

APPENDIX

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Inspection Report: 50-344/94-05

License: NPF-1

Licensee: Portland General Electric Company
121 S. W. Salmon Street, TB-17
Portland, Oregon

Facility Name: Trojan Nuclear Plant (TNP)

Inspection At: TNP site, Columbia County, Oregon

Inspection Conducted: October 13, 1994

Inspectors: Michael T. Masnik, Senior Project Manager
Office of Nuclear Reactor Regulation

H. Dean Chaney, Senior Radiation Specialist
Walnut Creek Field Office, RIV

Approved:

Seymour H. Weiss
for Seymour H. Weiss, Chief, Non-Power Reactor and
Decommissioning Project Directorate

11/15/94
Date

Inspection Summary

Areas Inspected: Special, announced inspection of the TNP large component removal project safety evaluation, large component removal project environmental review, and large component removal project radiation protection program.

Results:

- The licensee safety assessment for large component removal was performed in compliance with TNP internal procedures and conforms to the requirements of 10 CFR 50.59.
- Potential environmental impacts associated with large component removal project were found to be within the bounds of impacts predicted by the August 1973 Final Environmental Impact Statement for the Trojan Nuclear Plant (FES) and the August 1988 Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities (GEIS).

Attachments:

- Persons Contacted and Exit Meeting

DETAILS

1 INTRODUCTION

The purpose of this inspection was to review the 10 CFR 50.59 safety evaluation by Portland General Electric, PGE or the licensee, supporting the large component removal (LCR) project at the Trojan Nuclear Plant (TNP) and to determine if the environmental impacts associated with large component removal are within the impacts predicted by the August 1973 Final Environmental Impact Statement for the Trojan Nuclear Plant (FES), and the August 1988 Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities (GEIS). Additionally the inspectors independently verified the licensee calculations concerning radioactive material releases and offsite dose consequences during the LCR project and examined the PGE radiation protection and ALARA programs for LCR.

The inspectors reviewed the following: (1) the PGE 10 CFR 50.59 safety review for the LCR project, (2) the PGE July 7, 1994, Large Component Removal Plan, (3) the licensee-supplied supplemental information on LCR dated September 28, 1994, (4) the Technical Analysis Corporation (TAC) independent review of LCR, dated October 11, 1994, entitled, "Review of the PGE Large Component Removal Plan for Trojan Nuclear Plant," and (5) TNP procedures governing the administrative controls, preparation, and review of safety evaluations.

The environmental evaluation included a review of the PGE Environmental Screening document required by procedure, the Trojan Large Component Removal Plan dated July 7, 1994, the FES for Trojan and the GEIS for Decommissioning. The inspectors also visited the barge unloading facility and discussed the permitting requirements for improvements to the barge unloading facility necessary for shipping the Trojan large components.

Licensee calculations concerning potential radioactive material releases and offsite dose consequences were reviewed and compared to standard NRC-acceptable calculational techniques for various load drops involving the steam generator or pressurizer. The PGE radiation protection and ALARA programs were evaluated against NRC requirements. The inspectors reviewed selected ALARA work packages/exposure estimates and preliminary Radiation Work Permits for the LCR project.

2 LARGE COMPONENT REMOVAL SAFETY EVALUATION

The safety evaluation for LCR is contained in Defueled Plant Modification Request (DPMR) 93-015 "Large Component Removal Project." TPP 30-5, "Defueled Plant Modifications Implementation," Rev 1, specified requirements for the preparation of DPMRs. TPP 30-5, Section 4.3.6.a required that the Action Engineer conduct a safety screening evaluation using the Screening Criteria Checklist found in TPP 18-1 "10 CFR 50.59 and Other Regulatory Evaluations," Revision 3. The safety evaluation addressed the 10 CFR 50.59 criteria. Additionally, licensee procedures stated that the screening evaluation could result in a number of other evaluations including: an environmental

evaluation, a security plan evaluation, a QA program evaluation, a decommissioning plan evaluation, and a fire protection plan evaluation.

The inspectors concluded that the existing Trojan plant procedures were detailed and provided effective programmatic control of licensee internal review of defueled plant modifications, specifically DPMR-93-015 and the detailed construction packages associated with the DPMR. Specifically, TPP 30-5, Rev 1, appropriately linked the preparation of plant modifications to TPP 18-1, Rev 3, which provided requirements and guidance for performing evaluations under 10 CFR 50.54 and 10 CFR 50.59, and other regulatory requirements. TPP 18-1 specified detailed requirements and guidance necessary to provide appropriate evaluation of plant modifications.

Portland General Electric assures the proper use of 10 CFR 50.59 evaluations through the implementation of TPP 18-1. This procedure provides guidance for the preparation of safety evaluations related to plant modifications and appropriately reflects the current permanently shutdown and defueled condition of the plant. The inspectors found TPP 18-1 comprehensive and sufficiently detailed to ensure that the criteria of 10 CFR 50.59 were properly considered for LCR. Overall, the inspectors concluded that the procedures reviewed provided acceptable guidance for the preparation of DPMR 93-015 and Safety Evaluation (SE) 94-015, Rev 1, dated May 9, 1994 (SE 94-015).

The inspectors reviewed the screening criteria checklist dated May 10, 1994, prepared by the licensee for DPMR-93-015 and SE 94-015. Additionally the inspectors reviewed the associated environmental evaluation, the security plan evaluation, the QA program evaluation, the decommissioning plan evaluation and the fire protection plan evaluations that were required by the screening evaluation. Safety Evaluation (SE) 94-015 was approved by the Trojan Plant Review Board on May 12, 1994.

PGE is authorized under 10 CFR 50.59 to make changes, or conduct tests or experiments or change procedures for TNP without prior NRC approval, unless the proposed change, test, or experiment involves a change in the technical specifications incorporated in the license or an unreviewed safety question.

The licensee had reviewed the TNP Appendix A and B Technical Specifications incorporated in facility license NPF-1 and determined that the LCR program could be conducted without requiring a change to the technical specifications. A review of the TNP technical specifications by the NRC inspectors confirmed this determination by the licensee.

Proposed changes, tests or experiments are also prohibited if they involve an unreviewed safety question. A proposed change, test, or experiment is deemed, by 10 CFR 50.59, to involve an unreviewed safety question (i) if the probability of occurrence or the consequences of an accident or malfunction of equipment important to safety previously evaluated in the safety analysis report may be increased; or (ii) if a possibility for an accident or malfunction of a different type than any evaluated previously in the safety

analysis report may be created; or (iii) if the margin of safety as defined in the basis for any technical specification is reduced.

PGE concluded, as documented in SE 94-015, that the LCR program will not increase the probability, consequences, or type of any accident previously evaluated in the Defueled Safety Analysis Report (DSAR). The postulated accidents evaluated in the DSAR are (1) a release of radioactivity from a tank, (2) a fuel handling accident, and (3) a loss of forced cooling to the spent fuel pool.

The licensee evaluated the release of radioactivity from a steam generator and during a load drop inside containment. This was considered the bounding accident involving the release of radioactivity during LCR. Before the steam generators are removed from the containment, they will be filled with low density cellular concrete, sealed with nozzle covers, plugs, or other appropriate closures, and covered with a special coating to immobilize surface contamination. It is assumed for the bounding accident that the accident occurred before the steam generator is filled with the low density concrete and that all temporary covers over openings are dislodged by the impact of the drop. The licensee assumed that the accidental dropping of a steam generator during lifting inside containment would release 10 percent of the activity in the steam generator and that one percent is of a small enough size to become airborne. Assumptions in the PGE analysis included that the containment opening would be closed and the containment purge system operating. The calculated release as a result of the hypothetical accident would result in a whole body dose to the public of 0.0499 mrem, which is substantially less than the calculated dose to the public from the rupture of the Waste Gas Decay Tank, as described in the DSAR. Therefore, the licensee concluded that the consequences of an accident are not greater than previously evaluated in the DSAR. The inspectors agreed that the consequences of an accident during LCR are not greater than previously evaluated in the DSAR. Additionally, the inspectors compared the licensee's hypothetical LCR accident to the dose consequences presented in a postulated fire in the onsite radwaste building (TNP calculations RPC-93-019). The calculated offsite dose consequences of a postulated radwaste building fire were two orders of magnitude greater than the steam generator load drop inside containment.

PGE also concluded that the proposed LCR project would not increase the probability of occurrence or the consequences of a malfunction of equipment important to safety. The only equipment important to safety at the Trojan plant is the spent fuel pool, the pool storage racks, the portion of the service water system necessary for makeup to the spent fuel pool, and structures associated with the spent fuel pool, all located in the auxiliary and fuel buildings. Since LCR activities will be confined principally to the containment building and the yard area, the inspectors concluded that no interaction with any safety related systems components or structures is anticipated.

The LCR program will not involve the movement of fuel in the spent fuel pool or interact directly with components or systems involving the radwaste system.

There will likely be some movement of heavy loads out through the containment equipment hatch which is located near the spent fuel pool. The installation of physical restraints, modifications to existing structures and components, and the erection of barriers in the fuel building provide additional assurance that the spent fuel will be protected. Additionally, procedures will be in place to assure that the movement of heavy loads past the spent fuel pool will not threaten the integrity of the fuel pool, fuel elements or fuel pool cooling and makeup capability.

The licensee determined that the LCR activities do not alter plant response to external events such as explosions, earthquakes, tornadoes, or high winds since the storage configuration of the spent fuel will not be altered. The impact of these phenomena on the large components after removal from containment was bounded by the heavy load drop analyses discussed below. Detensioning of tendons and cutting of an opening in the side of the containment building do not adversely affect the ability of the containment structure to withstand tornado forces. Although the door (covering the planned opening in the containment) would not be designed to withstand tornado winds or missiles, there would be no direct missile path between the opening and the spent fuel pool or equipment necessary to maintain the spent fuel.

The inspectors verified by walkdown that the fuel in the spent fuel pool and the spent fuel pool piping systems and support structures are sufficiently separated from LCR activities to preclude any accidents involving the spent fuel and its associated safety-related systems.

PGE concluded that the proposed LCR activities will not create the possibility of an accident of a different type than any evaluated in the DSAR. The Section 6.1 of the DSAR identified radioactive releases from a component as one of the general classifications of accidents in the permanently defueled condition. Any potential accident involving the spent fuel would be of the same type as a fuel handling accident or an accident to the structures systems or components necessary to maintain the spent fuel considered in the DSAR Sections 6.2 and 6.3. Postulated accidental radioactive releases from the LCR activities will not exceed those assumed as a basis for the Permanently Defueled Emergency Plan, and represent a small fraction of 10 CFR 20 dose limits and EPA Protective Action Guides. The staff agrees that the release of radioactivity as a result of a steam generator load drop inside containment is the same type of accident as the release of radioactivity from the Waste Gas Decay Tank evaluated in Section 6.1.1 of the DSAR and previously evaluated during plant operation (FSAR Section 15.7.1).

PGE also concluded that there was no possibility for a malfunction of equipment important to safety during LCR of a different type than any evaluated previously. As discussed above, none of the LCR activities will pose a risk to the structures, systems or components important to safety. The spent fuel pool and the emergency makeup flow path to the spent fuel pool are well away from the areas where the principal activities associated with the LCR program will be occurring. Movement of test weights, waste concrete and other equipment associated with the LCR project through the containment

equipment hatch will follow safe load paths established to ensure there are no adverse interactions with the spent fuel pool or associated safety-related systems or components. The staff agrees with the above conclusion by the licensee.

The licensee reviewed the current Bases in the Appendix A Technical Specifications for TNP (through amendment 193), and determined that none of the LCR activities involve any of the margins of safety discussed in the Bases. Therefore, the licensee concluded, and the inspectors agreed, that the LCR program does not reduce the margin of safety as defined in any bases for the TNP Appendix A Technical Specifications.

The inspectors concluded that the safety evaluation for LCR comply with the requirements of 10 CFR 50.59, that there is no unreviewed safety question involving the LCR program and that adequate safety programs and procedures are or will be in place to ensure that the steam generators and the pressurizer can be safely removed and transported.

3 LARGE COMPONENT REMOVAL ENVIRONMENTAL REVIEW

The inspectors also examined the PGE Environmental Screening document for the large component removal required by TPP 18-1, the Trojan Large Component Removal Plan dated July 7, 1994, the FES for Trojan and the GEIS for Decommissioning to determine if (i) the licensee properly characterized the potential environmental impacts associated with the large component removal process and (ii) the predicted impacts associated with LCR are within the range of impacts predicted by the FES and the GEIS. The staff also visited the barge unloading facility and discussed the permitting requirements for improvements to the barge unloading facility necessary for shipping the Trojan large components.

The inspectors reviewed the May 10, 1994, TNP environmental evaluation associated with TNP SE 94-015. The staff determined that the impacts, both radiological and non-radiological, including the activities associated with refurbishment of the barge slip are bounded by the impacts identified in the August 1973 Final Environmental Impact Statement for the Trojan Nuclear Plant (FES), and the August 1988 Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities (GEIS).

4 LARGE COMPONENT REMOVAL RADIATION PROTECTION

The inspectors examined the following licensee calculations concerning radioactive material releases and offsite dose consequences during the LCR project.

- RPC-93-016, "Scoping Estimate of Steam Generator and Pressurizer Activity," Revision 1, dated May 12, 1994.

- RPC-94-007, "Site Boundary Doses from A Steam Generator Drop Inside Containment," Revision 0, dated May 12, 1994
- RPC-94-008, "Limiting Activity Releases Due to Decommissioning Activities," Revision 0, dated May 3, 1994.
- Memorandum from M. Murdock (TNP) to J. Fischer (TNP); Subject: Estimated Off-Site Dose From Surface Area Contamination; Serial Number: MM-012-94; dated August 9, 1994.

The licensee used standard and NRC-acceptable calculation¹ techniques in determining the radiological consequences of various load drops involving either a pressurizer or steam generator. The PGE pressurizer and steam generator curie content project (the basis for the radioactive material source term) used material sampling techniques that would provide exceptionally accurate isotopic and total radioactivity estimates for the LCR components.

The selected portions of the calculations presented by the licensee were independently verified by the inspectors using the dose factors in EPA Federal Guidance Report No. 11, "Limiting Values of Radionuclide Intake and Air Concentrations and Dose Conversion Factors For Inhalation, Submersion and Ingestion," and the calculational models presented Section H of the NRC Response Technical Manual, Vol 1, Revision 3, dated November 1993. The PGE off-site dose results (Total Effective Dose Equivalent-TEDE and Committed Dose Equivalents-CDE) from steam generator being dropped within the containment (worst-case situation due to striking/landing pad hardness versus outside soil hardness) and less than 10 percent of the resultant radioactivity being released from the containment (worst-case by several magnitudes) resulted in a TEDE of less than 0.05 millirem to a person located at the site boundary for two hours. This is many magnitudes lower than the EPA emergency protective action guidelines (1 REM TEDE) and is considered insignificant. The inspectors also determined that the off-site dose estimates were accurate and would result in doses several magnitudes below the NRC allowable dose to members of the public (100 millirem per year TEDE) as set forth in 10 CFR Part 20.1301 (a) and (b).

The inspectors examined the PGE radiation protection program attributes involving in the following areas:

- Implementing Radiation Protection Program, including an ALARA program, that meets the requirements set forth in 10 CFR Parts 20.1101(a) and 20.1101(b).
- Developing and implementing detail procedures for conduct of the TNP Radiation Protection and ALARA programs.
- Providing an experienced staff for implementation of the TNP ALARA program.

- Estimating the radiological conditions present at the LCR worksite, job work force requirements, individual and collective dose expenditures, etc.
- Establishing contamination control measures, radiation shielding measures, work area monitoring program, scheduling of operations that minimize collective and individual radiation dose, and ALARA performance tracking program.

The PGE projected overall exposure expenditure estimate of 138 person-rem for the complete LCR Project is based on a conservative assessment of the duration and difficulty of the LCR program. The total overall exposure for LCR is likely to be less than 138 person-rem.

It was found that the PGE radiation protection and ALARA programs were still in compliance with 10 CFR Part 20 requirements, and as previously described in NRC Inspection Reports 50-344/93-17, 50-344/94-01, 50-344/94-03, and 50-344/94-04. See the aforementioned NRC Inspection Reports for detailed descriptions of licensee programs associated with the LCR Project.

The licensee has established a consulting contract with a Health Physicist who is very knowledgeable in the removal of steam generators and radiation protection program auditing. The contractor will be performing an independent evaluation of the readiness of the licensee for starting LCR and periodic audits during the program. The inspectors reviewed selected ALARA work packages/exposure estimates and preliminary Radiation Work Permits for the LCR program. The ALARA packages reviewed incorporated sound industry practices for assuring doses to workers are maintained ALARA.

The licensee appears to be well prepared to implement sound radiation protection and ALARA programs that will ensure the continued health and safety of both workers and the public during the LCR project.

ATTACHMENT

1 PERSONS CONTACTED

1.1 Licensee Personnel

H. Chernoff, Manager Licensing
M. Mullin, Licensing Engineer
M. Lackey, General Manager, Engineering/Decommissioning
D. Nordstrom, General Manager, Nuclear Oversight
S. Nichols, Manager, Large Component Removal
J. Mihelich, Manager, Engineering
T. Meek, Manager, Radiation Protection
L. Kelly, Project Engineer
D. Cummings, Project Engineer
C. Casciato, Assistant
P. Yundt, General Manager, Plant Support
M. Murdock, ALARA Coordinator
G. Huey, Supervisor Health Physicist
A. Bowman, Supervisor Radiation Protection Technician

1.2 NRC Personnel

M. Masnik, Senior Project Manager, NRR
D. Chaney, Senior Radiation Specialist, WCFO

The personnel listed above either attended the exit briefing or were contacted during the inspection.

2. EXIT BRIEFING

An exit briefing was conducted on October 13, 1994. During the briefing, the team reviewed the scope and findings of the inspection. The licensee did not identify as proprietary any information provided to, or reviewed by, the inspectors.