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EVALUATION

of

SALEM GENERATING STATION

Public Service Electric and Gas Company

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SUMMARY

INTRODUCTION

The Institute of Nuclear Power Operations (INPO) conducted an evaluation of Public Service Electric and Gas Company's (PSE&G) Salem Generating Station during the weeks of October 4 and 11, 1982. The station is located on the eastern shore of the Delaware River, about eight miles southwest of Salem, New Jersey. Salem Unit 1 (1090 MWe) and Salem Unit 2 (1115 MWe) began commercial operation in June 1977 and August 1981, respectively.

PURPOSE AND SCOPE

INPO conducted an evaluation of site activities to make an overall determination of plant safety, to evaluate management systems and controls, and to identify areas needing improvement. Information was assembled from discussions, interviews, observations, and reviews of documentation.

The INPO evaluation team examined station organization and administration, operations, maintenance, technical support, training and qualification, radiological protection, and chemistry. The team also observed the actual performance of selected evolutions and surveillance testing. Corporate activities were not included in the scope of the evaluation, except as an incidental part of the station evaluation. As a basis for the evaluation, INPO used performance objectives and criteria relevant to each of the areas examined; these were applied and evaluated in light of the experience of team members, INPO's observations, and good practices within the industry.

INPO's goal is to assist member utilities in achieving the highest standards of excellence in nuclear plant operation. The recommendations in each area are based on best practices, rather than minimum acceptable standards or requirements. Accordingly, areas where improvements are recommended are not necessarily indicative of unsatisfactory performance.

DETERMINATION

Within the scope of this evaluation, the team determined that the plant is being safely operated by qualified personnel.

The following beneficial practices and accomplishments were noted:

- The capacity factor and availability of Unit 2, since the beginning of commercial operation, is impressive.

- A strong commitment to training is evident.

Improvements were recommended in a number of areas. The following are considered to be among the most important:

Additional emphasis is required to reduce the backlog of work orders, drawing revisions, and plant modifications.

Adherence to established radiation protection procedures and policies is needed.

Material and housekeeping conditions in the auxiliary building and the intake structures need to be improved.

In each of the areas evaluated, INPO has established PERFORMANCE OBJECTIVES and supporting criteria. All PERFORMANCE OBJECTIVES reviewed during the course of this evaluation are listed in APPENDIX II.

Findings and recommendations are listed under the PERFORMANCE OBJECTIVES to which they pertain. Particularly noteworthy conditions that contribute to meeting PERFORMANCE OBJECTIVES are identified as Good Practices. Other findings describe conditions that detract from meeting the PERFORMANCE OBJECTIVES. It would not be productive to list as Good Practices those things that are commonly done properly in the industry since this would be of no benefit to PSE&G or to INPO's other member utilities. As a result, most of the findings highlight conditions that need improvement.

The recommendations following each finding are intended to assist the utility in ongoing efforts to improve all aspects of its nuclear programs. In addressing these findings and recommendations, the utility should, in addition to correcting or improving specific conditions, pursue underlying causes and issues.

As a part of the second and succeeding evaluations of each station, the evaluation team will follow up on responses to findings in previous reports. Findings with response actions scheduled for future completion have been carried forward in APPENDIX I to this report. In areas where additional improvements were needed, a new finding that stands on its own merit has been written. Thus, this report stands alone, and reference to previous evaluation reports should not be necessary.

The findings listed herein were presented to PSE&G management at an exit meeting on October 14, 1982. Findings, recommendations, and responses were reviewed with PSE&G management on December 22, 1983. Responses are considered satisfactory.

To follow the timely completion of the improvements included in the responses, INPO requests a written status by July 15, 1983. Additionally, a final update will be requested six weeks prior to the next evaluation.

The evaluation staff appreciates the cooperation received from all levels of PSE&G.

PUBLIC SERVICE ELECTRIC AND GAS COMPANY

Response Summary

Public Service Electric and Gas Company is pleased to have had INPO perform an evaluation of the Salem Generating Station. INPO's evaluation has identified various areas in need of improvement, some of which we were cognizant. Recommendations made by INPO will be considered in providing the direction for improving overall performance in our nuclear operation.

The positive comments with respect to the performance record of Unit 2 and the strong commitment to training is appreciated. It is apparent that experience with operation of Unit 1 and improvements in design have resulted in a more reliable operating plant. The training commitment is supported by the successful hiring program, which has increased the number of personnel in the reactor operator training program.

A vigorous effort is being made by the nuclear department to improve the processing of plant modifications and drawings to assure that the station has the current information in a timely manner. The maintenance department is embarking on a program by the maintenance planners to reduce the backlog of work orders.

A number of INPO findings relating to radiation protection concern lack of adherence to policies and procedures. It is believed that by improving personnel understanding of the need for such policies and procedures, performance in this area will be improved.

Management has taken positive steps to improve the material and housekeeping conditions by performing weekly tours of different areas. All personnel will be reminded in radiation worker review training to maintain cleanliness in his/her work areas.

It was a pleasure to have the INPO evaluation team return to Salem Generating Station, giving us their perspective and assistance in evaluating our management performance.

ORGANIZATION AND ADMINISTRATION

INDUSTRIAL SAFETY

PERFORMANCE OBJECTIVE: Station industrial safety programs should achieve a high degree of personnel safety.

Finding
(OA.5-1)

Some industrial safety conditions and practices need additional attention. Examples include the following:

- a. the hot and humid environment of the penetration areas in the auxiliary buildings
- b. inconsistent implementation and interpretation of the station policy for head protection
- c. repeated injuries involving muscular strains, minor lacerations, and foreign objects in the eye

Recommendation

Improve the environment in the penetration areas so that personnel access can be gained without undue hazard. During industrial safety training, emphasize the head protection policy and unfavorable trends in injury reports. Stress supervisory responsibility and accountability for day-to-day industrial safety performance.

Response

The status of corrective actions is as follows:

- a. The system leaks and insulation deficiencies in the auxiliary building have been corrected for Unit 1. Unit 2 will be corrected during the January 1983 outage. The modifications to improve the ventilation system in the penetration areas of the auxiliary building are approximately 10 percent complete. Priority will be given to completion of this project during 1983 outages. In addition, guidelines requiring the use of "hot environment" protective suits by employees working in these areas are being considered.
- b. A revised policy statement, regarding the use of hard hats by all employees and visitors at the Salem Generating Station, will be issued by the nuclear department by February 1983.
- c. During the monthly safety meetings, supervisors have reviewed the company's safety guidelines on items b. and c. of this finding with all employees. The Monthly Summary of Accident Experience will be reviewed and analyzed monthly by the safety supervisor to determine if any significant changes are being experienced in the work-related injury history. Based on this review and analysis, specific information will be provided to station

supervisors for use during monthly safety meetings so that effort can be concentrated on correcting potential problem areas.

OPERATIONS

CONDUCT OF OPERATIONS

PERFORMANCE OBJECTIVE: Operational activities should be conducted in a manner that achieves safe and reliable plant operation.

| | |
|----------------------------|--|
| Finding (OP.2-1) | Access to the control room console area is not routinely restricted. As a result, personnel without official functions are allowed to approach control boards without approval. |
| Recommendation | Enforce the existing policy that requires granting of permission for entry to the control room console area, and restrict entry to only those that have a need. |
| Response | The existing policy has been re-enforced through the Information Directive Distribution Notice System to the licensed operators, indicating the responsibilities for controlling access to the console area. |

PLANT STATUS CONTROLS

PERFORMANCE OBJECTIVE: Operational personnel should be cognizant of the status of plant systems and equipment under their control, and should ensure that systems and equipment are controlled in a manner that supports safe and reliable operation.

| | |
|----------------------------|--|
| Finding (OP.3-1) | Improvements are needed in the implementation of the blocking tag system. The following specific problems were noted: <ol style="list-style-type: none">Many tagging requests and tags are not filled out completely.Some tags have nomenclature that is different from that on the tagged component.The periodic review of tagouts does not include checks for unauthorized tags and is generally ineffective in correcting deficiencies.Some temporary tagout releases for testing remain in effect longer than allowed by administrative procedures. |
| Recommendation | Emphasize adherence to station tagging procedures. Increase supervisory involvement to ensure that tags are properly prepared and that temporary releases are restored in a timely manner. |

Revise the existing requirements for the periodic review of blocking tags to include a check for unauthorized tags.

Response

Operations personnel will be personally counseled on the importance of adherence to administrative procedures by the operations manager. The existing requirements for the periodic audit of outstanding tagging requests and tags will be revised to include provisions to check for unauthorized tags. The administrative policy concerning the length of time temporary tagging releases may remain in effect will be reviewed, finalized, and incorporated into the documents that describe and control the safety tagging program. The requirements of temporary tagging operations will then be re-emphasized to all personnel who interface with the safety tagging system during safety tagging rules training that is scheduled for completion by June 1983.

**Finding
(OP.3-2)**

Turnover practices by control room desk operators do not always provide for a complete transfer of information and are not in accordance with Operations Directives.

Recommendation

Enforce current directives governing shift turnover. Supervisors should periodically check the quality of information transfer during turnovers.

Response

Operations department personnel will be personally counseled by the operations manager on the importance of adherence to the administrative procedures that govern shift turnover and the requirements of supervision to periodically verify the quality of information transferred during shift turnover. The policy will also be reiterated to the operators through the Information Directive Distribution Notice System by March 1983.

**Finding
(OP.3-3)**

Information provided by the computerized Tagging Request and Inquiry System (TRIS) is sometimes not reliable. Although the potential effectiveness of the system and the ongoing efforts to improve TRIS are recognized, the following deficiencies were noted:

- a. A formal method has not been developed to ensure that completed design modifications to systems are reflected in standard tagging requests.
- b. Current computer software provides no self-auditing method.

- c. Effective reviews are not conducted frequently enough to identify all personnel and computer-generated errors.
- d. Periodic training in the operation and capabilities of TRIS is not conducted for operators and supervisory personnel.

Recommendation As part of the continuing effort to improve the reliability and capability of TRIS, include measures to correct the above-noted deficiencies.

Response The status of corrective actions is as follows:

- a. Administrative Procedure AP-8, "Station Design Changes, Tests, and Experiments," will be revised to ensure that TRIS is updated and the updating is documented upon the completion of all station design changes. The target date for completion is June 1983.
- b. Administrative procedures will be developed and implemented to perform TRIS software audits. This will ensure the program is functioning as designed by September 1983.
- c. The hard copy file of tagging requests that is compared with TRIS reports to verify computer accuracy on a semi-annual basis will now be compared on a monthly basis.
- d. A TRIS training manual is in the process of development. It will be issued to all users of TRIS, and should improve their ability to use the capabilities of the system.

A formal indoctrination training program for new TRIS users has been developed and implemented.

Finding
(OP.3-4)

Administrative controls governing the use of caution tags are not effective. As a result, these tags are sometimes incorrectly used, not always authorized by appropriate personnel, and often remain installed for extended periods of time.

Recommendation

Expand current procedures for the use of caution tags to include the following:

- a. specific direction on the proper use of caution tags
- b. an index of active caution tags
- c. periodic review to verify that existing caution tags are applicable, needed, and legible
- d. periodic review to ensure caution tags are maintained in accordance with procedures

Response

The administrative procedures that govern the use of caution tags will be reviewed and expanded to include specific direction in the use and control of caution tags. TRIS will be evaluated for capability to include the processing of caution tagging operations. TRIS would then provide the indexing and tracking functions required for caution tags. Audit procedures will also be developed and implemented to ensure the requirements for caution tagging operations are complied with. The target date for completion is June 1983.

**Finding
(OP.3-5)**

Instrumentation outside the control room is not included in the existing plant program for identification of degraded instrumentation. Defective meters, gauges, and annunciators are identified by a variety of informal methods.

Recommendation

Expand the current system used in the control room, or develop another system to ensure that degraded instrumentation throughout the plant is effectively identified.

Response

The current system used in the control room to identify and track degraded instrumentation will be expanded and modified as required to include instrumentation outside the control room by June 1983.

OPERATIONS FACILITIES AND EQUIPMENT

PERFORMANCE OBJECTIVE: Operational facilities and equipment should effectively support plant operation.

**Finding
(OP.6-1)**

The following Good Practice was noted: A mimic bus arrangement depicting the logic diagrams for reactor protection and safety injection actuation and for the safeguards loading sequence is displayed in the control room. This ready reference contains indication of the following:

- a. valve positions
- b. coincidence and status of trips
- c. condition of blocks
- d. coincidence and status of safety injection signals

- e. circuit breaker positions
 - f. operation of safety-related components
 - g. status of containment isolation
 - h. safeguards equipment loading sequence
-

MAINTENANCE

PLANT MATERIAL CONDITION

PERFORMANCE OBJECTIVE: The material condition of the plant should be maintained to support safe and reliable plant operation.

Finding (MA.2-1) The work control system is not utilized to full effectiveness to improve the material condition of the plant. A number of material deficiencies observed during the evaluation were not documented in the work control system.

Recommendation Ensure that material deficiencies are documented. Emphasize to plant personnel the need to identify and report material deficiencies on a routine basis.

Response Plant personnel are making a greater effort to identify and report all material deficiencies not previously identified.

The operations department will implement, as applicable, a plant material deficiency identification program similar to that recommended by INPO Good Practice MA-301, "Plant Material Deficiency Identification." The target date for completion is November 1983.

WORK CONTROL SYSTEM

PERFORMANCE OBJECTIVE: The control of work should ensure that identified maintenance actions are properly completed in a safe, timely, and efficient manner.

Finding (MA.3-1) Implementation of activities associated with the work control system needs improvement in the following areas:

- a. A large backlog of non-outage corrective maintenance exists.
- b. A system for planning and scheduling of maintenance activities has been recently implemented; however, only about 10 percent of the jobs are currently included.
- c. A method for plant identification of reported deficiencies does not exist.

Recommendation Expand the use of the recently implemented planning and scheduling system to assist in reducing the large backlog of work. Work

control procedures should be modified to include plant identification of reported deficiencies. INPO Good Practice MA-301, "Plant Material Deficiency Identification," could be of assistance in this area.

Response

The backlog of non-outage corrective maintenance work orders will be reduced by increasing the percentage of the daily workload that is preplanned and scheduled for accomplishment. Based upon work that can be scheduled, this percentage will be increased in accordance with the following schedule:

- 30 percent by June 1983
- 50 percent by January 1984
- 80 percent by June 1984
- 100 percent by December 1984

In addition, a plant material deficiency identification program similar to that recommended by INPO Good Practice MA-301, "Plant Material Deficiency Identification," will be implemented by November 1983.

PREVENTIVE MAINTENANCE

PERFORMANCE OBJECTIVE: The preventive maintenance programs should contribute to optimum performance and reliability of plant equipment.

Finding
(MA:5-1)

The preventive maintenance (PM) program for mechanical and electrical equipment needs to be expanded. The current program consists principally of equipment lubrication and equipment checks that are required by technical specifications.

Recommendation

Review plant mechanical and electrical equipment to identify what should be covered in a comprehensive PM program, and determine and implement necessary PM actions to be included for each component.

Response

A review of items such as licensee event reports, deficiency reports, work orders, vendor recommendations, and operating experience will be performed to determine what equipment will be included in the maintenance PM program. The target date for completion is February 1983.

Inspection order cards for the items identified above will be issued, and the maintenance department will implement an upgraded PM program by December 1983.

TECHNICAL SUPPORT

OPERATING EXPERIENCE REVIEW PROGRAM

PERFORMANCE OBJECTIVE: Industrywide and in-house operating experiences should be evaluated and appropriate actions undertaken to improve plant safety and reliability.

SOER STATUS

The status of Significant Operating Experience Report (SOER) recommendations is as follows:

| <u>Number of Recommendations</u> | <u>Action Taken</u> |
|----------------------------------|---------------------|
| 63 | Satisfactory |
| 39 | Not applicable |
| 48 | Pending |

The following recommendations are pending action:

| <u>SOER Number</u> | <u>Recommendation Number</u> |
|--------------------|------------------------------------|
| 80-2 | 2 |
| 81-2 | 1, 2, 3, 4, 5, 6 |
| 81-3 | 2, 3 |
| 81-14 | 1, 2 |
| 81-15 | 2a, 2b, 2c, 3 |
| 81-16 | 1, 2, 3 |
| 82-1 | 2a, 2b, 2c, 2d, 3 |
| 82-3 | 1 |
| 82-4 | 6 |
| 82-7 | 1, 2, 3, 4a, 4b, 4c, 4d, 4e, 4f, 5 |
| 82-8 | 1, 2, 3, 4 |
| 82-9 | 1, 2, 3, 4, 5, 6, 7, 8, 9 |

An update on the status of each recommendation listed in the "pending action" category shown above is requested in the six-month follow-on response to this report. In addition, the status of each immediate action (red tab) SOER recommendation received subsequent to this evaluation should be included in the six-month follow-on response. A tabular summary, similar to that above, is requested.

| | |
|----------------------------|--|
| Finding (TS.3-1) | Salem does not actively participate in the Nuclear Plant Reliability Data System (NPRDS). Failure reports have not been submitted for Salem Unit 1 since the second quarter of 1981, and engineering data sheets and failure reports have not been submitted for Salem Unit 2. |
| Recommendation | Resume submittal of failure reports for Salem Unit 1. Commence submittal of failure reports and engineering data sheets for Salem Unit 2. |

Response Computer software modifications have been implemented to provide inputting of engineering data and failure reports. Data is now included in the data base and submitted to INPO on a quarterly basis.

PLANT MODIFICATIONS

PERFORMANCE OBJECTIVE: Plant modification programs should ensure proper review, control, implementation, and completion of plant design changes in a safe and timely manner.

Finding (TS.4-1) A large backlog of plant modifications exists. Approximately 1,500 modifications are presently outstanding, some dating back to 1976.

Recommendation Implement corrective measures, as appropriate, to reduce the backlog of plant modifications. In addition, periodically review established priorities for plant modifications, canceling modifications that are no longer warranted.

Response A review will be made of outstanding modifications to reassess the need and priority for these changes. Modifications that are no longer warranted will be canceled by December 1983. Design change requests are now reviewed more closely in establishing need and priority prior to preparing a modification package for future accomplishment.

Finding (TS.4-2) A large backlog of document revisions exists for completed modifications.

Recommendation Continue efforts to reduce the backlog of design documents associated with completed modifications. Provide the necessary emphasis and priority to ensure that final design documents are completed in a timely manner.

Response An improved tracking system will be instituted, and increased emphasis will be placed on documentation updates to close out completed design change request packages. The target date for instituting this tracking system is April 1983.

**Finding
(TS.4-3)**

Temporary jumpers and lifted leads do not receive an independent technical design review prior to or promptly after installation.

Recommendation

Perform an independent technical design review of jumpers and lifted leads currently installed. In the future, this review of jumpers and lifted leads should be conducted prior to or promptly after installation.

Response

Administrative Procedure AP-13 will be modified to incorporate selected technical review criteria as guidelines to individuals involved in requesting and authorizing jumpers and lifted leads by April 1983. This technical review will be conducted either prior to or promptly after installation of temporary jumpers and lifted leads.

TRAINING AND QUALIFICATION

TRAINING ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: The training organization and administrative systems should ensure effective control and implementation of training activities.

**Finding
(TQ.1-1)**

Technical helpers, utility mechanics, and utility operators are not provided with initial training related to their knowledge and skill requirements, including industrial safety practices.

Recommendation

Provide an initial training and qualification program to develop the knowledge and skills necessary for entry level personnel to perform their assigned duties. Existing programs (Phase I) could be modified to address this need. Qualification requirements should be completed prior to assigning workers to their duties. INPO documents "Nuclear Power Plant Non-Licensed Operators - Guidelines for Qualification Programs" (GPG-04), "Guidelines for Instrument and Control Technician Qualification" (GPG-08), "Guidelines for Mechanical Maintenance Personnel Qualification" (GPG-05), and "Guidelines for Electrical Maintenance Personnel Qualification" (GPG-07) could be of assistance in this effort.

Response

At present all technical helpers, utility mechanics, and utility operators attend a nuclear indoctrination course, which is an 11-day training program. This is conducted shortly after they are employed, and typically it is presented once each quarter. Supervisors will ensure that technical helpers and utility mechanics are appropriately trained prior to assignment of specific work.

All utility operators attend a seven-week training program annually. Personnel assignment practices will be modified, such that newly hired utility operators will attend the utility operator training with the next shift to be assigned to the training center after employment.

MAINTENANCE PERSONNEL TRAINING AND QUALIFICATION

PERFORMANCE OBJECTIVE: The maintenance personnel training and qualification program should develop and improve the knowledge and skills necessary to perform assigned job functions.

**Finding
(TQ.5-1)**

A continuing training program for maintenance and instrument and control personnel is not currently provided.

Recommendation

Develop and implement a continuing training program for the station and utility mechanic, machinist, electrician, boiler repair technician, technical helper, instrumentation and control assistant, and instrumentation and control technician positions. INPO documents "Guidelines for Mechanical Maintenance Personnel Qualification" (GPG-05), "Guidelines for Electrical Maintenance Personnel Qualification" (GPG-07), and "Guidelines for Instrument and Control Technician Qualification" (GPG-08), could be of assistance in this effort.

Response

The current training programs for the identified employees are extensive and include an indoctrination program upon hiring, an apprentice program that develops intermediate level skills as they gain experience, and an advanced program that brings an individual to journeyman level. Continuing training programs associated with the above disciplines will be evaluated and developed for personnel who do not advance to higher training levels on schedule and for personnel after achieving the journeyman level. The evaluation portion of this effort will be completed by October 1983.

RADIOLOGICAL PROTECTION

RADIOLOGICAL PROTECTION ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: The organization and administrative systems should ensure effective control and implementation of the radiological protection program.

**Finding
(RP.1-1)**

Station and contractor personnel do not always comply with requirements of Radiation Exposure Permits (REPs) and station radiological protection procedures. Examples include the following:

- a. failure to wear protective clothing required by REPs in posted contaminated areas
- b. improper removal of protective clothing
- c. workers gaining access to and performing work in the controlled access area under the wrong REP
- d. improper wearing of personnel dosimetry devices

Recommendation

All station supervisory personnel should enforce worker compliance with station radiological protection requirements. Additional training should be provided to station and contractor personnel in protective clothing and dosimetry requirements.

Response

All station supervisory personnel as well as radiation protection personnel will be instructed to observe for and enforce worker compliance with radiological protection requirements by March 1983. Instructions in the form of drawings are being made and will be posted at strategic locations to assist personnel in the proper method of protective clothing removal. The manager - nuclear training has included these items in the radiation worker review training.

RADIOLOGICAL PROTECTION PERSONNEL QUALIFICATION

PERFORMANCE OBJECTIVE: The radiological protection qualification program should ensure that radiological protection personnel have the knowledge and practical abilities necessary to effectively implement radiological protection practices.

**Finding
(RP.2-1)**

The following Good Practice was noted: The initial training program for radiological protection and chemistry technicians is comprehensive and uses training facilities and equipment that

duplicate plant equipment. Additionally, comprehensive written and oral qualification examinations are administered to trainees.

GENERAL EMPLOYEE TRAINING IN RADIOLOGICAL PROTECTION

PERFORMANCE OBJECTIVE: General employee training should ensure that plant personnel, contractors, and visitors have the knowledge and practical abilities necessary to effectively implement radiological protection practices associated with their work.

- Finding (RP.3-1)** Improvements in radiological protection general employee training (GET) are needed. Examples of problems include the following:
- a. Individual workers are not required to demonstrate practical radiological protection abilities such as frisking, use of step-off pads, donning and removal of protective clothing, and reading pocket ion chambers.
 - b. Written examinations do not include questions that require workers to apply basic radiological protection knowledge to situations that may be encountered in their work.

Recommendation Require each worker to demonstrate practical radiological protection abilities during GET. Expand the scope of written GET examinations to include questions that require the worker's application of radiological protection knowledge.

Response The nuclear training department is developing a comprehensive program that includes demonstration by each person of practical radiological protection abilities including frisking, use of step-off pads, donning and removal of protective clothing, and reading of pocket ion chambers (dosimeters). The target date for completion is May 1983.

The written examinations used in the GET program have been revised to include questions that require workers to apply basic radiological protection knowledge to situations that may be encountered in their work.

RADIOACTIVE EFFLUENTS

PERFORMANCE OBJECTIVE: Radioactive effluent controls should minimize radioactive materials released to the environment.

Finding (RP.6-1) The volume and curie content of discharged liquid effluents can be reduced. Processed water is not reused. Additionally, plant water inventory losses need to be minimized.

Recommendation The station should evaluate plant water inventory losses and the reuse of processed water. Based on this evaluation, a program should be implemented to reduce the volume and curie content of water discharged to the environment.

Response An independent liquid waste source study was conducted in 1980 to identify any unnecessary or excessive source of water being processed as liquid radioactive waste. Since that time, the discharge volumes have shown a decreasing trend.

A waste water management review will be made to determine if operational improvements can be made and to develop accountability for waste generation. This will be completed by July 1983. In addition, PSE&G will review the design of the liquid radioactive waste system by October 1983 to determine if system effectiveness can be improved.

SOLID RADIOACTIVE WASTE

PERFORMANCE OBJECTIVE: Solid radioactive waste controls should minimize the volume of radioactive waste and ensure safe transportation of radioactive material.

Finding (RP.7-1) The following Good Practice was noted: Sorting of potentially contaminated trash has resulted in a reduction of compactible waste volume by approximately 50 percent. Several radiological protection technicians have been assigned to survey and sort this trash on a routine basis.

PERSONNEL DOSIMETRY

PERFORMANCE OBJECTIVE: The personnel dosimetry program should ensure that radiation exposures are accurately determined and recorded.

**Finding
(RP.8-1)**

The personnel dosimetry program needs strengthening as evidenced by the following examples:

- a. A policy has not been established that identifies the conditions requiring the use of extremity and multiple whole-body dosimetry.
- b. The accuracy and precision of results obtained from the thermoluminescent dosimeter (TLD) processing system is not verified by exposing TLDs to known amounts of radiation and evaluating reported results.

Recommendation

Develop a station policy for use of extremity and multiple whole-body dosimetry, and incorporate this policy in training programs and station procedures. To ensure the quality of the dosimetry program, include TLDs with known exposures during normal TLD processing and compare the reported results with the known exposure values. Investigate and determine the cause of any abnormal results.

Response

RPE 3.021 has been changed to institute an upgraded program for the placement of extremity and multiple whole-body dosimetry.

An inspection order card is now issued periodically to ensure that the TLD processing system is verified by evaluating results of TLDs exposed to known amounts of radiation.

RADIOACTIVE CONTAMINATION CONTROL

PERFORMANCE OBJECTIVE: Radioactive contamination controls should minimize the contamination of areas, equipment, and personnel.

**Finding
(RP.9-1)**

The monitoring of station and contractor personnel for radioactive contamination needs to be improved. Many personnel exiting contaminated areas do not correctly monitor themselves for radioactive contamination as required by station policy. In particular, personnel do not always monitor their whole bodies for contamination at the nearest frisker when leaving a contaminated area. Personnel frequently move the frisker probe too quickly over body

areas being monitored. Additionally, station portal monitors at the exits of the controlled area were found to alarm at contamination levels well above prescribed setpoints.

Recommendation Ensure that personnel comply with the station's requirements for contamination monitoring. Implement a program to frequently check the response of station portal monitors using radioactive sources.

Response Signs have been posted at both control points to remind personnel of the need for and extent of personal monitoring to check for contamination. Nuclear training now includes the importance of frisking in all phases of radiation worker training. Additionally, supervisors periodically observe for proper radiological monitoring techniques and enforce rules when necessary. The portal monitor setpoints are now checked on a periodic basis and reset to the correct values as required.

Finding (RP.9-2) The techniques used to monitor vehicles do not ensure that alpha and beta-gamma contamination can be detected at the levels of the station contamination limits. Problems noted are as follows:

- a. scanning of surfaces for alpha contamination with a portable scintillation detector too rapidly to allow for proper meter response
- b. counting of large area cloth smears for beta-gamma contamination in a manner that does not minimize the self-absorption of beta radiation by the cloth

Recommendation Improve monitoring techniques such that contamination on vehicles can be detected at the levels of the station alpha and beta-gamma contamination limits.

Response The status of corrective actions is as follows:

- a. Personnel have been reinstructed in the proper use of the portable scintillation detector.
 - b. Radiation protection personnel have been instructed to follow the proper steps in RPI 4.003, which specify a 100 cm² smear be taken to minimize self-absorption. Procedures will be reviewed to determine if any changes or precautionary notes are necessary. This will be completed by February 1983.
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**Finding
(RP.9-3)**

Large roll-up doors on the boundaries of the controlled area are frequently left open to the environment when not needed for entry or exit of equipment. Radioactive waste processing and shipping operations are routinely performed in areas adjacent to the clean facilities building roll-up door.

Recommendation

Keep large roll-up doors on the boundaries of the controlled area closed except when transporting materials or equipment through the doors. Ensure these doors are closed when work that might result in airborne radioactivity is performed inside the controlled area.

Response

Motor failures on the roll-up door in the auxiliary building have necessitated manual operation. A design change request is in process to improve operation reliability. The target date for completion of this modification is April 1983. A department directive will instruct all radiation protection supervisors that during evolutions such as compacting and movement of demineralizers, the door shall be closed. In addition, the same warnings shall be posted at this door and the fuel handling building roll-up door operating mechanisms. The target date for completion is March 1983.

**Finding
(RP.9-4)**

Workers are not always aware of radiation and contamination levels when they are working in the controlled area. Extended REPs, posted radiological survey maps, and radiological signs are not effectively used to provide this information to workers.

Recommendation

Ensure that workers are informed of or have ready access to information on radiation and contamination levels in their work areas.

Response

PSE&G recognizes that workers should be aware of the radiation and contamination levels in their work areas. All station personnel are apprised of both the requirements of the REP system and the posting of radiation areas and survey sheets in conjunction with the GET and radiation worker review classes. In order to evaluate the need to improve current practices, personnel will be randomly questioned to determine their knowledge of radiation hazards in their work area. Improvements that are necessary will be implemented by April 1983.

CHEMISTRY

CHEMISTRY ORGANIZATION AND ADMINISTRATION

PERFORMANCE OBJECTIVE: The organization and administrative systems should ensure effective implementation and control of the chemistry program.

**Finding
(CY.1-1)**

Chemistry technicians do not always adhere to chemistry procedures. Examples include the following:

- a. failure to check reagent shelf lives
- b. use of glassware for silica analyses
- c. failure to keep procedures up to date
- d. use of incorrect sample flow rate
- e. use of incorrect sample volume
- f. failure to identify out-of-specification results

Recommendation

Chemistry procedure adherence should be stressed to the technicians. Supervisory personnel should more closely monitor procedure adherence to improve sampling and analysis techniques of chemistry personnel.

Response

Four additional chemistry supervisory level positions are expected to be filled by March 1983. As these individuals gain experience at the supervisory level, procedure adherence will improve. These supervisors will counsel individuals on the importance of procedure adherence. In addition, procedure adherence for chemistry technicians will be stressed during future training classes.

**Finding
(CY.1-2)**

Chemistry parameters are not recorded in a fashion that facilitates trend review. The computer printout format currently in use does not readily relate associated analyses or reflect applicable plant conditions. Additionally, data is only entered into the computer monthly, delaying trend reviews.

Recommendation

Identify key chemistry parameters and record them in a timely manner in a format that reflects plant conditions and related chemistry parameters. Trend these parameters on a frequent basis.

Response A new computer graphics plotter that reflects associated plant conditions is now used to trend key chemistry parameters. Trend reviews are being performed daily and monthly plots are forwarded to management.

CHEMISTRY CONTROL

PERFORMANCE OBJECTIVE: Chemistry controls should ensure optimum chemistry conditions during all phases of plant operation.

Finding (CY.3-1) Corrective measures taken when chlorides and potassium chromates in the component cooling water systems are out of specification have not been adequate in some cases. A coordinated plan to correct these problems and to determine the long-term effects on components serviced by the component cooling water systems has not been developed.

Recommendation Implement a program that outlines actions required to re-establish proper chemistry conditions in the component cooling water systems when specifications are exceeded. Particular emphasis should be placed on controlling chemistry during heat exchanger leakage and following maintenance. Additionally, evaluate whether long-term deleterious effects exist in components serviced by the component cooling water systems and take corrective action as appropriate.

Response The procedure for taking corrective measures when chlorides and potassium chromates in the component cooling water systems are out of specification has been reviewed and revised. Plant management will ensure that timely corrective action is taken when out-of-specification conditions exist in the component cooling water systems.

An evaluation of the chemistry requirements for the component cooling water system will be made by March 1983. This will evaluate the potential for long-term deleterious effects on components serviced by the system.

Finding (CY.3-2) A program is needed to control cleaning agents, decontamination agents, and solvents to prevent these materials from entering plant systems. Examples of uncontrolled cleaning agents and solvents that could be harmful to plant components were noted throughout the plant.

Recommendation Establish a program to provide controls for the use, transfer, and disposal of cleaning agents, decontamination agents, and solvents. A list of approved cleaning agents, decontamination agents, and solvents should be established.

Response Administrative Procedure AP-21 will be revised to ensure that the above materials are handled in a controlled manner by June 1983.

LABORATORY ACTIVITIES

PERFORMANCE OBJECTIVE: Laboratory and counting room activities should ensure accurate measuring and reporting of chemistry parameters.

Finding (CY.4-1) Some chemistry reagents are being used with expired or unidentified shelf lives. In addition, some reagents reportedly have been received from the storeroom with expired shelf lives.

Recommendation Establish a program that provides guidance to technicians on reagent shelf lives. In addition, the program should require periodic monitoring of the laboratory and the storeroom to ensure that reagents are not retained past the shelf life expiration date.

Response The program for controlling chemistry reagents will be improved to better identify reagents with expired shelf lives.

The manager - nuclear procurement will review storeroom procedures and implement improvements where needed. The target date for completion of identified improvements is March 1983.

**Finding
(CY.4-2)**

The methods used for the analysis of iron, copper, and chloride do not accurately measure these parameters at the limits specified by vendor recommendations or station procedures. In addition, the station limits for copper and iron are not consistent with vendor recommendations.

Recommendation

Establish methods that will provide accurate measurement of iron, copper, and chloride at the levels required. After these methods have been established, technicians should be trained in these techniques in order to ensure that the required sensitivities are achieved. Re-evaluate and compare station limits for iron and copper with vendor specifications to ensure that a sound basis exists for variances from vendor recommendations.

Response

A qualified analytical laboratory will be utilized to perform the analysis for iron and copper at the sensitivity called for in the vendor's recommendations by March 1983. Chloride analysis is now conducted using the ion chromatograph method that allows accurate measurements of the concentrations normally encountered.

APPENDIX I

Summary of Outstanding Response Action from Previous Evaluation (1981)

QUALITY PROGRAMS

(INPO Procedure OA-104, Revision 5)

2. **Finding (Reference Criterion B)**

An approved quality program is in place but is not functioning adequately in every aspect of the operation. Little emphasis is placed on non-safety-related aspects of operations. Only limited coverage is provided in some areas such as surveillance, in-service inspection and chemistry.

Recommendation

Expand quality programs coverage to all aspects of station operation in a graduated manner, including non-safety as well as safety-related areas.

Response

The development of a formal balance-of-plant QA program has been initiated and is expected to be completed by April 1, 1982. The QA Department is currently reviewing the surveillance program for all station activities in conjunction with the examination of position responsibilities and organization structure. The results of this review will be incorporated into revised quality assurance instructions for specific surveillances. These instructions when combined with an increase in staffing levels will correct deficiencies in operations surveillance, in-service inspection and chemistry. It is expected that these instructions will be issued by September 30, 1981.

Status

PSE&G is currently applying selected quality program aspects to various balance-of-plant (BOP) components considered to be important to safety or reliability. These applications have been primarily related to plant modifications when special circumstances warranted this approach. INPO is developing a Good Practice in this area that will offer additional guidance and alternative methods for application of quality programs to BOP components. PSE&G will evaluate the Good Practice and will consider improvements to current methods at that time.

TECHNICAL SUPPORT ORGANIZATION AND ADMINISTRATION

(INPO Procedure TS-701, Revision 1)

2. **Finding (Reference Criterion D)**

A training program has not been established to provide continuing training and retraining for technical support personnel. Although some training is done for technicians and reactor engineers, there needs to be a commitment to an on-going training program to improve and develop skills and keep personnel cognizant of the state-of-the-art changes and specific plant systems.

Recommendation

Establish a training program for on-site technical support personnel. The training needs for on-site technical support personnel should be evaluated in such areas as plant systems and components, specialized

engineering knowledge or skills and effective management techniques. On-site technical support personnel should be given the opportunity and should be encouraged to attend pertinent seminars and conferences within the areas of their expertise.

Response

This area will be reviewed in conjunction with the previous finding with appropriate action implemented by March 1, 1982.

Status

This training program has been delayed due to the longer than anticipated time to staff the training department and due to the impact of a recent labor strike. The development of a program for training of station technical support personnel has been undertaken by the technical supervisory skill program (TSSP) Committee with members from the Training Center, Salem and Hope Creek Generating Stations, and consultant training specialists. A comprehensive modular TSSP is being developed that includes information on plant systems and components, specialized engineering knowledge or skills and effective management techniques. PSE&G is planning to develop and implement this program by July 1983.

ENGINEERING SUPPORT
(INPO Procedure TS-702, Revision 2)

1. Finding (Reference Criterion A)

Improvements are needed in the plant performance monitoring program to optimize plant thermal performance and maintain a high degree of reliability. A coordinated approach is not used in the assignment of personnel to monitor plant performance, collect and analyze data on a continuing basis and utilize the results to recommend plant improvements.

Recommendation

Develop a coordinated program to monitor plant performance on a routine basis to improve operating performance and reliability.

Response

We concur with this finding and will implement the recommendations by March 1, 1982.

Status

A performance and reliability group has been established along with a performance and reliability program. A portion of the program has been implemented. Total implementation is scheduled to be completed by October 1983.

APPENDIX II

Performance Objectives Reviewed

ORGANIZATION AND ADMINISTRATION

OA.1 Station Organization and Administration

Station organization and administrative systems should ensure effective implementation and control of station activities.

OA.2 Mission, Goals, and Objectives

Station mission, goals, and objectives should be established and progress monitored through a formal program.

OA.3.1 Management Assessment

Management should assess and monitor station activities to ensure effective performance of all aspects of nuclear plant operation.

OA.3.2 Quality Programs

Quality programs should ensure the effective performance of activities important to nuclear safety.

OA.4 Personnel Planning and Qualification

Personnel programs should ensure that station positions are filled by individuals with proper job qualifications.

OA.5 Industrial Safety

Station industrial safety programs should achieve a high degree of personnel safety.

OA.6 Document Control

Document control systems should provide correct, readily accessible information to support station requirements.

OA.7 On-site Nuclear Safety Review Committee

Review of station nuclear activities by a knowledgeable interdisciplinary group should ensure achievement of a high degree of nuclear safety.

OPERATIONS

OP.1 Operations Organization and Administration

The operations organization and administrative systems should ensure effective control and implementation of department activities.

OP.2 Conduct of Operations

Operational activities should be conducted in a manner that achieves safe and reliable plant operation.

OP.3 Plant Status Controls

Operational personnel should be cognizant of the status of plant systems and equipment under their control, and should ensure that systems and equipment are controlled in a manner that supports safe and reliable operation.

OP.4 Operations Knowledge and Performance

Operator knowledge and performance should support safe and reliable plant operation.

OP.5 Operations Procedures and Documentation

Operational procedures and documents should provide appropriate direction and should be effectively used to support safe operation of the plant.

OP.6 Operations Facilities and Equipment

Operational facilities and equipment should effectively support plant operation.

MAINTENANCE

MA.1 Maintenance Organization and Administration

The maintenance organization and administrative systems should ensure effective control and implementation of department activities.

MA.2 Plant Material Condition

The material condition of the plant should be maintained to support safe and reliable plant operation.

MA.3 Work Control System

The control of work should ensure that identified maintenance actions are properly completed in a safe, timely, and efficient manner.

MA.4 Conduct of Maintenance

Maintenance should be conducted in a manner that ensures efficient and effective plant operation.

MA.5 Preventive Maintenance

The preventive maintenance programs should contribute to optimum performance and reliability of plant equipment.

MA.6 Maintenance Procedures and Documentation

Maintenance procedures should provide appropriate directions for work and should be used to ensure that maintenance is performed safely and efficiently.

MA.7 Maintenance History

The maintenance history should be used to support maintenance activities and optimize equipment performance.

MA.8 Maintenance Facilities and Equipment

Facilities and equipment should effectively support the performance of maintenance activities.

TECHNICAL SUPPORT

TS.1 Technical Support Organization and Administration

The technical support organization and administrative systems should ensure effective control and implementation of department activities.

TS.2 Surveillance Testing Program

Surveillance inspection and testing activities should provide assurance that equipment important to safe and reliable plant operation will perform within required limits.

TS.3 Operations Experience Review Program

Industrywide and in-house operating experiences should be evaluated and appropriate actions undertaken to improve plant safety and reliability.

TS.4 Plant Modifications

Plant modification programs should ensure proper review, control, implementation, and completion of plant design changes in a safe and timely manner.

TS.5 Reactor Engineering

On-site reactor engineering activities should ensure optimum nuclear reactor operation without compromising design or safety limits.

TS.6 Plant Efficiency and Reliability Monitoring

Performance monitoring activities should optimize plant thermal performance and reliability.

TS.7 Technical Support Procedures and Documentation

Technical support procedures and documents should provide appropriate direction and should be effectively used to support safe operation of the plant.

TRAINING AND QUALIFICATION

TQ.1 Training Organization and Administration

The training organization and administrative systems should ensure effective control and implementation of training activities.

TQ.2 Non-Licensed Operator Training and Qualification

The non-licensed operator training and qualification program should develop and improve the knowledge and skills necessary to perform assigned job functions.

TQ.3 Licensed Operator Training and Qualification

The licensed operator training and qualification program should develop and improve the knowledge and skills necessary to perform assigned job functions.

TQ.4 Shift Technical Advisor Training and Qualification

The shift technical advisor training program should develop and improve the knowledge and skills to perform assigned job functions.

TQ.5 Maintenance Personnel Training and Qualification

The maintenance personnel training and qualification program should develop and improve the knowledge and skills necessary to perform assigned job functions.

TQ.6 Technical Training for Managers and Engineers

The technical training program for engineers and managers should broaden overall knowledge of plant processes and equipment as a supplement to position-specific education and training.

TQ.7 General Employee Training

The general employee training program should develop a broad understanding of employee responsibilities and safe work practices.

TQ.8 Training Facilities and Equipment

The training facilities, equipment, and materials should effectively support training activities.

RADIOLOGICAL PROTECTION

RP.1 Radiological Protection Organization and Administration

The organization and administrative systems should ensure effective control and implementation of the radiological protection program.

RP.2 Radiological Protection Personnel Qualification

The radiological protection qualification program should ensure that radiological protection personnel have the knowledge and practical abilities necessary to effectively implement radiological protection practices.

RP.3 General Employee Training In Radiological Protection

General employee training should ensure that plant personnel, contractors, and visitors have the knowledge and practical abilities necessary to effectively implement radiological protection practices associated with their work.

RP.4 External Radiation Exposure

External radiation exposure controls should minimize personnel radiation exposure.

RP.5 Internal Radiation Exposure

Internal radiation exposure controls should minimize internal exposures.

RP.6 Radioactive Effluents

Radioactive effluent controls should minimize radioactive materials released to the environment.

RP.7 Solid Radioactive Waste

Solid radioactive waste controls should minimize the volume of radioactive waste and ensure safe transportation of radioactive material.

RP.8 Personnel Dosimetry

The personnel dosimetry program should ensure that radiation exposures are accurately determined and recorded.

RP.9 Radioactive Contamination Control

Radioactive contamination controls should minimize the contamination of areas, equipment, and personnel.

CHEMISTRY

CY.1 Chemistry Organization and Administration

The organization and administrative systems should ensure effective implementation and control of the chemistry program.

CY.2 Chemistry Personnel Qualification

The chemistry qualification program should ensure that chemistry personnel have the knowledge and practical abilities necessary to implement chemistry practices effectively.

CY.3 Chemistry Control

Chemistry controls should ensure optimum chemistry conditions during all phases of plant operation.

CY.4 Laboratory Activities

Laboratory and counting room activities should ensure accurate measuring and reporting of chemistry parameters.

CY.5 Chemical and Laboratory Safety

Work practices associated with chemistry activities should ensure the safety of personnel.