



**UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
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April 29, 2003

Mr. Stephen M. Quennoz, Vice President
Power Supply/Generation
Portland General Electric Company
Trojan Nuclear Plant
71760 Columbia River Highway
Rainier, Oregon 97048

SUBJECT: NRC INSPECTION REPORT 50-344/2002-05;72-17/2002-01

Dear Mr. Quennoz:

NRC inspections were conducted between December 16, 2002 and February 13, 2003, at your Trojan nuclear reactor facility to evaluate the dry cask storage activities for your Independent Spent Fuel Storage Installation (ISFSI). These inspections included observation of activities associated with your pre-operational testing program, the loading of your first cask and the thermal monitoring program for the first and third casks. The inspections were conducted to confirm compliance of your program and activities with the requirements specified in the license, technical specifications, Final Safety Analysis Report and the NRC's Safety Evaluation Report. The enclosed report presents the results of this inspection. Overall, the inspection found that activities were being performed in accordance with procedural and regulatory requirements. No violations of NRC regulations were identified.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any) will be made available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

If you have any questions concerning this inspection, please contact Mr. Vincent Everett, Senior Health Physicist, at (817) 860-8198 or the undersigned at (817) 860-8191.

Sincerely,

/RA/

D. Blair Spitzberg, Ph.D., Chief
Fuel Cycle and Decommissioning Branch

Portland General Electric Co.

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Docket No.: 50-344

License No.: NPF-1, SNM-2509

Enclosure:

NRC Inspection Report

050-00344/2002-05;72-17/2002-01

cc w/enclosure:

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bcc w/enclosure (via ADAMS distrib):

- EECollins
- DBSpitzberg
- ERZiegler
- GKMorell
- RJEvans
- EMGarcia
- RRTemps
- CMRegan
- JSMcAnallen
- RRMunoz
- JVEverett
- FCDB File
- TWDexter
- NHolbrook

ADAMS: Yes No Initials: JVE
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04/29/03	04/17/03	04/29/03	04/29/03
RIV:DNMS:FCDB	RIV:DNMS:FCDB	RIV:DNMS:FCDB	NMSS:SFPO
EMGarcia	TWDexter	RRMunoz	CMRegan
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04/28/03	04/29/03		

ENCLOSURE

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Docket No.: 50-344, 72-17

License No.: NPF-1, SNM-2509

Report No.: 50-344/2002-05;72-17/2002-01

Licensee: Portland General Electric Company

Facility: Trojan Nuclear Plant/Independent Spent Fuel Storage Installation

Location: 71760 Columbia River Highway
Rainier, Oregon 97048

Dates: December 16 - 19, 2002 (Pre-operational demonstration - exit
conducted on December 19, 2002))
December 30, 2002 - January 13, 2003 (Loading of first cask - exit
conducted via phone on January 22, 2003)
February 10 - 13, 2003 (ISFSI operations - exit conducted on
February 13, 2003)

Inspectors: J. V. Everett, Team Leader, Region IV
G. K. Morell, Health Physicist, Region IV
R. J. Evans, P.E., C.H.P., Senior Health Physicist, Region IV
E. M. Garcia, Health Physicist, Region IV
R. R. Temps, Safety Inspector, SFPO
C. M. Regan, Project Manager SFPO
J. S. McAnallen, Nuclear Safety Intern, NMSS
R. R. Munoz, Health Physicist (Inspector-in-Training), Region IV
T.W. Dexter, Consultant

Accompanied by: A. Bless, Resident Inspector
Oregon Office of Energy

Approved by: D. Blair Spitzberg, Ph.D., Chief
Fuel Cycle & Decommissioning Branch

Attachments: Supplemental Information
Inspector Notes

ADAMS Entry: IR 05000344-02-05;07200017-02-02 on 12/16/02-2/13/03; Portland
General Electric Co.; Trojan Nuclear Plant; ISFSI Report;
No violations.

EXECUTIVE SUMMARY

Trojan Nuclear Plant NRC Inspection Report 50-344/2002-05;72-17/2002-01

On December 31, 2002, Portland General Electric began loading the first canister for the Holtec Hi-Storm 100S cask system for storage at the Trojan Independent Spent Fuel Storage Installation (ISFSI) located adjacent to the Trojan nuclear plant. Thirty four canisters containing 780 spent fuel assemblies and twenty-two failed fuel cans will be stored at the Trojan ISFSI. Completion of the dry cask loading operations is expected by the end of 2003. Upon completion of the dry cask loading operations, Portland General Electric will be able to begin the decontamination and dismantlement of the spent fuel pool.

The Trojan ISFSI project has required several years of planning and preparation, including a major change in the cask design. The NRC inspections documented in this report placed considerable emphasis on the transition of Portland General Electric from the TranStor cask design to the Holtec design to verify that the required programs and training had been adequately revised to reflect all the changes needed to safely load and store spent fuel at Trojan. The extensive inspections conducted over a two month period by eight inspectors resulted in no violations of NRC regulations or identification of open items requiring follow-up inspections. These findings reflect the hard work and effort by the Trojan team and their contractors to develop and implement the current dry cask storage program.

The NRC conducted three onsite inspections. The first inspection focused on reviews of the licensee's procedures and programs related to dry cask storage and included observation of the pre-operational testing program. The second inspection was conducted during the loading of the first canister and included 24-hour coverage by the NRC through the loading, drying, helium backfilling and welding of the canister. Lowering of the canister into the concrete cask was also observed. The third inspection was conducted during the loading of the third canister. This inspection included observation of selected cask loading activities and reviewed the results of the thermal validation tests of the first and third casks. The primary inspection procedures used for guidance during these inspections were Inspection Procedure 60854 "Pre-Operational Testing of an ISFSI," Inspection Procedure 60855 "Operations of an ISFSI," and Inspection Procedure 81001 "ISFSI Security." In addition, Inspection Procedure 60856 "Review of 10 CFR 72.212(b) Evaluations," and Inspection Procedure 60857 "Review of 10 CFR 72.48 Evaluations," were also used. Fourteen key technical areas were included in the NRC inspections of the ISFSI program. Selected topics in each of these areas were reviewed against the requirements in the federal regulations and the Final Safety Analysis Report (FSAR) for the Holtec cask. The inspections included considerable time observing worker performance during the pre-operational testing program and the loading of the first canister. Attachment 2 of this report provides the inspector notes documenting the findings in each of the technical areas reviewed. The following provides a summary of these findings and conclusions.

- ! The cask vendor had completed a detailed design analysis to verify that the modified Holtec multi-purpose canister would be compatible for storage in Trojan's existing TranStor concrete casks. Modifications to Holtec's standard multi-purpose canister

required shortening the canister to fit into the TranStor cask and enlargement of the four corner cells inside the canister to hold the Trojan failed fuel cans and damaged fuel containers. (Attachment 2 - Design Features).

- ! Design modifications to the ISFSI transfer station to accommodate the slightly larger Holtec transfer cask were reviewed and found to be adequate. The transfer station was originally designed for use with the TranStor transfer cask (Attachment 2 - Design Features).
- ! The emergency plan, implementing procedures and drill program were found to comply with the requirements of 10 CFR 72.32(a). An Alert classification and specific emergency action levels had been established for the ISFSI. Three successful ISFSI emergency drills had been conducted by the licensee (Attachment 2 - Emergency Planning).
- ! Provisions for fire protection were reviewed and found acceptable for the ISFSI. This included requirements to maintain a fire protection plan, limit the amount of combustible material in or near the loaded casks and maintain arrangements with local fire and ambulance services (Attachment 2 - Fire Protection).
- ! Procedures had been developed for classifying and controlling the loading of the spent fuel into each canister to ensure compliance with FSAR and technical specification requirements. Implementation of the fuel load verification requirements were observed during the loading of the first canister (Attachment 2 - Fuel Verification).
- ! Provisions were designed into the Holtec canisters to accommodate the licensee's failed fuel cans in special oversized cell locations (Attachment 2 - Fuel Verification).
- ! The heavy load program was reviewed and found acceptable. Areas reviewed included the crane maintenance program, lifting trunnion tests, lifting yoke tests, certification of slings, required visual examinations of the transfer cask lifting trunnions, use of impact limiters, movement of heavy loads over the spent fuel pool and safe load paths (Attachment 2 - Heavy Load).
- ! The licensee's calculations for the weight of the spent fuel in the canister confirmed that the total weight of the canister's contents would be within the limits specified in the technical specifications (Attachment 2 - Heavy Load).
- ! The required dryness limit specified in the technical specifications and limits for the time to complete the drying of the canister to prevent internal fuel temperatures from exceeding design limits had been adequately incorporated into procedures (Attachment 2 - Hydro/Drying/Helium).
- ! Requirements for hydrostatic testing, backfill of the canister with helium and helium leak testing were adequately incorporated into procedures consistent with the criteria specified in the FSAR and technical specifications (Attachment 2 - Hydro/Drying/ Helium).

- ! The pre-operational testing program was adequately implemented by the licensee covering the topical areas required by the FSAR. The NRC inspection team observed activities related to: heavy loads, fuel movement, welding, nondestructive testing of welds, helium leak testing, hydrostatic testing, helium backfill operations, vacuum drying and implementation of procedures. Workers demonstrated good knowledge of procedures and equipment and understood the regulatory requirements related to dry cask storage activities. Problems that occurred during the pre-operational testing were readily recognized and effectively resolved (Attachment 2 - Pre-operational Tests).

- ! Extensive review of ISFSI procedures against the requirements established in the technical specifications and FSAR were completed by the NRC. Areas reviewed included: use of air pads for moving the cask, ambient temperature limits for cask movement, notification requirements, approval process for procedures, speed limits on the casks, process for dealing with stuck fuel assemblies, thermal validation test requirements, time to boil limits on the canister and loading and unloading operations. Procedures were found to be comprehensive with action oriented steps that clearly described the required activities consistent with the technical specifications and FSAR requirements (Attachment 2 - Procedures & Tech Specs).

- ! Trojan's quality assurance program for their Part 50 reactor license was being applied to the ISFSI. The quality assurance program was reviewed and found to adequately be applied to ISFSI related activities. Areas such as audits and surveillances, safety review committee oversight, handling and storage of components, control of purchased material, control of test equipment, documentation requirements for components, design controls and corrective action processes were reviewed and found acceptable (Attachment 2 - Quality Assurance).

- ! An effective ALARA program had been developed by Trojan using pre-job briefings, procedures and radiation work permits to establish radiological controls for work activities. Preparations and planning for keeping exposures low had included review of the expected dose rates that could be encountered during various work activities as described in the FSAR. Training on these radiological conditions had been provided to radiation protection technicians. Conversations with the radiation protection staff during the pre-operational tests and observations during the loading of the first canister indicated that training on how to minimize exposures to workers performing the various tasks was effective (Attachment 2 - Radiological Protection).

- ! Radiation and contamination survey requirements and limits established in the FSAR and technical specifications had been incorporated into the procedures. Forms and drawings were included in the procedures for documenting radiological surveys (Attachment 2 - Radiological Protection).

- ! Area radiation monitors, air handling and filtration systems, and liquid waste systems had been adequately integrated into the dry cask storage activities (Attachment 2 - Radiological Protection).

- ! Provisions for environmental monitoring had been established including requirements for providing annual reports to the NRC (Attachment 2 - Radiological Protection).
- ! Various requirements in 10 CFR Part 72 and the FSAR related to establishing and maintaining records had been incorporated into the licensee's records management system. This included retention requirements for keeping duplicate records and requirements for the length of time the records are to be kept (Attachment 2 - Records).
- ! The licensee had established an independent review and audit committee that was adequately staffed with qualified personnel and had been functioning in accordance with its charter and the FSAR (Attachment 2 - Safety Reviews).
- ! Implementation of the safety review process required by 10 CFR 72.48 and Trojan's corrective action process were reviewed by selecting several specific issues for evaluation. Two issues were reviewed in detail relating to canister lids that had not received required ultrasonic testing and the use of heated nitrogen for drying the canisters prior to backfilling with helium. Safety reviews were found to be complete and adequately documented (Attachment 2 - Safety Reviews).
- ! Provisions for security at the ISFSI had been established consistent with the requirements of 10 CFR 73.51 and 72.184. Security controls were established for the loading of the canisters with spent fuel, movement of the casks to the ISFSI and storage of the casks (Attachment 2 - Security).
- ! Physical security systems such as lighting, protected area barriers, detection systems, communications systems, provisions for access control and alarm stations were inspected and in some cases challenged. No concerns were identified with the systems and facilities established for protecting the ISFSI (Attachment 2 - Security).
- ! Security force personnel, training, contingency procedures and arrangements for support from local law enforcement agencies provided the basis for a good response capability by Trojan's security organization to a potential threat. Interviews with security force personnel found them to be highly motivated and very knowledgeable of required response actions (Attachment 2 - Security).
- ! The security plan, procedures and records provided a formalized and well documented security program (Attachment 2 - Security).
- ! Qualification requirements established in the FSAR for the ISFSI Manager, ISFSI Specialists and Certified Fuel Handlers were reviewed against the experience and educational background of the personnel assigned to these positions. All personnel were qualified for the positions assigned (Attachment 2 - Training).
- ! A review of training and qualification modules and records for personnel assigned work activities associated with the ISFSI were found to be current and complete. Good controls had been established by the licensee to track the status of training of each individual and

to keep supervisors updated on the qualification status of their assigned workers (Attachment 2 - Training).

- ! Provisions for welding the canister lid, vent and drain ports and the enclosure ring using a robotic flux core arc welding process was well developed. Extensive documentation was provided by the welding contractor for the procedure qualification records and weld procedure specifications to demonstrate compliance with ASME Section IX code requirements (Attachment 2 - Welding).
- ! A back-up process to use manual flux core arc welding or manual gas tungsten arc welding was also fully qualified (Attachment 2 - Welding).
- ! Provisions had been established to purge under the lid and to monitor for oxygen to ensure an explosive mixture of gases did not develop during the lid to shell root pass welding. During the pre-operational testing and during the loading of the first canister, this process was closely observed by the NRC inspectors and found to be effective in monitoring for explosive gases during the welding process (Attachment 2 - Welding).
- ! The nondestructive examination process for the welds on the canister lid, vent and drain ports and enclosure ring were reviewed including personnel qualifications. Nondestructive examinations included visual, liquid penetrant testing and helium leak testing. The acceptance criteria in the procedures for the helium leak testing was consistent with the limit established in the technical specifications. Observation of the Level III qualified NDE inspector performing the nondestructive examinations during both the pre-operational testing program and during the loading of the first canister provided evidence that he was knowledgeable and qualified in the examination processes and could perform the required tests in accordance with the FSAR requirements (Attachment 2 - Welding).
- ! Records were reviewed to verify welder qualifications. Nine welders had been qualified on the robotic process and twelve on the manual process. The welders had completed welding of test coupons that were examined using nondestructive techniques to verify the adequacy of the welds. Discussions with selected welders and the President of the welding company found them to be very knowledgeable of the welding procedures and ASME codes used during welding operations (Attachment 2 - Welding).
- ! The licensee had developed a cutting process that could be used to open a canister loaded with spent fuel. A truncated canister lid was cut off during the pre-operational testing demonstrations, including removal of the vent and drain port covers. A similar technique had actually been used to cut open a loaded canister at another reactor site (Attachment 2 - Welding).

ATTACHMENT 1

PARTIAL LIST OF PERSONS CONTACTED

Portland General Electric

C. Allen, Nuclear Oversight
B. Baker, NDE Level III Examiner
C. Casciato, Licensing Specialist
T. Ciapano, Engineer
S. Cole, Security Officer
J. Cooper, Health Physicist/Engineer
K. Cox, ISFSI Manager
D. Dempsey, Training Coordinator
S. Doran, Security Officer
L. Dusek, Plant Support Manager
R. Eder, ISFSI Specialist
M. Featherston, Licensing
J. Fischer, ISFSI Supervisor
R. Fleming, Security
S. Ford, Licensing Engineer
D. Heath, Engineer
M. Lackey, General Manager
K. Lehman, Administrative Assistant
R. Lewis, Acting Fuel Management/Decommissioning Supervisor
R. Magnuson, Nuclear Security Operations Supervisor
T. Meek, Radiation Protection Manager
J. Mihelich, Engineering Manager
S. Nichols, ISFSI Project Manager
K. Oberloh, Operations
D. Perkins, Engineering Clerk
R. Reinart, I&E Supervisor
T. Ruiz, Emergency Planner
P. Schaffran, Licensing Assistant
G. Schneberger, ISFSI Shift Coordinator
S. Schneider, Operations Manager
R. Stanton, Control Room Operator
C. Storms Sr., ISFSI Specialist
M. Tursa, ISFSI Engineer
J. Vingered, Maintenance Manager
M. Ward, Security Watch Supervisor
J. Westvold, Quality Assurance Manager
A. Zacharias, ALARA Engineer
G. Zimmerman, Licensing Engineer

Contract Personnel

K. Allison, Technical Support, RIO Technical Services, Inc
S. Atwater, ISFSI Loading Shift Manager, Holtec International Inc.
J. Andrescavage, ISFSI Pre-Op and Fuel Load Manager, Holtec International Inc.
T. Bajma, Quality Assurance Engineer, Holtec International Inc.
J. Barrett, President, Barrett Robotic Welding Services Inc.
N. Hanna, Helium Leak Test Examiner Level III, Leak Testing Specialists, Inc.
R. Keller, Director Site Services, Holtec International Inc.
D. McGaugh, Welding Foreman, Barrett Robotic Welding Services Inc.
M. McNamara, Vice President Nuclear Projects, Holtec International Inc.
T. Miller, ISFSI Shift Manager, Holtec International Inc.
E. Parkes, Engineer, Barrett Robotic Welding Services Inc.
G. Rowe, Quality Assurance Engineer, Holtec International Inc.
M. Soler, Quality Assurance Manager, Holtec International Inc.
D. Williams, NDE Level III Examiner, Holtec International Inc.
J. Woessner, Consultant to Oregon Office of Energy
B. Zanc, Technical Consultant

INSPECTION PROCEDURES USED

60854	Preoperational Testing of an ISFSI
60855	Operations of an ISFSI
60856	Review of 10 CFR 72.212(b) Evaluations
60857	Review of 10 CFR 72.48 Evaluations
81001	ISFSI Security

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Discussed

None

Closed

None

LIST OF ACRONYMS

ALARA	as low as reasonably achievable
ASME	American Society of Mechanical Engineers
BFS	British Fuel Services
BRWS	Bartlett Robotic Welding Services, Inc.
CAR	corrective action request
CTL	commitment tracking list
CFR	code of federal regulations
EAL	emergency action level
EPIP	emergency plan implementing procedure
FCAW	flux core arc welding
FHP	fuel handling procedure
FSAR	final safety analysis report
GET	general employee training
HPP	Holtec project procedure
HQP	Holtec quality procedure
ISFSI	independent spent fuel storage installation
LEL	lower explosive limit
MPC	multi-purpose canister (referred to as “canister” in the report)
NDE	non-destructive examination
NMSS	NRC Office of Nuclear Material Safety and Safeguards
NRC	Nuclear Regulatory Commission
NVLAP	National Volunteer Laboratory Testing Program
PGE	Portland General Electric
PQR	procedure qualification record
PT	dye penetrant test
QA	quality assurance
RP	radiation protection
RPP	radiological protection procedure
RWP	radiation work permit
SFP	spent fuel pool
SFPO	Spent Fuel Project Office (NRC)
SNR	site nonconformance report
SNT-TC	(American) Society for Nondestructive Testing - Technical Council
SOG	security operations guideline
SOI	security operating instructions
SPIP	security plan implementing procedure
TIP	Trojan ISFSI procedure
TLD	thermoluminescent dosimeter
TNP	Trojan nuclear plant
TPP	Trojan plant procedure
WPS	welding procedure specification