues Council process to encourage and provide a convenient and nonthreatening means to collect employee concerns and respond to issues.

Interviews, implementation of RTF programs and policies, and employee participation in safety programs all support the idea that personnel have an appropriate awareness of safety and environmental protection requirements.

Interviews with managers showed that RTF management has a very good policy and positive attitude concerning the communication of health, safety, and environmental information to workers. Managers at all levels responded very positively and specifically regarding policy execution. RTF employees not in management positions were also interviewed to determine whether their management encourages them and if they are willing to bring up new safety and environmental issues. Employees feel that they receive good encouragement from upper RTF management; however, not all mid-level managers and below do a good job of reinforcing this policy. Overall, workers feel they are encouraged to raise safety issues to management for resolution when necessary.

The second aspect of this objective included the review of various management programs that are important to safety. These include the self-assessment program, the lessons learned program, and the identification and resolution of USQs.

There is no formal, documented self-assessment program in place at RTF. A performance-based management assessment program has been developed to address requirements in DOE 5700.6C. The RTF management assessment program is still in draft so its implementation cannot be evaluated; however, RTF has performed roughly 14 assessments of specific program areas in 1992. These efforts form the basis for a successful start of a self-assessment program.

The Tritium Operating Experience Program (TOEP) is the primary formal program for making RTF management personnel aware of safety issues and occurrences that could affect plant operations or be indicative of safety problems. Other programs, including performance indicators and trending, also exist that serve as indicators of safety problems. Appropriate actions are taken to ensure that lessons learned are implemented.

A formal program exists at RTF for identification and reporting of USQs, which is governed by WSRC USQD Manual 11Q. The USQD manual was recently revised and issued as an interim manual. The RTF USQD procedure is being revised to comply with the specific technical criteria of DOE 5480.21.

Management involvement in the USQD process is delineated in Section 6.7.2.1 of the TSR, which requires that USQ determinations be reviewed and dispositioned by the Tritium Safety Review Committee (TSRC). The present RTF USQD procedure does not require this review. Four USQDs reviewed indicated that USQDs were properly performed, except that the TSRC review was not conducted.

Other issues with the USQ process include the following: the RTF procedure states that a completed USQ screening constitutes a USQD, which would require all safety screens to be reviewed by the TSRC. Additionally, WSRC site and RTF USQD procedures indicate that "increase in frequency" exists ONLY if the change would cause the predicted frequency of an event to increase to a higher frequency category. This is inconsistent with DOE 5480.21, Section IV, paragraph 3e, which indicates that trends should also be considered.

Finding

M.8-1 The USQ process does not meet the requirements of TSR Section 6.7.2.1 concerning review by the Tritium Safety Review Committee. (M.8.5.4) - SR

Observations

M.8-A WSRC has not implemented a formal self-assessment program. (M.8.2.1)

M.8-B WSRC site and RTF USQD procedures do not consider trends in consideration of an increase in frequency. (M.8.4.5)

Objective M.9 The results of the WSRC corporate review verify the readiness of hardware, personnel, and management systems for tritium operations.

Results

In evaluating whether this objective is met, several aspects of the WSRC ORR program were reviewed. The scope of the ORR was reviewed to determine whether all areas of health, safety, and the environment were covered. The depth of the ORR was evaluated to determine whether an adequate determination of WSRC's state of readiness was conducted, and the categorizing of identified issues and implementation plans involving conditional issues were also reviewed.

The RTF ORR Report (WSRC-PP-92-1183) and Addendum (WSRC-PP-93-232) were reviewed and discussed with WSRC ORR personnel to determine the scope and the depth of the review. The ORR plan was reviewed and determined to adequately cover health, safety, and environmental areas. The performance of the ORR was also reviewed. Several aspects of the ORR were determined to have been hindered by programs not being fully developed or fully implemented. The readiness review began on April 1, 1992, the Report was issued on October 27, 1992, and the Addendum was issued on January 27, 1993. As a result of some programs not being in place at the time the reviews were conducted, assessments of the effectiveness of implementation could not be performed. Areas where implementation reviews were not conducted included Technical Safety Requirements and Conduct of Maintenance. Discussions with WSRC ORR personnel indicate that this issue is understood and a mechanism is in place to ensure that a final assessment of implementation is conducted. Areas where the WSRC ORR could not be completed were documented as open items in the ORR report and included as "A" punchlist items. "A" punchlist items are assigned to a manager who is responsible to ensure that the proper actions have been completed and that implementation is effective. A closure package is then prepared that provides the required documents and information which demonstrate the closure basis. These packages are then reviewed for concurrence by the WSRC ORR team and a representative sampling are reviewed by the DOE RTFPO. In conclusion, the scope of the WSRC ORR was determined to be adequate and the depth sufficient to ensure an adequate state of readiness.

As discussed above, issues that resulted from the ORR were classified as "A" punchlist items if disposition is required for startup. Other issues in which

disposition is not required for startup are classified as "B" punchlist items. "B" punchlist items are issues that take long-term considerations into account. Some examples of both "A" and "B" punchlist items were reviewed and the rationale for determining restart and long-term action was evaluated as being proper. A review was also conducted to determine whether conditional acceptances of ORR criteria were addressed with adequate implementation plans. It was determined that no conditional issues exist.

Results of the WSRC ORR, including the final "A" punchlist closure process, was determined to adequately analyze hardware, personnel, and management readiness for tritium operations.

Findings

None

Observations

None

Objective M.10 An adequate startup test program has been developed and implemented.

Results

An adequate startup test program should ensure that safety-related systems and process equipment are demonstrated operable and are fully capable of supporting tritium processing at RTF. In addition, the viability of procedures and training of operators should be confirmed in a realistic setting. The test program should verify that a safety culture and formality in conduct of operations are in place and functioning while conducting startup testing at RTF.

A review of the administrative procedures which govern the startup test program was conducted. These procedures define a well controlled and comprehensive startup test program consistent with industry standards. The program has established detailed acceptance criteria representing performance and safety requirements for equipment and systems.

The adequacy of tests with respect to confirming operability of process equipment was examined. Test acceptance criteria were found to be adequately developed, reviewed, and issued.

The earlier stages of testing were designed to identify gross problems and demonstrate that the mechanical installation was complete. These early tests accomplished several purposes in addition to the stated test purpose, including the training of operators and test conductors, the identification and validation of operating instructions, and the identification of needed maintenance actions, including corrective maintenance and many instrument calibrations.

A sampling of startup tests were selected at random to represent the scope and coverage of the test program. These tests represented several types of tests conducted throughout the test program, ranging from component tightness and integrity checks performed in the early stages of testing, to integrated system tests in the final stages of the test program.

The test/test result documentation was marginal at the beginning of the test program, but major improvements in this area were accomplished over the course of the testing program. The documentation for recent testing was adequate. Test results were supportive of the purpose of the test in all reviewed cases, in that stated acceptance criteria were met and identified deficiencies were tracked to completion and closed.

Operations procedures were used in conjunction with the test procedures, allowing validation of the procedures which will be used for normal operation of the component/system being tested. This contributed to the overall improving trend noted regarding the quality of test procedures and documentation throughout the testing program.

A review of the list of open tests and test results was conducted to assess the status of completion of the test program. Four of 169 tests required prior to deuterium introduction have not been closed. Also, 37 of 70 tests required prior to tritium introduction either have not been performed or must be accepted and closed (representing more than 50 percent of all testing required to be complete prior to tritium introduction). The remaining testing represents 2 to 3 weeks of testing effort, and completion, acceptance, and closure of these tests is considered appropriate prior to proceeding. Specific concern was noted for 13 tests involving the fire system or hardwire interlock integrated system tests. These tests have been completed, but the results have not been approved.

Individual test procedures were reviewed and found to be of high quality with test results adequately documented. The program has used lessons learned from prior tests to improve successive testing. Also, RTF Engineering has generated specific acceptance criteria documents that provide the basis for the equipment and systems tested. Selected acceptance criteria were evaluated against the scope and purpose of the associated startup tests and determined to be appropriate. The acceptance criteria were met for all observed/reviewed tests.

Actual performance of startup testing was monitored by the DOE ORR team. Test personnel were interviewed, found to be knowledgeable, and demonstrated a conscientious attitude toward the testing program. The completion of the tests was well documented, and the review and approval process for the associated procedures and test results was adequate.

The startup test program is comprehensive and effective. With the exception of those processes and components that require tritium for final demonstration and those tests yet to be completed, the startup test program has demonstrated the design, function, and control of the installed systems and equipment. The test program documentation provides a retrievable baseline for the design and operation of the facility.

WSRC presented a document that details a phased transition from construction and testing to operations. This phased approach will provide RTF management a period of time for normal operations. This time will be used to fully institutionalize recently implemented programs, train on revised procedures, and allow the watch team a period to gain increased confidence in their ability.

The first phase of the transition will be used to practice radiological controls, fully implement TSRs, and train on operations supporting the tritium tests. Emphasis is placed on training on recently revised procedures that are used in the test program and the validation of these procedures. This phase will be completed before the introduction of tritium.

The second phase would stress preparation for normal operations and response to casualty procedures. It would run concurrent with the tritium test program.

The final phase is the transition from construction and testing and will be used by management to ensure the integration of procedures, personnel, and equipment operations to support full operations of the facility. This commitment to this phased approach to stabilizing and integrating the operations of the facility was vital to the ORR Team's confidence in the ability of WSRC to operate RTF safely.

Findings

M.10-1 The startup tests required prior to tritium introduction are not complete. (M.10.1.3) (H.2.5.2) - SR

Observations

None

Objective M.11 Management authority, responsibility, and accountability are defined, understood, and implemented to ensure line organization control of safety.

Results

RTF policies and procedures were reviewed in order to determine whether management authorities, responsibilities, and accountability are clearly defined. The RTF administrative procedures contain the policies establishing personal accountability for operational performance. SOP-PP-11065, "RTF Operations Organization and Administration," describes the RTF organizational structure and provides guidance designed to ensure a high level of operational performance. Embedded in this procedure is the standard of excellence philosophy for RTF operations, as well as the establishment of clear lines of authority and responsibility for normal, off-normal, and emergency conditions. The several additional procedures reviewed reflected the standards of excellence and management responsibilities, authorities, and accountability contained in SOP-PP-11065.

The program procedures for operations, maintenance, engineering, radiation protection, quality assurance, occurrence reporting, nuclear safety, configuration management, lessons learned, self-assessment, fire protection, training, emergency planning, and waste management were reviewed. Program controls, such as monitoring of operational performance, inspection program, management and supervisory training requirements, and planning operations activities with safety and environment in mind were also evaluated. It was found that program controls are adequate and have been effectively communicated through procedures with the exception of self-assessment which has not yet been developed and implemented.

Interviews of five RTF staff and management personnel were conducted to determine whether their responsibilities and associated authorities, as defined in the procedures and policies, were understood and practiced. Individuals interviewed clearly understand and implement their responsibilities. Several critiques were reviewed; and it was found that management attends, reviews, and approves critiques. Management participates in daily planning and status meetings, which are important elements in the exercise of management authority and responsibility. During interviews, it was clear that management was aware of the established expectations for management and understood they are to set an example for their employees and deal squarely with issues as they arise.

Staff personnel were found to be knowledgeable of assigned responsibilities and established principles of operations. They were aware of and appear to routinely practice the principles of "believe your indications," "follow procedures," "do not bypass interlocks," and "routinely check alarms and indicating lights."

WSRC management directives, policies, and procedures were reviewed to determine whether communication and coordination of activities are adequately addressed. Guidance provided by the administrative procedures was considered adequate and should provide for effective communication and coordination between the various operational and support organizations. Interviews of personnel from various organization levels and disciplines concerning their understanding of their individual and organizational responsibilities for communication and coordination were conducted. All personnel responded positively, indicating that expectations had been clearly communicated and they understood what was involved, as well as the significance of compliance.

In the control room, several interactions between operations personnel and support groups such as maintenance were observed and were found to be satisfactory. There are also three daily meetings that enhance the communication and coordination process between operating management and support organization management.

Interviews were also conducted to determine whether the staff feels that they are accountable to management and whether management practices the philosophy of individual and organizational accountability. From interviews with senior RTF management, it was clear that individual and organizational accountability is an operating principle at RTF and is regularly practiced. There were innumerable instances where this principle was observed in action during the

ORR. Other instances were substantiated by the review of completed critiques. It was also clear from the interviews, as well as the documents reviewed, that management is very strict in their adherence to individual and organizational accountability.

Findings

None

Observations

None

Objective M.12 The DOE Savannah River Field Office has established adequate oversight programs to ensure the safety of tritium operations.

Results

The DOE Savannah River Field Office (SR) involvement with operations activities and its knowledge of plant operations were evaluated. The capability to oversee safety and environmental protection aspects of RTF operations was also evaluated along with whether SR fosters an appropriate safety culture.

The RTFPO Program Manager and other SR personnel from various groups were interviewed to determine their day-to-day involvement in facility operations, especially safety issues and requirements. SR is involved in facility activities on a daily basis and involved in the resolution of safety issues on a real-time basis. The FRs routinely attend shift turnover meetings, abnormal event critiques, and plan-of-the-day meetings. Review of the RTF Tickler System, a database of SR issues, indicates that SR regularly raises safety-related issues and closely works with WSRC for resolution. Discussions with WSRC operations personnel confirmed that SR is involved in daily facility operations, including the identification and resolution of safety issues.

The FRs' knowledge of facility operations was evaluated under Objective P.2, as well as the facility-related training and qualification requirements. All systems and equipment that compose the RTF process are covered by training requirements which have been completed by each of the FRs. Discussions with the Program Manager and the FRs indicated that facility operations training requirements were significantly increased as a result of lessons learned from the HB-Line ORR, where FR knowledge in this area was identified as a weakness. Followup interviews and discussions during facility walkdowns indicated that the facility and systems training has resulted in a satisfactory level of knowledge of facility operations.

The capability of SR to oversee tritium operations was evaluated through interviews with members of each of the various groups involved in overseeing RTF activities. The review indicated that the RTFPO staff and the matrix technical support staff have commercial and navy nuclear experience in

addition to several years of onsite experience. The staff personnel interviewed included three FRs, a fire protection engineer, a quality assurance engineer, an environmental engineer, a nuclear safety engineer, two other technical support engineers, a project engineer, a program support engineer, and the health/radiological protection engineer. SR managers were also interviewed, including the Assistant Manager, Nuclear Materials Processing (AMNMP); the RTFPO Program Manager; the Technical Support Branch Chief; and the DP Program Manager. These interviews and reviews of experience concluded that sufficient depth and breadth of coverage are provided for oversight of tritium operations.

Discussions with various WSRC supervisors and engineering staff indicated that the SR oversight program is staffed with a sufficient number of adequately skilled members. Every WSRC employee questioned concerning the adequacy of SR oversight was very positive and expressed an opinion that adequate technical capability and expertise are provided to perform oversight.

The SR program for verifying readiness of the RTF to perform tritium operations was evaluated. The RTFPO Program Manager indicated that the SR readiness verification was not a formal concentrated effort. The readiness verification effort consisted of a team of SR personnel reviewing the WSRC ORR. This effort resulted in a letter to the President of WSRC with 20 specific deficiencies pertaining to this ORR. Although this review did identify deficiencies with the WSRC ORR process, SR did not evaluate some areas important to the determination of WSRCs state of readiness to introduce tritium. The Program Manger indicated that in addition to the WSRC ORR review, SR evaluated training and qualification by attending classroom training sessions and oral boards, reviewed the WSRC management assessment program, conducted independent QA assessments, and maintained a daily vigilance over events leading to introduction of tritium. Based on these observations, RTFPO recommended commencement of the DOE HQ ORR.

The DOE ORR Team concluded that WSRC was not prepared to demonstrate readiness to introduce tritium in two specific areas. They are the implementation of the TSRs into operating, surveillance, and maintenance procedures and radiological work practices of the facility.

Additionally, the Readiness to Proceed memorandum submitted by DOE and WSRC did not identify all deferred items, discrepancies, and open issues related to RTF operations.

The ORR Team has concluded that SR did not provide DOE Headquarters sufficient information to make an informed judgement as to the readiness of RTF to commence tritium operations.

SR managers and staff were interviewed, and the current oversight program was evaluated for adequacy in providing continuing long-term oversight of facility operations. Some areas of tritium operations are not adequately covered. The program currently in place has focused on day-to-day issues and the completion of required startup items; consequently, systematic assessment of some key programmatic areas is not being conducted. These areas include environmental compliance, QA, and USQDs. The Operations Specialist position of the

emergency response organization is also not staffed with a facility-knowledgeable individual and backup. A mechanism such as a management transition plan is needed to ensure that the necessary changes are made to the SR oversight program to ensure adequate coverage of long-term facility operations.

Finally, SR policies and practices were evaluated, and individuals were interviewed to determine the emphasis placed on safety culture. Specific examples of safety and health issues were reviewed to determine the extent and significance of issues raised by SR. These issues were also discussed with WSRC personnel to get their viewpoint of SR involvement. The total review indicated that the RTFPO staff is very involved in raising safety and health issues and they are effective in promoting and enforcing the proper safety culture. One area of weakness was identified, however. The SR process for conveying safety issues to WSRC is informal and could result in unwanted direction of WSRC personnel (directly from SR without proper WSRC management approval). As RTF transitions into tritium operations, a more formal process should be implemented.

The SR self-assessment program is not yet fully implemented. A draft site procedure on self-assessment exists and is in the process of being reviewed. Pending final issuance of this procedure, the AMNMP has taken action to initiate self-assessment elements. Elements include management walkthroughs, an Order compliance review of major DOE Orders, and a detailed review of the conduct of operations program. In conclusion, it was determined that SR fosters a proper safety culture in conducting their oversight responsibilities.

Findings

M.12-1 The current SR oversight program does not provide adequate coverage of some aspects of long-term facility operations, and the process for conveying safety issues to WSRC is informal. (M.12.2.2) - HQ

Observations

M.12-A The SR self-assessment program for the RTF has not been fully implemented. (M.12.3.1)

Objective M.13 The implementation status for DOE 5480.19, Conduct of Operations Requirements for DOE Facilities, is adequate for tritium operations in RTF.

Results

A review of the implementation and execution of the requirements of DOE 5480.19 was conducted through direct observation of RTF personnel during normal routine activities and drills. The WSRC Conduct of Operations Manual (Revision 0, July 1, 1991) is the basis for site implementation of DOE Order 5480.19. This manual contains 18 chapters that address the same sequence of chapters found in the DOE Order and fully conforms to the Order requirements.

In addition, the WSRC Conduct of Operations Manual contains annotated supplementary guidance for each chapter, as well as appendices that provide examples of effective implementation. The RTF Conduct of Operations Implementing Procedures Manual, ST2-3, provides the requirements, responsibilities, and controls for the implementation of DOE 5480.19 at RTF. In many cases, the WSRC manual and the RTF procedures manual restated guidance statements in DOE Order as mandatory statements. The RTF implementation procedures for DOE 5480.19, Chapter 2, "Shift Routine and Operating Practices," and Chapter 13, "Operations Aspects of Facility Chemistry and Unique Processes," were not yet approved or implemented and were not reviewed.

The ORR Team closely evaluated operators' understanding and compliance with conduct of operations requirements through observing normal control room routine, shift turnovers, operator rounds, operator interviews, routine evaluations, and building drills. Procedure compliance, communications, equipment status control, control room decorum, shift turnovers, and log keeping are examples of the areas assessed. In most cases, the operators demonstrated a thorough understanding of conduct of operations. Their actions in the building during normal and abnormal conditions reflected an attitude consistent with DOE and WSRC managements' expectation for operation of a tritium facility.

Several areas reviewed were particularly strong regarding conduct of operations. The lockout and tagout system is adequate and the administrators are knowledgeable and attentive. Administrative logkeeping instructions are well understood and followed. Operator turnovers are formal, professional, and thorough. Shift Orders were current and provided required information to the shift. A formal and effective operator aid program has been established.

There were some aspects of DOE 5480.19 that were not adequately implemented as discussed below.

Operations Procedures

During the ORR, procedural compliance by the operators was closely observed. Interviews with several operators revealed an adequate understanding of the concept of procedural compliance, including knowledge of required actions if a procedure were determined to be incorrect. While some evolutions were performed using strict step-by-step procedural compliance, some weaknesses were observed during the performance of some operating procedures. Most cases of deviations could be attributed to unclear or imprecise procedural steps being interpreted by the operator. All procedures observed were satisfactorily completed according to the intent of the procedure with no observed instances of unsafe or reckless actions taken. While most deviations from procedural compliance could be explained as interpretation of a weak procedural step, there were some cases where it would have been prudent to stop the procedure and request a procedure change. This is also discussed in Objective M.1.

Shift Routine and Operating Practices

AOs are not always fulfilling their requirements with regard to roundsheet readings and room inspections. In general, out-of-specification readings are not always being documented and promptly reported to the control room. Some of the problems are related to the specifications on the roundsheet and to the limitations of the gages being read. The AOs are also not recording alarms on local control panels. During the time the shift supervisors were observed, it was not clear that proper facility tours were being completed. These tours are not recorded in the logbook.

Control Room Activities

Control room activities were thoroughly monitored during the ORR. In general, operations in the control room were conducted in a formal and professional manner. Access was properly controlled. Alarms were promptly acknowledged by the CRO and announced to the Shift Manager or Control Room Supervisor. Most of the time the CRO would obtain an acknowledgement from the supervisor, but some announcements were missed.

The major weakness is the unclear division of responsibility between the Shift Manager and Control Room Supervisor when both are present. The Control Room Supervisor often will acknowledge alarms for the Shift Manager, leave the control room without a turnover, return to the control room and again acknowledge alarms without a turnover. The continuity of the Shift Manager watchstation as it shifts between the Control Room Supervisor and the Shift Manager is not always clear and apparent, particularly to the CROs.

Communications

In the area of communications, weaknesses were noted in the performance of "repeat-backs" between operators, especially during building drills. Dedicated emergency communications (radios, phone, etc.) were not routinely used during drills between the FEC and remote casualty teams, such as the on-scene coordinator, HP monitoring teams, and Rally Point Coordinator. During a fire drill, the building fire alarm was allowed to continue ringing for approximately 45 minutes, significantly hampering communications efforts. During a test of the Automatic Transfer Switches (ATSs), direct communication was not established between the Diesel Generator Operator, the AO at the ATS, the Control Room (Shift Manager), and the Test Director. When problems occurred during this test, there were delays in notifying the Shift Manager of the nature of the problems.

While transferring blowers on Kanne Tritium Monitors, HP personnel did not adequately communicate or coordinate the evolution with Operations. The evolution resulted in an unexpected building alarm. No public address (PA) announcement was made regarding the cause of the alarm and building personnel were confused on how to respond to the alarm.

Control of Equipment and System Status

Several significant weaknesses were noted in the control of equipment and system status. The Distributed Control System (DCS), which is the operator's primary tool for the day-to-day operation of systems and maintenance of their status, does not currently have the capability to indicate the presence of a component with a danger tag. For example, during the ORR, an operator attempted to send an operational command via the DCS to a valve that had a danger tag "DO NOT OPERATE."

Valve lineups were in question on four oxygen monitoring systems that were in operation. Lineups varied between the four systems, and the responsible operators were unable to locate information necessary to establish the proper lineup.

Control room system status files have not been established for all systems. The systems' status board in the control room was used during shift turnover, but often was not changed until the time for the next shift turnover, though operations were taking place throughout the shift that changed the plant configuration.

Independent Verification

Techniques for independent verification were observed during the RTF ORR, and some deficiencies were noted. For example, DOE 5480.19 and the RTF Conduct of Operations Manual section covering independent verification clearly specify that local valve position indication should be used unless an ALARA or other condition (e.g., valve cannot be seen, no local position indication is available, etc.) precludes this. Operators at the RTF used indication at the DCS to position and verify position of all automatic valves. Many of the valves were easily accessible with clear visual indication of the valve position.

Operator training in actions to take if a valve is found out of position need to be upgraded. At least one operator signed off a step for a valve that was not in the position required by the check-off sheet.

Required Reading

Required reading was reviewed and found to be partially implemented. All procedure changes are currently routed to the operators for reading. However, other material required by DOE 5480.19 is not being circulated. A required reading procedure has been approved that will satisfy this requirement, but it has not been fully implemented.

Findings

M.13-1 While RTF has implemented most aspects of DOE 5480.19, there remain several areas where improvement is needed to achieve the level of performance expected at the time of tritium introduction to the facility. Specifically: - (HQ)

- Operating Procedures. (M.13.1.2) (M.1.3.1) (M.1.3.2)
- Shift Routine and Operating Practices. (M.13.1.2)
- Control Area Activities. (M.13.1.2)
- Communications. (M.13.1.2)
- Control of Equipment and System Status. (M.13.1.2)
- Independent Verification. (M.13.1.2) (M.1.3.2)

M.13-2 The RTF implementation procedures for DOE 5480.19, Chapter 2, "Shift Routine and Operating Practices," and Chapter 13, "Operations Aspects of Facility Chemistry and Unique Processes," are not approved or implemented. (M.13.1.1) - SR

Observation

M.13-A Not all required reading material specified in DOE 5480.19 is being circulated to operations personnel. (M.13.1.2)

APPENDIX A - TEAM COMPOSITIONS AND AREAS OF RESPONSIBILITY

TEAM LEADER

RICHARD C. CROWE (DP-67)

ADMINISTRATIVE ASSISTANTS

HEIDI COBLENTZ (LEAD) (DP-67)
DONNA NOTTINGHAM (DP-67)
CYNTHIA DOUGHTY (ETM)

SENIOR SAFETY EXPERTS

RICHARD C. CROWE (DP-67)
E. MORRIS HOWARD (ETM)
WAYNE RICKMAN (SONALYSTS)

OPERATIONS FUNCTIONAL GROUP

GROUP LEADER

KIM R. LOLL (DP-63)

OPERATIONS GROUP MEMBERS

JERRY HOUGHTON (DOE-SR)
THOMAS J. HULL (DP-63)
WILLIAM E. MILLER (DP-67)
JEFFRY L. ROBERSON (DP-67)
MICHAEL A. THOMPSON (DP-67)
MARK H. ZAGAR (SCIENTECH)

MAINTENANCE, TESTING AND SURVEILLANCE GROUP

GROUP LEADER

JOE KING (DP-62)

MAINTENANCE, TESTING AND SURVEILLANCE GROUP MEMBERS

DUANE L. SNYDER (SCIENTECH)
LARRY W. WHITE (DOE-SR)
MICHAEL N. WORLEY (DOE HQ)

ENGINEERING AND TECHNICAL SUPPORT GROUP

GROUP LEADER

TOM D. PESTORIUS (ORISE)

ENGINEERING AND TECHNICAL SUPPORT GROUP MEMBERS

ALBERT P. BAIONE (SCIENTECH)
MOSI DAYANI (DOE-SR)
THOMAS V. KRAFT (SCIENTECH)
DAVID J. ODLAND (SONALYSTS)
J. SCOTT PURVIS (DP-67)
JAMES R. STAIR (DP-67)
SCOTT DAVIS (DOE-OR)

MANAGEMENT AND ORGANIZATION GROUP

GROUP LEADER

JOHN T. LA POINT (SCIENTECH)

MANAGEMENT AND ORGANIZATION GROUP MEMBERS

DAVID C. CULLISON (DP-67)
DOUGLAS E. HINTZE (DR-1)
JEFFREY L. KOTSCH (SCIENTECH)
MICHAEL MCWILLIAMS (SAIC)
LANCE E. TRAVER (SCIENTECH)
WILLIAM WEBB (SCIENTECH)

APPENDIX B - BIOGRAPHICAL SKETCHES OF TEAM MEMBERS

Albert P. Baione (Engineering and Technical Support Technical Expert) is a nuclear engineer with 13 years of experience. For 10 years, Mr. Baione worked in nuclear facility operations and safety for the DOE Division of Naval Reactors. The majority of this work involved the development, management, and evaluation of refueling and radiological control programs, including the evaluation of management and organizational performance. Mr. Baione led inspection teams from Naval Reactors Headquarters in appraising the implementation of headquarters radiological control requirements on board nuclear-powered ships and in nuclear ship repair facilities. As Engineering Group Manager in Scientech's office in Rockville, Maryland, Mr. Baione manages a multi-million dollar Defense Programs contract, and he participates in various safety and regulatory projects related to nuclear engineering for the NRC and DOE. He participated in the two Building 559 Operational Readiness Reviews (ORRs) at Rocky Flats, serving as the Management, Organization and Staffing Group Leader for the first ORR.

Heidi Coblentz (Lead Administrative Assistant) is the Safety Appraisal Specialist for DOE Defense Programs Office of Inspections. She has 8 years of experience in Government service, including 5 years with DOE. Ms. Coblentz has coordinated 10 Defense Programs Technical Safety Appraisals, participated on 3 Tiger Teams, and the K-Reactor ORR.

Richard C. Crowe (ORR Team Leader and Senior Safety Expert) is the Director, Office of Inspections. He holds a B.S. in Nuclear Engineering and has 18 years of experience in the nuclear field. The first 12 years of his career were spent in the Navy's Nuclear Power Program. After being certified as a Nuclear Engineer Officer by the Naval Reactors branch of DOE, Mr. Crowe served as the Chief Engineer during construction of a nuclear submarine. He also served as the Executive Officer of a nuclear submarine. During this period he supervised two refueling outages and three startup test programs. For 2 years, he was assigned as team member to a Naval Nuclear Propulsion Examining Board, participating in 67 inspections of nuclear reactor plants. Mr. Crowe left the Navy in 1986 to take a position at the Shoreham Nuclear Power Station where he completed his SRO certification. His assignments included Assistant to the Plant Manager and Nuclear Analysis Division Manager. In these positions, he was assigned as overall leader for two pre-full-power-license ORRs. Mr. Crowe assumed his present position with DOE in 1992. Mr. Crowe has experience in safety evaluations; codes, standards, and regulatory requirements; root cause analysis; nuclear operations and maintenance; and conduct of ORRs.

David C. Cullison (Management and Organization Technical Expert) is a nuclear engineer with the Department of Energy Defense Programs. He has 9 years experience in the nuclear field. He spent the first 8 years of his career in the Navy's Nuclear Power Program where he served as a division officer aboard a nuclear submarine. He was certified as a chief nuclear engineer by Naval Reactors branch of the DOE. As a result of his Navy nuclear experience, he has significant experience and expertise in many areas of nuclear operations and maintenance. Mr. Cullison separated from the Navy in 1991 and joined the DOE. Since then, Mr. Cullison has worked in the Defense Programs Office of

Inspections as an Inspection Team leader and Inspection Team Functional Area leader on several Defense Programs Technical Safety Appraisals (TSAs). Mr. Cullison's areas of expertise are nuclear operations and maintenance, engineering and technical support, emergency preparedness, and quality assurance.

Scott L. Davis (Engineering and Technical Support Technical Expert) is the Program Manager for Safety and Health in the Laboratory Operations Branch, Oak Ridge National Laboratory, DOE Field Office, Oak Ridge. He holds a MPH in Public Health and has 13 years of experience in the Nuclear/Medical Field. Mr. Davis has served as a Program Manager for Emergency Management. He has formulated, developed, implemented, and appraised the Oak Ridge Field Office and the contractor's emergency preparedness and radiological safety programs. Mr. Davis served as the point of contact for the Radiological Assistance Program for DOE Region II and the development of the National Oceanic and Atmosphere Administration Site Survey Project. Mr. Davis has worked as a Health Physicists and Primary Radiation Officer for the U.S. Army Communications and Electronics Command and the Electronics Research and Development Command. His experience in safety, health physics, and program management has been demonstrated by holding five NRC licenses and serving on many special assignments such as Tiger Teams and Investigation Boards.

Mosi Dayani (Engineering and Technical Support Technical Expert) is a nuclear engineer in the Reactor Engineering Branch of SRSPO. He holds a B.S. in Nuclear Engineering and has over 13 years experience in commercial and defense nuclear industries. Mr. Dayani worked as a system engineer on various plant heat transport and emergency cooling systems at the Clinch River Breeder Reactor Plant Project Office. In 1983, he joined the Department of Energy at Richland Operations Office and performed program engineering of defense and civilian waste management programs. In this capacity he managed several nuclear waste R&D programs. He also conducted Operational Readiness Reviews of various nuclear waste test facilities and completed the Monitored Retrievable Storage Program design, Environmental Assessment, and the recommendation to the U.S. Congress to meet the requirements of the Nuclear Waste Policy Act of 1982. He then transferred to the Brown's Ferry Nuclear Power Plant where he performed as a system engineer on reactor outage tasks and restart activities in the Technical Support Organization. He also successfully completed the 7-month Technical Staff and Managers training course. Mr. Dayani has worked at the SRSPO on restart and test of the K-Production Reactor since 1989 as a system engineer or program manager.

Cynthia Doughty (Administrative Assistant) has 8 years of administrative support experience, including over 2 years of extensive support to various offices at DOE-HQ. She is employed by Energy Technology Management (ETM). Significant efforts in support of DOE include: assisting in the planning, scheduling, coordination, and onsite administrative support for several Technical Safety Appraisals for DOE Defense Programs Office of Inspections; providing planning, coordination, staffing, and onsite administrative support for Operational Readiness Reviews conducted by the DOE Office of Waste Operations, Vitrification Projects Division; providing onsite administrative support to quarterly gaseous diffusion plant meetings in Lexington, Kentucky for the DOE Office of Uranium Enrichment's Office of Operations and Facility

Reliability; and providing assistance in the design, revision, and data entry of a Requirements Summary Data Base supporting management control system assessment for DOE's Office of Waste Operations.

Douglas E. Hintze (Management and Organization Technical Expert) is a nuclear engineer on the technical staff of the Departmental Representative to the Defense Nuclear Facilities Safety Board. He holds a B.S. in Mathematics from the U.S. Naval Academy and an M.B.A. in Finance from Virginia Polytechnic Institute and State University. The first 9 years of his career were spent in the Navy, including 6 years in the Nuclear Propulsion Program serving as a division officer aboard a nuclear submarine. The remaining 3 years of naval service was spent as the program manager for curricula development for the TRIDENT II Strategic Weapons System training program. In this assignment, he was responsible for the development of new training courses to include computer based training and automation of existing courses. Mr. Hintze's area of expertise is nuclear operations, particularly training and conduct of operations.

Jerry L. Houghton (Operations Technical Expert) is a Technical Support Engineer with DOE Savannah River Special Projects Office (SRSPO). He holds a B.S. in Nuclear Engineering Technology. Mr. Houghton has 25 years of experience in operations, engineering, and nuclear fields. The first 11 years of his career were spent in the Naval nuclear power programs where he served in the submarine force and as a senior staff member with the Naval nuclear power training facility. Mr. Houghton was qualified as Engineering Officer of Watch Engineering Watch Supervisor, and Senior Training Instructor. Mr. Houghton separated from the Navy in 1977 and joined the operations management team at a midwest nuclear utility. During the 11 years serving with the utility, Mr. Houghton gained significant operational experience from the successful construction, licensing, startup, and operation of the facility. Mr. Houghton was licensed as Senior Reactor Operator (NRC), Shift Technical Advisor, and INPO Peer Evaluator. In 1989, Mr. Houghton joined the Westinghouse Reactor restart team at Savannah River Site (SRS). While at SRS, he advised operations management regarding methods and techniques to improve the conduct of operations. Mr. Houghton joined DOE in 1991. Mr. Houghton has experience in nuclear operations, construction, training, testing, and engineering.

E. Morris Howard (Senior Safety Expert) is a consultant with Lawrence Livermore National Laboratory. He holds a B.S. from the University of Chattanooga and attended the graduate school of Nuclear Science and Engineering at the Catholic University of America. He is a Registered Professional Engineer in three fields, i.e., Electrical, Quality, and Nuclear Engineering. He has 39 years of experience in the electrical power industry, including 29 years of experience in nuclear power. Mr. Howard has extensive experience in both the operation and regulatory oversight of nuclear facilities and has served as a Senior Safety Expert on the ORR for K-Reactor and Rocky Flats Building 707. He started his career in the power industry with the Tennessee Valley Authority as an electrical engineer in the power systems operations organization. His transition to the nuclear industry began with the U.S. Army Nuclear Power Program, beginning as an electrical engineer and advancing to Director of the Operations Department with responsibility for

the safe operation of five nuclear installations. After approximately 18 months with the Naval Facilities Engineering Command as the Director of the Naval Nuclear Power Unit's Technical Support Department, Mr. Howard joined the U.S. Atomic Energy Commission (AEC), which later became the U.S. Nuclear Regulatory Commission (NRC). At the AEC/NRC, Mr. Howard started as a senior reactor engineer with responsibility for reviewing submittals from license holders and preparing the staff position on modifications and changes. At one time, he was the Chief of Engineering and Construction in the Northeast. He progressed to the position of Director of Region IV in Arlington, Texas. After his retirement from the NRC, he joined KMC as a Senior Associate. Later he joined Florida Power Corporation as Director, Site Nuclear Operations, with maintenance, outage planning and performance, and administration. After more than 3 years at Florida Power, he joined Georgia Power Company as corporate manager of training and progressed to General Manager, Nuclear Operations Services. His most recent position was with Virginia Polytechnic Institute where he was a member of the facility and research associate with the Management Systems Laboratories. Most recently Mr. Howard served as a Senior Safety Expert for the Operational Readiness Review for K-Reactor at the DOE Savannah River Site. Mr. Howard's areas of expertise include nuclear engineering (including project management and construction), conduct of nuclear reactor operations and nuclear safety assessments.

Thomas J. Hull (Operations Technical Expert) is a nuclear engineer with DOE in the Reactor Project Control Division of the Office of Processing and Reactor Facilities. He holds a B.S. in Chemical Engineering and is pursuing his M.S. in Technical Management. He has 6 years of experience in the nuclear field. Mr. Hull spent the first 5 years of his career in the Navy's Nuclear Power Program. He served as a division officer on a nuclear powered cruiser and was certified as a Nuclear Engineer Officer by the Naval Reactors branch of DOE. He was subsequently promoted to the Chemistry and Radiological Controls Assistant, which is the principal assistant to the Chief Engineer on all nuclear safety issues related to chemistry and radiological controls. Mr. Hull's next assignment with the Navy was as the Plans and Programs Officer with the Navy's Operational Test and Evaluation Force, responsible for the evaluation of new weapon and engineering systems performance. Mr. Hull separated from the Navy in 1991 and assumed his present position with DOE in October 1991. He is currently developing programmatic guidance, monitoring all technical and operational activities, and conducting periodic site inspections. Mr. Hull has experience in nuclear operations, maintenance, inspections, and radiological controls.

Joseph F. King (Maintenance, Testing and Surveillance Group Leader) has over 30 years of operational experience in the U.S. Navy. He was directly involved in the management, supervision, and operation of naval nuclear reactors. His experience includes assignments that involved initial startup of eight reactors and command of the nuclear power cruiser USS Virginia (CGN 38) for over 3 years. As the Nuclear Power Readiness and Training Officer for the Surface Force U.S. Atlantic Fleet, he directed a team of nuclear-qualified officers who assured that nuclear powered ships were operated to the highest standards. In addition, he directed the certification effort on initial startup of two ships. This certification assured that the management and crew training met the required standards for safe operation and crew emergency

response effectiveness prior to initial at-sea operations. Most recently, Mr. King was a Deputy Commander of the Naval Sea Systems Command, involved in program management, acquisition, and maintenance.

Mr. King is currently a Nuclear engineer in the Office of Engineering and Operations Support, Defense Programs, U.S. Department of Energy. He participated in the ORRs for Buildings 559 and 707 at Rocky Flats and the evaluation of Plutonium Start-up Test Program for Building 559.

Jeffrey L. Kotsch (Management and Organization Technical Expert) is a Senior Health Physicist with Scientech, Inc. He holds a B.S. in Biology and M.S. degrees in Zoology/Physiology and Radiation Health. He is also a certified Health Physicist and has 17 years of experience in the nuclear field. Mr. Kotsch began his career as a health physicist with the NRC, where he was involved in a variety of activities: program management for the regulatory compliance of four uranium recovery facilities; occupational radiological safety reviews; environmental impact assessments; environmental monitoring reviews; health physics training; emergency response actions; and computerized radiological dose assessments. Additionally, he served as branch representative on a number of NRC research and standards development projects. After 3 years with the NRC, Mr. Kotsch became the Head of the Radiation Health Group at Salem and Hope Creek Nuclear Generating Stations, where he was responsible for establishing and directing the operations of centralized radiation health services. Assigned as the Head of the Radiation Support Group in 1988, his responsibilities expanded and included the areas of ALARA engineering, radwaste program and standards, training, and radiological accident analysis. Mr. Kotsch joined Scientech in 1990, where he participates in safety and regulatory projects involving radiation protection, environmental monitoring, and emergency preparedness. In addition, Mr. Kotsch was a team member of the Savannah River K-Reactor and Rocky Flats Building 707 Operational Readiness Reviews and a team member on the Environment, Safety and Health task force on developing the Radiological Control Manual. Mr. Kotsch's areas of specialization are operations management and radiation protection. He has extensive experience in developing and managing radiation protection programs at nuclear power plants.

Thomas V. Kraft (Engineering and Technical Support Technical Expert) is the Senior Fire Protection Engineer with Scientech, Inc. He has over 15 years experience in fire protection and safety engineering. This work includes extensive field and oversight work with a broad range of industrial facilities ranging from utilities and petro-chemical plans to laboratories and electronic manufacturing facilities. DOE experience includes senior managing fire protection engineer for INEL Test Reactor Area where a $23 million fire protection and life safety line item project was successfully proposed and supported for physical upgrades to protection and alarms to meet improved risk requirements. In addition, he has served as member of the Brookhaven Tiger Team Assessment. Additional projects have included Fire Hazards Analyses for Westinghouse Hanford, EG&G Idaho, and Sandia National Laboratories, as well as design review support for DOE-ID Occupational Safety Support Branch and EG&G.

John T. La Point (Management and Organization Group Leader) is an independent consultant with over 28 years of experience within the nuclear industry. His

most recent experience was an assignment with the Department of Energy, Savannah River Special Projects Office to assist the Office Director during the restart efforts of the K-Reactor. Prior to that he was a member of the Department of Energy Operational Readiness Review Team for K-Reactor restart during the first phases of that review and also conducted reviews of the radiological control program at the DOE's FERMILAB particle accelerator. He has had many diverse assignments during his 28 years including the position of Site Director/Deputy Site Director at the Sequoyah Nuclear Power Plant. In this capacity, he was responsible for all aspects of operation of both units, including operations, maintenance, engineering, training, licensing, and quality assurance. During this assignment, both reactor plants were restarted after extended shutdowns, a successful refueling outage was accomplished, and the site was removed from the NRC's troubled plant list. The plants also accomplished extended runs of 299 days, which tripled the previous record for these plants. He also served 20 years in the Naval Nuclear Power program during which time he qualified as on Engineering Officer of the Watch, served with the Naval Reactors program at a major shipyard, where, among other responsibilities he served as a Joint Test Group member and safety monitor during power plant testing.

Kim R. Loll (Operations Group Leader) is the Director of the Reactor Operations Division, Office of Processing and Reactor Facilities, at DOE Headquarters. Mr. Loll hold a B.S. in Physics. Mr. Loll has 16 years of experience in the nuclear field. He spent 7 years in the Navy Nuclear Power Program, serving over 3 years as a division officer on a nuclear submarine, and certifying as Nuclear Engineer Officer by the Naval Reactors branch of DOE. He served for 2 years on the staff of Commander Submarine Force, U.S. Pacific Fleet, and separated from the Navy in 1982. He took a position with General Electric Company, Nuclear Energy Division, where he completed his Senior Reactor Operator Certification. He performed pre-operational and startup testing at the Susquehanna Steam Electric Station in Berwick, Pennsylvania, during the period 1983-1985. Mr. Loll held various positions in the Susquehanna Plant Engineering Group as a G.E. contractor to Pennsylvania Power and Light Company from 1986 until 1991, serving as the G.E. Site Services Manager during the last 3 years. He joined the DOE in July 1991. Mr. Loll has experience in reactor operations, maintenance, and testing.

Michael R. McWilliams (Management and Organization Technical Expert) is a training and human factors consultant with Science Applications International Corporation (SAIC). He holds a B.A. in Psychology and an M.S. in Industrial/Organizational Psychology. He has over 13 years experience providing training and human factors-related services to the nuclear industry and DOD. From 1979 to 1980 he served as a research associate with the Navy Personnel Research and Development Center where he was responsible for designing strategies for evaluating the effectiveness of Navy training programs. From 1980 to 1983 he served as a consultant with the NUS Corporation where he was responsible for assisting nuclear utility companies in implementing post-TMI training programs and developing personnel appraisal systems. As a consultant with SAIC since 1983, Mr. McWilliams' assignments have included: technical advisor for establishing training requirements, developing job performance measures, and producing videotape training programs for operators at DOE's Y-12 Plant; managing the development of computer-based

training programs in areas such as quality assurance and radiation safety; developing maintenance procedures for the AVLIS SDF program at Lawrence Livermore National Laboratory; and performing human factors assessments of safety parameter display systems (SPDS) at nuclear power plants. For the past several years, Mr. McWilliams has been involved in the evaluation of licensed training programs and emergency operating procedures at nuclear power plants as a contractor to the US Nuclear Regulatory Commission. He has also served on the Operational Readiness Review Team evaluating training for Building 559 at DOE's Rocky Flats Plant. As a contractor to the NRC, Mr. McWilliams has received special training in Westinghouse PWR Technology and Fundamentals of Inspection.

William E. Miller (Operations Technical Expert) is a nuclear engineer with DOE in Defense Programs' Office of Inspections. He holds a B.S. in Mechanical Engineering and has 17 years experience in nuclear engineering. The first 5 years of his career were spent in the Navy Nuclear Power Program, followed by 7 years in the commercial nuclear power program. Mr. Miller qualified as a Senior Reactor Operator at a commercial nuclear power plant. He has been with DOE for the last 2 years. One year was spent with the Office of Scientific and Engineering Recruitment, Training and Development (TR-1) as a lead instructor for the Fundamentals of DOE Operations Course conducted at many sites across the DOE complex. Mr. Miller has been with the Office of Inspections for over a year and has conducted six Technical Safety Appraisals.

Donna Nottingham (Administrative Assistant) is the Secretary for the Office of Inspections for DOE Defense Programs. She has 19 years of experience in Government service, including 5 years with DOE. Ms. Nottingham was the lead administrative support for the Savannah River Safety Evaluation Report for the restart of K-Reactor, and has participated on one Tiger Team Assessment.

David J. Odland (Engineering and Technical Support Technical Expert) has an M.S. in engineering physics and over 20 years of experience in the operation, maintenance, design, construction, and modification of nuclear power plants. Mr. Odland served in the U.S. Navy nuclear propulsion program for two tours, including a new construction tour. Mr. Odland has worked in the commercial nuclear power industry in the following capacities. He has been a startup engineer with responsibility for instrumentation and controls systems at Millstone 3. As Engineering Supervisor at Millstone 1, Mr. Odland was responsible for electrical, mechanical, and reactor engineering support to an operating unit. In addition, he supervised the plant's In-Service Inspection Program. As Maintenance Supervisor, he was responsible for the mechanical and electrical maintenance (preventive and corrective) at Millstone 1 and directed the efforts of the maintenance department through a refueling outage. He was licensed as a Senior Reactor Operator and served as a member of the Plant Operations Review Committee. As Superintendent of Maintenance and Modification s at Enrico Fermi 2, Mr. Odland was responsible for all site maintenance and modifications. He provided oversight to a department of over 250 personnel providing mechanical, electrical, and instrumentation and controls support. Mr. Odland is currently a Certified Operating License Examiner for the Nuclear Regulatory Commission. He has provided support to commercial utilities in assessing their performance of Technical Specification Surveillances, and has participated in an Electrical Distribution Safety

Functional Inspection. Mr. Odland was a member of the Operational Readiness Review Team for the Analytical Chemistry Building (Building 559) at the Rocky Flats Plant. During Phase I of the ORR, he was responsible for reviewing the Maintenance, Testing, and Surveillance Programs. During Phase II of the ORR, Mr. Odland was the Group Leader for Engineering; Maintenance, Test, and Surveillance; and Fire Protection. Mr. Odland has also provided assistance to the Plutonium Reclamation Facility at Westinghouse Hanford in the implementation of a revised Final Safety Analysis Report.

Tom Pestorius (Engineering and Technical Support Group Leader) is an independent engineering consultant. He holds a B.S. degree from the U.S. Naval Academy and an M.S. in Mechanical Engineering. He has 23 years of work experience, much of it in the nuclear field. Mr. Pestorius spent the first 11 years of his career in the Navy's Nuclear Propulsion Program. He was certified as a nuclear engineer officer by the Naval Reactors division of DOE. Mr. Pestorius separated from the Navy on 1979 to join Nuclear Technology Incorporated. He served as a project manager for nuclear utility customers and was involved with training, TMI post-accident efforts, fire protection, emergency planning, and quality assurance. In 1981, Mr. Pestorius began working for the Federal government in Washington, D.C., first as an ASME Congressional Fellow in the U.S. House of Representatives and later as a Senior Policy Analyst in the White House Office of Science and Technology. In the latter capacity, he was heavily involved with the formulation and implementation of U.S. energy policy. Responsibilities included chairing the Interagency Committee for Radiation Policy Coordination and managing two scientific panels. In 1984, Mr. Pestorius joined Ebasco Services, Inc. as its Washington, D.C. representative, responsible for strategic and marketing planning, direct sales, and proposal preparation. Mr. Pestorius left Ebasco in 1986 to assume the position of Vice President (and Managing Partner/Owner) of Dynametrics, responsible for the eastern U.S. marketing and sales efforts for a large European Chemical Company's electronics materials products. In 1989, he became the President of TPA, providing analytical, marketing and training services to energy, environmental, and electronics businesses.

J. Scott Purvis (Engineering and Technical Support Technical Expert) is a nuclear engineer with DOE in Defense Programs' Office of Inspections. He has 9 years of experience in the nuclear field and spent the first 8 years of his career in the Navy's Nuclear Power Program. He served as Chemistry and Radiological Controls Officer and Electrical Officer on a nuclear submarine and was certified as a Nuclear Engineer Officer by the Naval Reactors branch of DOE. Mr. Purvis later served as Fleet Liaison Officer in the Navy's MK-48 torpedo Program Office, responsible for technical support and life-cycle maintenance for the MK-48 torpedo and served as a member of the Torpedo Certification Examining Board that inspected and certified operations for MK-48 torpedo facilities throughout the Navy. Mr. Purvis separated from the Navy in 1990 to join the Office of Inspections and has served as the Team Leader for a Defense Programs Technical Safety Appraisal (DP TSA) of the Y-12 Plant and Functional Area Leader at five other DP TSAs.

Wayne Rickman (Senior Safety Expert) has more that 30 years of operational experience in the Naval Nuclear Propulsion (submarine) Program, achieving the rank of Rear Admiral. Mr. Rickman was involved in the training and

qualification of personnel in the Naval Nuclear Propulsion and the Naval Nuclear Weapons Programs. He served as commanding officer of two submarines, including a Trident submarine with the Navy's largest and newest submerged power reactor and the Trident C-4 weapons system. In addition, Mr. Rickman served as a Deputy Commander for training for a submarine squadron, where he directed, monitored, and evaluated the training and qualification of submarine crews in operations of nuclear reactors and nuclear weapons. He also served as special assistant to the Director, Naval Nuclear Propulsion Program, where he was responsible for the selection, qualification, training, and assignment of personnel who supervise, operate, and maintain naval nuclear propulsion plants. Mr. Rickman's last assignment as a Rear Admiral was the Flag Officer responsible for training in the Atlantic fleet. He was responsible for 14 diverse training organizations with 2,000 instructors in more than 650 courses and a throughput of 175,000 students per year.

Mr. Rickman is presently employed as a Principal Analyst and Vice President of Nuclear Operations for Sonalysts, Inc. He is supporting the U.S. Department of Energy by testing and providing certification for K-Reactor operators at the Savannah River Site. He assisted in the DOE Operational Readiness Review of Rocky Flats Building 559 by developing the training acceptance criteria for that review. Mr. Rickman participated as the team leader for the Management and Training group of experts for the Building 559 ORR. He participated as a Senior Nuclear Safety Expert on follow-up visits to Building 559. He participated in the ORR for Building 707 at Rocky Flats as a Senior Nuclear Safety Expert. He also is a member of the H-B Line ORR at Savannah River Site.

Jeffry L. Roberson (Operations Technical Expert) is a nuclear engineer with the Department of Energy Defense Programs. He holds a BS in Nuclear Engineering from the Georgia Institute of Technology. He has 10 years experience in the nuclear field. He spent the first years of his career at the E. I. Hatch, Nuclear Generating Facility of the Georgia Power Co, in Baxley, Ga in the reactor controls division. He then served in the Navy's Nuclear Power Program where he served as a division officer aboard a nuclear submarine. He was certified as a Chief Nuclear Engineer by Naval Reactor Branch of DOE. As a result of his Navy and civilian experience, he has significant experience in many areas of nuclear operations, maintenance, health physics, and nuclear design. Mr. Roberson separated from the Navy in 1990 and spent 1 year as a programs manager for a major acquisition program for the Department of the Navy. Mr. Roberson joined the DOE in 1991. Since then, Mr. Roberson has worked in the Defense Programs Office of Inspections as an Inspection Team Leader and Inspection Team Functional Area Leader on several Defense Programs Technical Safety Appraisals (TSAs). Mr. Roberson's areas of expertise are conduct of operations, emergency preparedness, and radiation protection.

Duane L. Snyder (Maintenance, Testing and Surveillance Technical Expert) is an independent engineering consultant. He holds a B.S. degree from the U.S. Naval Academy and has 18 years of experience in the nuclear field. His first 6 years were spent in the Navy's Nuclear Propulsion Program, where he served as an engineering division officer and was certified as a Nuclear Engineer Officer by Naval Reactors. Mr. Snyder separated from the Navy in 1980 to join

General Electric and obtained an SRO certification. He is a licensed Professional Engineer. He has worked on widely varying projects at several nuclear utilities. Mr. Snyder has experience preparing and reviewing pre-operational and power ascension test procedures for commercial reactors, reviewing associated test results, and coordinating plant modifications and outage activities. His assignments have included startup test engineer, system engineer, shift test engineer, and assistant to the restart test manager at a problem plant. Mr. Snyder's most recent experience has been at SRS conducting programmatic and performance-based reviews and assessments of the operating contractor for the DOE. These reviews and assessment activities include the preparation of technical reports for the K-Reactor Restart Safety Evaluation Report, Operations Technical Expert for the DOE K-Reactor ORR, and technical support coverage of the K-Reactor Power Ascension Test Program.

James R. Stair (Engineering and Technical Support Technical Expert) is a Nuclear Engineer in DOE's Defense Programs Office of Inspections. Mr. Stair holds a B.S. degree in Nuclear Engineering and has 16 years of experience in the nuclear industry. The first 9 years of Mr. Stair's experience were with a public utility (General Public Utilities Nuclear Corporation (GPUNC)) which operates Three Mile Island Nuclear Station (A Babcock & Wilcox Model 177 Pressurized Water Reactor). While with GPUNC, he served in the positions of Licensing Compliance Engineer (3 years), Station Nuclear Engineer (3 years), and Certified Shift Technical Advisor (3 years). The following 6 1/2 years were spent with the Nuclear Regulatory Commission in the positions of Reactor Engineer, Certified Resident Inspector at the Susquehanna Nuclear Station (a General Electric Model 4 Boiling Water Reactor), and in temporary detail at various other commercial nuclear stations. Mr. Stair assumed his present position with DOE in December 1991. Since then, his primary involvement has been the performance of Technical Safety Appraisals at Pantex, Nevada Text Site, Kansas City Plant, Mound, and Savannah River. Mr. Stair's areas of expertise include nuclear operations and maintenance, occupational safety and health, and quality assurance.

Michael A. Thompson (Operations Technical Expert) is a nuclear engineer with DOE in Defense Programs' Office of Inspections. He has 7 years of experience in the nuclear field. Mr. Thompson spent the first 6 years of his career in the Navy's Nuclear Power Program. He served as Reactor Controls Division Officer and Electrical Officer on a nuclear cruiser and was certified as Nuclear Engineer Officer by the Naval Reactors branch of DOE. During two years of shipyard overhaul, Mr. Thompson served as an Alternate Joint Test Group Member, supervising the operational testing sequence for two nuclear reactors. Mr. Thompson separated from the Navy in 1989 and was hired by IBM as a Large Systems Marketing Representative. Mr. Thompson joined DOE in 1991 in the Office of Inspections. Mr. Thompson has served as the Team Leader for a Mound Plant Technical Safety Appraisal, and functional area leader for several TSA inspections throughout the DOE complex.

Lance E. Traver (Management and Organization Technical Expert) is a nuclear and environmental engineer with 10 years of experience. Mr. Traver served in the U.S. Navy for 5 years where he developed an understanding of reactor operations and safety principles via the Naval Nuclear Propulsion Program.

His accomplishments included qualification as Chief Engineer and Senior Supervisor of Naval Nuclear Propulsion Plants, and receipt of two Navy Achievement Medals. As an employee of Scientech, Inc., he has participated in evaluating the reactor restart program for the Savannah River Site Production Reactors and has conducted root cause analyses of safety issues at both the Savannah River Site and the Rocky Flats Plant. Mr. Traver provided technical support for a criticality safety assessment at the Rocky Flats Plant and a plutonium hold-up study at the Hanford Site. He has also served as Technical Coordinator and Technical Editor for various DOE Operational Readiness Reviews and Technical Safety Appraisals. Mr. Traver earned a M.S. degree in Environmental Engineering from the University of Maryland in May 1992. Since then, he has been supporting the Office of Environmental Restoration and Waste Management at the DOE Savannah River Field Office through a technical support services contract and has been involved with such protects as the Consolidated Incinerator Facility, In-Tank Precipitation and Extended Sludge Processing, and the E-Area Vaults.

William S. Webb (Management and Organization Technical Expert) has 10 years of experience in the nuclear field. The first 5 years were spent in the Naval Nuclear Power Program serving as a division officer on a nuclear submarine. The remaining 5 years were spent at the Savannah River Site (SRS) as a DOE employee. Mr. Webb has held several positions at SRS including, Senior Nuclear Engineer, K-Reactor Operations Branch Chief, and K-Reactor Technical Support Branch Chief. He has also served as the DOE Unreviewed Safety Question (USQ) Program Coordinator. During his 5 years at SRS, he has lead numerous team inspections and had direct responsibility in several different areas of nuclear plant operations. These areas include: technical specifications, safety evaluations, configuration management, safety analysis, project management, systems engineering, design engineering, conduct of operations, and conduct of maintenance. Mr. Webb was involved in the K-Reactor Restart Program from development of the improvement programs through implementation and the successful completion of the Power Ascension Test Program. Mr. Webb is currently a Scientech employee at the Augusta, Georgia, office where he provides DOE support in the Waste Management areas and participates in ORRs.

Larry W. White (Maintenance, Testing and Surveillance Technical Expert) is a qualified Facility Representative at K-Reactor for the U.S. Department of Energy (DOE). He has 27 years of experience in the nuclear field. He spent the first 23 years in the U.S. Navy's nuclear power program where he served as Leading Engineering Laboratory Technician, Machinery Division Leading Petty Officer, and Engineering Department Leading Petty Officer on various submarines. He has been with DOE for nearly four years as a Facility Representative at P-Reactor, K-Reactor, and participated in the K-Reactor Power Ascension Test Program. Mr. White's areas of expertise are nuclear operations, maintenance, and inspection/oversight.

Michael N. Worley (Maintenance, Testing and Surveillance Technical Expert) is an engineer with DOE in the Office of Processing and Reactor Facilities, Reactor Operations Division. He holds a B.S. degree and has 9 years of experience in the nuclear field. Mr. Worley spent the first 8 years of his career in the Navy's Nuclear Power Program. He served as a division officer

and as a department head on a nuclear submarine, and was certified as a Nuclear Engineer Officer by the Naval Reactors branch of DOE. Mr. Worley's next assignment with the Navy was Assistant Force Engineer on the staff of Commander, Submarine Force Pacific. As a member of this staff, Mr. Worley directed programs to improve the preservation and maintenance practices of over 40 nuclear powered submarines. In November 1991, Mr. Worley assumed his present position with DOE, where he is conducting reviews of outage practices and restart preparations at SRS. Mr. Worley has experience in nuclear operations, maintenance and preservation, and inspections.

Mark H. Zagar (Operations Technical Expert) has 14 years of experience in the nuclear field. The first 5 years were spent in the Naval Nuclear Power Program, serving as a division officer on a nuclear submarine. After separating from the Navy in 1983, Mr. Zagar joined General Electric Company as a startup test engineer at various Boiling Water Reactors and earned his senior reactor operator (SRO) certification. He has served in a number of positions at commercial nuclear facilities, including startup engineer, shift test engineer, operations engineer, SRO classroom instructor, project manager for a procedure upgrade program, and supervisor of a commercial operations engineering support organization. Mr. Zagar spent 2 years assisting DOE in the restart of the Savannah River Site's (SRS) K-Reactor by providing oversight in operations, maintenance, and testing. He has served as a technical expert in Operations for DOE Operational Readiness Reviews at Savannah River Site K-Reactor, Rocky Flats Building 559, Savannah River Site H-B Line (Pu-238 Phase I and III operations), and Rocky Flats Building 707. Mr. Zagar is the current manager of Scientech's Augusta offices providing support services to the SRS Environmental Restoration and Waste Management organization, Nuclear Regulatory Commission, and various commercial nuclear power plant projects.

APPENDIX C - ACRONYMS

ALARA	As Low As Reasonably Achievable
AMNMP	Assistant Manager, Nuclear Materials Processing
ANSI	American National Standards Institute
AO	Auxiliary Operator
ASME	American Society of Mechanical Engineers
ATS	Automatic Transfer Switch
CAA	Clean Air Act
CAS	Central Alarm Station
CM	Corrective Maintenance
CRAD	Criteria and Review Approach Documents
CRO	Control Room Operator
CSA	Compliance Schedule Approval
CWA	Clean Water Act
DCF	Design Change Form
DCS	Distributed Control System
DECON	Decontamination
DNFSB	Defense Nuclear Facilities Safety Board
DOE	U.S. Department of Energy
DP	Defense Programs
EH	Office of Environment, Safety and Health
EMT	Emergency Medical Technician
ESH&QA	Environment, Safety, Health and Quality Assurance
FEC	Facility Emergency Coordinator
FHA	Fire Hazards Analysis
FY	Fiscal Year

FR	Facility Representative
FSAR	Final Safety Analysis Report
GET	General Employee Training
HAZCOM	Hazard Communications
HP	Health Protection
HVAC	Heating, Ventilation, and Air Conditioning
IAD	Independent Assessment and Development
IH	Industrial Health
IS	Industrial Safety
LCO	Limiting Conditions for Operation
MER	Mechanical Equipment Room
MRP	Management Requirements and Procedures
NCR	Nonconformance Report
NESHAP	National Emission Standards for Hazardous Air Pollutants
NFPA	National Fire Protection Association
NMP	Nuclear Materials Processing
NMPD	Nuclear Materials Processing Division
NPDES	National Pollution Discharge Elimination System
NS	Office of Nuclear Safety
NQA-1	Nuclear Quality Assurance-1
OJT	On-the-Job Training
ORR	Operational Readiness Review
OSR	Operational Safety Requirement
PHR	Process Hazards Review
PA	Public Address
PM	Preventive Maintenance

QA	Quality Assurance
QAP	Quality Assurance Procedure
RCRA	Resource Conservation and Recovery Act
RTF	Replacement Tritium Facility
RTFPO	Replacement Tritium Facility Program Office
RWP	Radiation Work Permit
SAR	Safety Analysis Report
SDCS	Satellite Document Control Station
SDIS	Seismic Detection and Isolation System
SEN	Secretary of Energy Notice
SER	Safety Evaluation Report
SOP	Standard Operating Procedure
SP	Special Procedure
SR	U.S. Department of Energy Savannah River Field Office
SRL	Savannah River Laboratory
SRS	Savannah River Site
STA	Shift Technical Advisor
TEOP	Tritium Operating Experience Program
TFET	Tritium Facilities Employee Training
TPC	Temporary Procedure Change
TSR	Technical Safety Requirement
TSRC	Tritium Safety Review Committee
UPS	Uninterruptible Power Supply
USQ	Unreviewed Safety Question
USQD	Unreviewed Safety Question Determination
WM	Waste Management
WSRC	Westinghouse Savannah River Company