UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
612 EAST LAMAR BLVD, SUITE 400
ARLINGTON, TEXAS 76011-4125

May 26, 2010

Mr. Stephen M. Quennoz
Vice President, Nuclear and Power
Supply/Generation
Portland General Electric Company
71760 Columbia River Highway
Rainer, OR 97048

SUBJECT: NRC INSPECTION REPORT 072-017/10-01

Dear Mr. Quennoz:

A routine inspection of spent fuel storage activities at the Portland General Electric Company Trojan Independent Spent Fuel Storage Installation (ISFSI) was conducted on April 27-28, 2010. At the conclusion of the inspection on April 28, 2010, an exit briefing was conducted with you and other members of your staff. The enclosed report presents the scope and results of the non-security portion of this inspection. A second inspection report (072-017/10-002) will be issued presenting the security findings of this inspection.

The non-security portion of this inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. Within these areas, the inspection included reviews of the ISFSI operations, quality assurance, emergency planning, radiological controls, records and safety reviews conducted by your staff.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosures, and your response (if any) will be 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). To the extent possible, your response should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the Public without redaction.

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

Sincerely,

/RA/

D. Blair Spitzberg, PhD, Chief
Repository & Spent Fuel Safety Branch

Docket: 072-017
License: SNM-2509

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NRC Inspection Report 072-017/10-01
w/Attachment

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U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Docket:	072-017
License:	SNM-2509
Report:	072-017/10-01
Licensee:	Portland General Electric Company
Facility:	Trojan Independent Spent Fuel Storage Installation
Location:	71760 Columbia River Highway Rainer, OR 97048
Dates:	April 27-28, 2010
Inspectors:	Vincent Everett, Senior Inspector Repository & Spent Fuel Safety Branch
Accompanied By:	Lee Brookhart, Health Physicist In-Training Repository & Spent Fuel Safety Branch
Approved By:	D. Blair Spitzberg, PhD., Chief Repository & Spent Fuel Safety Branch
Attachment:	Supplemental Inspection Information

ENCLOSURE

EXECUTIVE SUMMARY

Trojan Independent Spent Fuel Storage Installation
NRC Inspection Report 072-017/10-01

The Trojan Independent Spent Fuel Storage Installation (ISFSI) was being maintained in accordance with requirements in the site-specific License #72-017 and NRC regulations. The facility was in good physical condition and the staff was well qualified and trained to perform the required functions necessary to maintain the spent fuel in a safe storage condition. The Part 50 license for the Trojan reactor facility was terminated in 2005. Since then, staff reductions and the dismantlement of most of the site structures have significantly changed the work environment at the site. These changes, however, have not reduced the licensee's attention on the programs required to safely store the spent fuel. Personnel effectively interfaced with the NRC inspectors during this inspection and were able to answer questions and provide the necessary records to demonstrate compliance with NRC regulations. A very good questioning attitude was exhibited, indicating the staff's attention was focused on implementing a strong oversight program of safety. Most of the current staff had worked at the site when the facility was an operating reactor. They have continued to carry over the safety culture of the operating days to the current implementation of the site programs. The ISFSI facility is being maintained and documents and records kept current. Radiation safety programs are being implemented to protect workers and to verify that radiation levels around the ISFSI are being maintained in compliance with NRC limits.

Away from Reactor ISFSI Inspection Guidance (60858)

- The ISFSI facility was being maintained in good physical condition and was properly posted (Section 1.a).

- The ISFSI organization was in compliance with Final Safety Analysis Report (FSAR) requirements for staffing and qualifications of personnel. Training was being performed and documented for site personnel to meet the requirements of the Certified ISFSI Specialist Training Program and to provide the required radiation protection training for access to the ISFSI (Section 1.b).

- The site radiation protection program was being implemented to provide personnel radiation protection and to verify radiation conditions at the ISFSI were in compliance with NRC radiation standards. Environmental dosimeters were located around the ISFSI to demonstrate compliance with exposure limits to the public (Section 1.c).

- The emergency planning program was being maintained current. Drills, exercises, and training were performed in accordance with requirements in the emergency plan. Training and participation in drills/exercises were offered to offsite support agencies. Supplies and equipment were being maintained in onsite emergency cabinets (Section 1.d).

- Inspections of the casks and pad were being performed at the required intervals. The temperature monitoring system was operational. Records demonstrated that cask temperatures had remained within Technical Specification limits. The 5-year interior cask inspection effort had been completed with no adverse conditions identified that could affect long term storage of the spent fuel (Section 1.e).

- The corrective action system was being used to capture issues and document corrective actions. All corrective action reports reviewed had been adequately resolved. No adverse trends were identified (Section 1.f).

- Internal reviews and audits were being conducted as required. Personnel performing these reviews and audits were well qualified and were current with training. A review of the audit reports and the annual reports of the ISFSI Safety Review Committee indicated a very strong oversight of ISFSI activities was being implemented by the licensee. Audit findings were being adequately resolved (Section 1.g).

- Records were being maintained in duplicate storage as required by 10 CFR Part 72 (Section 1.h).

- Revisions to the FSAR included a number of changes related to the termination of the Part 50 license and the dismantlement of the reactor facility and cooling tower. The controlled area was reduced from 300 meters to 200 meters based on actual radiation data collected around the site. The ISFSI decommissioning cost estimates were revised based on the uncertainty with the opening of a permanent repository by the Department of Energy (Section 1.i).

- Aging management programs were adequately implemented at the ISFSI related to the concrete casks and pad, the impact limiter for the transfer station, and the 5-year cask interior inspection (Section 1.j).

Review of 10 CFR 72.48 Evaluations (60857)

- All safety screenings had been performed in accordance with plant procedures. No safety evaluations had been required since the last NRC inspection (Section 2).

Report Details

Summary of Facility Status

The spent fuel from the Trojan Nuclear plant is stored at the Independent Spent Fuel Storage Installation (ISFSI) located adjacent to the area where the Trojan reactor was originally located. The reactor facility was radiologically remediated to releasable limits and demolished. The reactor site was released by the NRC from radiological controls under the Part 50 license on May 23, 2005. The ISFSI is maintained under a site-specific NRC Part 72 license. A tour of the ISFSI area and review of site records found the facility to be in good physical condition. Radiation levels were within acceptable levels, consistent with expected dose rates for an ISFSI. The facility was staffed primarily by personnel who had worked at the Trojan site when it was an operating reactor facility. This staff has continued to maintain the spent fuel in a safe configuration and have established, through a strong procedural and quality assurance process, the necessary documentation and records that confirm compliance with NRC regulations and the site license.

1 Away from Reactor ISFSI Inspection Guidance (60858)

1.1 Inspection Scope

The ISFSI inspection included review of selected records and interviews with site personnel to verify ISFSI operations were in compliance with the Trojan License SNM-2509 certificate of compliance and Technical Specifications, Amendment 6, and the Final Safety Analysis Report (FSAR), Revision 9. A tour of the ISFSI was conducted to confirm the facility was being maintained in good physical condition for the safe storage of the spent fuel.

1.2 Observations and Findings

a. Site Tour of the ISFSI

A tour was conducted of the ISFSI area to assess the condition of the casks, pad area, and security fences. The concrete casks and facility were in good condition. No flammable or combustible materials were stored inside the ISFSI. Sufficient radiation dosimeters were located around the ISFSI to provide adequate data to demonstrate compliance with regulatory limits in 10 CFR 72.104. The ISFSI area was properly posted with signs in accordance with 10 CFR Part 20 regulations related to radiation areas and radioactive materials areas.

b. Organization and Training

Requirements related to ISFSI staffing were included in the Technical Specifications and the FSAR. Technical Specification 5.2.1 required an ISFSI organization consistent with the FSAR or the Quality Assurance Program Topical Report. Technical Specification 5.3.1 required each member of the organization to meet or exceed the minimum qualifications as described in the FSAR. The FSAR sections applicable to these two Technical Specifications were Section 9.1, "*Organizational Structure,*" Table 9.1-1, *"ISFSI Staffing Qualifications – Operations Organization,"* and Figure 9.1-1, "*ISFSI Organization.*" In addition, FSAR Section 9.1.2 referenced ANSI Standard N18.1-1971, "*Selection and Training of Nuclear Power Plant Personnel,*" and required each member of the ISFSI staff to meet or exceed the ANSI requirements.

The licensee provided a current ISFSI organization chart dated April 2010. The organization chart was consistent with Figure 9.1-1 of the FSAR. Personnel listed were experienced and qualified in the areas required by FSAR Section 9.1.1.2, "*Operating Organization*." The ISFSI

Manager, located onsite, reported to the Vice President, Nuclear & Power Supply/Generation. Site personnel reported to the ISFSI Manager. Support staff were available, either onsite or from corporate, to provide expertise in all the technical areas listed in FSAR Section 9.1.1.1.1, *"Support Staff."* Nuclear oversight, provided through the quality assurance organization and the ISFSI Safety Review Committee (ISRC), provided a comprehensive review of site activities. The ISRC consisted of several senior personnel well qualified to perform oversight activities in the areas important to ISFSI operations and the safe storage of spent fuel.

Several individuals were selected for review of their qualification records to verify they met the requirements in ANSI N18.1-1971. The qualifications of the individuals reviewed exceeded the ANSI requirements. The current Trojan organization included personnel, most of which, had been employed by Portland General Electric (PGE) during the time the Trojan facility was an operating nuclear generating station. These individuals have many years of nuclear experience and have been the subject of numerous years of NRC inspections. This experience was evident in the quality of records being maintained and the ability to efficiently respond to NRC requests for information that demonstrated continued compliance with NRC regulatory and licensing requirements.

FSAR Section 9.1.2 required personnel who operate equipment or controls that are identified as important-to-safety to either be trained and certified in accordance with the *Certified ISFSI Specialist Training Program (PGE-1072)* or be under the direct visual supervision of a person who is trained as a certified ISFSI specialist. The daily operations at the ISFSI currently do not involve operations of important-to-safety equipment, which is listed in the FSAR, Section 3.3.3, *"Protection by Equipment and Instrumentation Selection."* However, the training program is being implemented as if important-to-safety equipment operations were part of the routine operations. This keeps the staff proficient and cognizant of which components are important to safety and require special attention.

The Trojan training program is described in Procedure TIP 40, *"General Training,"* Revision 7. This procedure defined the site requirements for general employee training for unescorted access to the protected area and radiologically controlled area, contractor radiation protection training requirements, and the certified ISFSI specialist training. Training was required for unescorted access to the ISFSI by FSAR Section 7.5.3.2.8, *"Training."* Initial training, annual retraining, quality assurance orientation, on-the-job training, and required reading were included in the licensee's training program. Provisions for visitor briefings were also included. Forms were developed for documenting completion of training and providing input to the instructors related to the students' opinions of the effectiveness of the training.

The list of completed training by each of the ISFSI staff was reviewed. All site personnel had completed the required training for 2009. The required training topics covered in the annual retraining were reviewed. Training was provided each quarter on selected topics. For the 2009 retraining, the topics covered emergency preparedness, ISFSI operations, ISFSI regulations, and ISFSI fundamentals. Good records were established documenting the topics covered for each quarter. During discussions with selected individuals, it was noted that the staff was aware and knowledgeable of current issues ongoing with ISFSIs throughout the industry. Through interactions with the cask vendor and industry counterparts, the licensee's staff was able to knowledgeably discuss several industry issues that related to the long-term storage of spent fuel.

c. Radiation Protection

A radiation protection program was required by Technical Specifications 5.5.2 and 5.5.4. This program is discussed in FSAR Section 7.5, *"Radiation Protection Program,"* and established

controls to limit onsite worker exposure and to monitor annual dose to the public. NRC regulations in 10 CFR 72.104 limit the dose to any real member of the public beyond the controlled area boundary to 25 mrem/yr.

The licensee was implementing a radiation protection program using the Trojan ISFSI Procedures (TIP) 13 series. TIP 13, *"ISFSI Radiation Protection Program,"* Revision 6 documented the licensee's program for controlling and minimizing radiation exposure to company personnel and members of the public within the facility. This procedure incorporated numerous topical areas, including requirements related to training and qualifications, As Low As Reasonably Achievable (ALARA) planning and responsibilities, radioactive waste management, dose controls, area posting requirements, dosimetry, storage of radioactive material, instrumentation, and conduction of surveys. Provisions were also included for dealing with radiological incidents that had the potential to violate federal regulations or involved a serious breakdown in the effectiveness of the radiation protection program.

Since the last NRC inspection, three revisions to TIP 13 had been issued. These revisions were reviewed to verify the changes had not reduced the commitments or effectiveness of the program. The licensee had performed a 72.48 screening of each of the revisions to the procedure. The changes were primarily editorial or format changes to improve readability. Several changes were intended to better characterize the conditions at the ISFSI and delete information that related to the Part 50 license, which had been terminated. Changes to 10 CFR Part 19 and Part 20 that became effective in 2008 were incorporated into the procedure.

Procedure TIP 13-2, *"Radiation Dose Monitoring,"* Revision 2, provided the licensee's process for monitoring and recording personnel doses required by FSAR Section 7.5.3.2.6, *"Personnel Monitoring."* This procedure, which discussed the issuance and control of personal thermoluminescent dosimeters (TLDs), also provided instructions on extension of administrative doses, issuance of emergency TLDs, response to an employee who has voluntarily made a declaration of pregnancy, and initiation of an investigation or assessment related to a personal exposure or loss of a TLD. Anyone with access to the radiologically controlled area, which is located around the ISFSI casks, is assigned a TLD. In 2009, 27 individuals were assigned TLDs, including contractors and visitors. No one recorded a detectable exposure on their assigned TLD. In 2008, 30 individuals had been assigned TLDs. No one received a detectable exposure. In 2007, 28 TLDs were issued. One individual recorded a dose on the TLD. Investigation into the exposure determined that the individual's dose was due to a recent nuclear medicine procedure and not to any exposure at the ISFSI. In 2006, 29 dosimeters were issued with none of the TLDs recording any dose. The licensee was providing the required annual report of individual occupational radiation dose in accordance with 10 CFR 20.2206(b).

Procedure TIP 13-3, *"ISFSI Radiological Surveys,"* Revision 1, provided a description of the direct radiation and contamination surveys performed at the ISFSI. Quarterly surveys, as required by FSAR Section 7.5.3.2.5, *"Area Surveys,"* were performed of the normally accessible areas of the ISFSI. Records for the first quarter 2010 were reviewed. Radiation readings were taken at 48 points within the ISFSI protected area fence. Dose rates ranged up to 1.5 mrem/hr (1500 µR/hr) at locations within the interior areas of the ISFSI where the individual taking the reading was surrounded by the casks. The hottest spot was on Cask E-11, which had one location that read 2.6 mrem/hr. Along the inner protected area fence, dose rates ranged from 35 µR/hr to 310 µR/hr. Areas outside the ISFSI protected area fence (outer fence), but in the general area of the ISFSI, ranged from 10 to 90 µR/hr. Typical background readings were around 7 µR/hr. During the tour of the ISFSI area, radiation levels recorded by the NRC inspectors ranged from 40 µR/hr to 68 µR/hr along the outer protected area fence on the south side. These readings were consistent with the licensee's survey results.

Contamination surveys were performed of the vents for one-fourth of the concrete cask each quarter. Both a top vent and a bottom vent were checked. For the first quarter 2010, all survey results were background. The licensee stated that no contamination has been found on the vents during previous surveys.

Monitoring of area and environmental radiation levels was required by FSAR Section 7.6, *"Estimated Off-Site Collective Dose Assessment*," which required TLDs to be located at the perimeter of and in the controlled area near the concrete casks. For the TLDs monitoring the controlled area and perimeter of this area, the licensee was using Procedure TIP 14, *"Trojan ISFSI Radioactive Effluent Control Program and Radiological Environmental Monitoring Program,"* Revision 7. The controlled area was 200 meters from the ISFSI. Part of this area extended out into the Columbia River. Portland General Electric had a written agreement in place with the Coast Guard that provided for the removal of personnel from the controlled area in the Columbia River should that be necessary due to radiation levels. The nearest real person to the ISFSI is approximately 660 meters.

Environmental monitoring data for 2009 was reviewed. The data being collected by the licensee demonstrated compliance with NRC Part 72.104 radiation limits. The TLDs were located at various site locations, including the eight sectors around the ISFSI. The following table provides the 2009 results for the eight sectors plus the two controls.

Number	Direction	Location	2009 Dose*
1	S	200 m at ground level in direct line with ISFSI	21 mR/yr
2	SW	200 m at ground level in direct line with ISFSI	5 mR/yr
3	W	195 m at ground level in direct line with ISFSI	17 mR/yr
4	NW	170 m on other side of ridge	29 mR/yr
5	N	200 m on other side of ridge	2 mR/yr
6	NE	130 m on other side of ridge	30 mR/yr
7	SE	100 m on ridge above top of casks by about 20 ft	57 mR/yr
16	E	30 m on ridge above top of casks by about 20 ft	540 mR/yr
17	N/A	Field control – fence south of lower gate guard house	65 mR/yr
18	N/A	ISFSI control – on TLD rack in TSC building	68 mR/yr

* Net mR is the reported TLD value minus the field or ISFSI control, whichever is greater

Dosimeters 1 through 6 provided representative doses at the controlled area boundary. Based on the highest of these dosimeters (i.e., 30 mR/yr for TLD 6), the licensee calculated that for a 2,080 hours occupancy time per year, the dose to an individual would be 7.1 mrem. No residents live near the controlled area boundary. Occupancy time used for the calculations of public dose at the controlled area boundary and the nearest real member of the public are discussed in FSAR Section 7.6.2, *"Analysis of Multiple Contributions."* The nearest resident lives 660 meters away. As can be seen from the TLD results, the dose to the nearest resident would not exceed the 25 mrem/yr limit in 10 CFR 72.104 due to the distance from the ISFSI. Based on the NRC survey at various locations from the ISFSI during the walking tour of the site and the environmental TLD results, the dose rates at 660 meters would approximate background levels.

The TLD 16 is located above the top of the casks on the ridge and recorded 540 mR for 2009. The dosimeter is approximately 20 feet above the top of the casks and near to the ISFSI pad. The steel lids on the top of the casks do not provide as much shielding from the spent fuel as the concrete that shields the sides. As such, a higher dose is expected above the casks as shown with this TLD.

d. Emergency Planning

Revisions to the licensee's emergency planning program since the last NRC inspection in July 2006 were reviewed. The licensee's emergency plan, PGE-1075, had been revised three times during that time period. Revisions 7 through 9 were reviewed and verified to not have reduced the effectiveness of the licensee's emergency response.

Required emergency plan drills were listed in Section 7.1.2 of the emergency plan. Required drills included an annual fire drill, an annual medical drill, an annual radiological/health physics drill, and a biennial exercise. The licensee had successfully conducted the required drills since the last ISFSI inspection. Drill packages for the medical drill of 2008, the fire drill of 2008, the radiological/health physics drill of 2008, the biennial exercise for 2007, and the biennial exercise for 2009 were selected for review. The selected drills met the objectives of site Emergency Plan Step 7.1. The drill packages included a description of the drill that was conducted, a timeline, a synopsis, and a drill critique. Drill deficiencies and areas for improvement were identified and placed into the licensee's corrective action program for resolution. Offsite support agencies, including the Columbia River Fire and Rescue, the Oregon Department of Energy, and the Columbia County Emergency Management, were notified of the drills/exercises and offered the opportunity to participate consistent with 10 CFR 72.32(a)(12)(ii). The Columbia River Fire and Rescue participated in the biennial exercise of 2007.

Emergency Plan Table 7-1 required semiannual verification of offsite agencies' phone numbers. Procedure EPIP 72-03, *"Emergency Preparedness Program Maintenance,"* Revision 10, Attachment 1, "*Emergency Preparedness Program Maintenance,*" listed the agencies to be contacted and required a signoff confirming contact with the agency. The semiannual audit per Attachment 1 for the years 2007 through 2009 were verified to have been completed.

A review of the emergency response personnel training records was conducted to verify that the licensee's emergency response organization was currently qualified. EPIP 72-03, Attachment 1, "*ERO Staffing Verification,*" dated March 10, 2010, documented that all emergency response personnel were current on their qualifications.

The annually required review of the licensee's emergency plan and letters of agreement per Step 7.2.1 of the emergency plan was performed. Years 2008 and 2009 were selected for compliance with the requirement. The licensee provided a completed EPIP 72-03 Attachment 2, "*Emergency Plan and Implementing Procedures Review,*" with supporting documentation that verified that the reviews were performed and agreements were current as required.

Emergency Plan Table 7-1 required the emergency supply equipment be inventoried semiannually. Trojan Procedure EPIP 72-03, Attachment 1, "*Emergency Equipment Inventory/Operational Check,"* listed the items required to be in the emergency kits. The selected periods of the 1st half 2007, 2nd half 2009, and 1st half 2010 were reviewed, verifying that the semiannual check was performed. The inspector performed an audit of one of the licensee's emergency kits and confirmed that all the required equipment was available and ready for use.

The licensee's emergency plan was verified to have a provision for notifying the public of information as required by 10 CFR 72.32(a)(16). This was accomplished through EPIP 72-01, "*Initial Response Actions,*" Revision 11, Step 6.2.9, that required notification to PGE media relations who would be instructed to coordinate public information with Oregon and Columbia County through a press release.

e. Visual and Thermal Monitoring

Technical Specification 5.5.3.a required weekly visual inspection of air inlet vents for the concrete casks to verify the vents were clear of any blockage. Procedure TIP 12, "*Monitoring of the Concrete Cask System*," Revision 8, Attachment 1, incorporated the Technical Specification requirement for weekly visual inspection of all concrete cask air vents for blockage. Weekly records were reviewed for the months of June 2007, December 2008, and October 2009. The records were complete and demonstrated compliance with the weekly visual inspection requirement for the months selected.

Technical Specification 5.5.3 required daily monitoring of the air outlet vent temperatures for the concrete casks. If an outlet vent was greater than 180^0 F, then it is possible that an inlet and/or outlet vent had become blocked requiring corrective action. Licensee Procedure TIP 17, "*Concrete Cask Thermal Monitoring System,*" Revision 6, Attachment 1, required recording concrete cask outlet temperatures obtained from a digital readout provided by the plant's thermal monitoring system. Attachment 1 also recorded the difference between the outlet vents and the ambient temperature to determine if any cask had an unexplained delta requiring corrective action. The months of June 2007, Dec 2008, and October 2009 were selected for review. Documentation on Attachment 1 provided evidence that the Technical Specification temperature limits had not been exceeded. The highest reading observed was 141^0 F on Cask E-11 in June of 2007. Should the automatic collection system fail, the licensee had instrumentation readily available to manually obtain individual concrete cask vent temperatures.

FSAR Section 9.7.6 required periodic inspection of the concrete casks, ISFSI pad, and transfer station to ensure structural integrity. An annual inspection program was implemented by the licensee using Procedure TIP 09, *"Structural Inspection Program*," Revision 6. Procedure TIP 09 discussed the annual visual inspection of all the casks, the storage pad surface, service pad surface, transfer pad surface, and transfer station. The cask vertical surfaces and the inlet/outlet screens were visually inspected for defects and irregularities. The definition section of the procedure provided clear definitions of defects and irregularities. For the concrete casks, a defect of the concrete surface was scabbing, spalling or cracking larger than approximately ½ inch in diameter or width with a depth greater than ¼ inch. For the pad, a defect was defined as visible signs of settling, movement, or holes/large cracks greater than ½ inch across and extending to the rebar. Ten casks, CC-6 through CC-15, were selected for review for the years 2007 through 2009. All selected casks were inspected each year as required. Only small irregularities such as localized pitting were noted on the exterior of the selected casks. All irregularities were repaired with 790 RTV silicone.

FSAR Section 9.7.7 required a 5-year inspection of the concrete cask's interior to identify any degradation present. This was performed on August 12, 2008, using Procedure TIP 18, "*Concrete Cask Interior Inspection Program*," Revision 2. The inspection was performed on Cask CC-03, the first concrete cask placed in service. The concrete cask interior annulus area and the interior areas of the vents were inspected by use of a boroscope and video recorder. The concrete cask's inlet and outlet vents and annulus areas were identified to be clear of any airflow blockage. The inspection report results did not identify any degradation mechanisms affecting system performance.

Required annual physical inventory of the spent fuel was performed using Procedure TIP 09 Attachment 1, *"Data Sheet-Annual Inspection of the Concrete Cask System,"* by documenting that the concrete cask cover bolt lock wires were still secure. The inventory results were

reviewed for 2007 through 2009 for 10 selected casks, CC-6 through CC-15. The records reviewed confirmed compliance to 10 CFR 72.72(b) regulations to perform an annual physical inventory.

f. Condition Reports

The licensee provided a list of the condition reports initiated in the corrective action system since the last inspection. The licensee had initiated 15 Corrective Action Reports (CARs). Six CARs were selected for additional review that related to ISFSI issues. This included issues related to procedures, training, the security alarm station, purchase orders, and the structural analysis for the damaged fuel container. All CARs reviewed were determined to be adequately resolved. No adversely developing trends were identified in the condition reports reviewed.

g. Internal Reviews and Audits

Oversight of activities at the Trojan site was accomplished by periodic audits/reviews and activities associated with the ISFSI Safety Review Committee (ISRC). These programs are discussed in the Quality Assurance Program (PGE-8010), FSAR Sections 9.6.1, "*Independent Safety Reviews"* and Section 9.6.2 *"ISFSI Safety Review Committee."* The programs implemented at Trojan were performed in accordance with several documents, including the site Quality Assurance Plan, Procedure TIP 02, *"ISFSI Safety Review Committee Charter,"* Revision 2, Procedure TIP 03, *"Independent Safety Reviewer Charter,"* Revision 2, and Procedure TIP 54 *"Audits,"* Revision 2.

The licensee had developed a list of required audits and assessments as Attachment 1 to Procedure TIP 54. This list provided the frequency requirement for the audit and the reference to the document requiring the audit. An audit checklist was also being maintained that could be sorted by date to track upcoming audits. Qualification requirements for auditors was established in Procedure TIP 55, *"Qualification of Auditors,"* Revision 0, and Procedure TIP 59 *"QC Inspection Controls and Personnel Qualifications,"* Revision 0. The licensee provided a list of personnel who were qualified to perform various audits. This list was compared against the various qualification requirements. The persons listed as auditors were qualified.

The audits conducted of the ISFSI operations for 2006 through 2009 were reviewed. The individuals performing the audits were well qualified and experienced. Areas reviewed in the audits included topics such as Technical Specification compliance, radiation protection, training, emergency planning, fire protection, and the corrective action program. The 2008 audit involved an in-depth review of the emergency planning program. No significant issues affecting the safe storage of the spent fuel were identified during the audits. The audit reports represented a thorough review of the programs to verify compliance with NRC requirements and to confirm that site procedures were being properly implemented. Findings were entered into the corrective action program.

Audits were also conducted of vendors providing services related to activities that were covered by the quality assurance program. This included companies providing calibration and maintenance of equipment such as the seismic monitoring system, survey instruments, and personnel dosimetry. An approved suppliers list was maintained by the licensee listing the companies that had been successfully audited. Most of the audits were conducted on a 3-year cycle.

Audits of two companies were reviewed in detail. Audit Report 08-01 of Global Dosimetry Services and Audit Report 08-03 of Engdahl Enterprises were reviewed. Global Dosimetry Services provided personnel and environmental dosimetry services. The audit was conducted June 21-22, 2008. This audit reviewed numerous programs, including software controls,

procurement controls, calibration program, traceability of calibration standard to the National Institute of Standards and Technology (NIST), material controls, storage, and traceability to the National Voluntary Laboratory Accreditation Program (NVLAP).

Engdahl Enterprises provided earthquake monitoring equipment calibration services. The audit was performed on July 9-10, 2008. The audit covered numerous topics, including calibration standards, environmental controls during calibration, calibration procedures, out-of-tolerance conditions, training and qualifications of calibration personnel, records, and storage.

Activities of the ISFSI Safety Review Committee (ISRC) were reviewed, including the annual reports for 2006 though 2009. The ISRC Charter is established in Procedure TIP 02, *"ISFSI Safety Review Committee Charter,"* Revision 2. The charter defined the purpose and responsibilities of the ISRC, membership requirements, training and qualification requirements for members, topical areas to be reviewed by the ISRC, and meeting/quorum requirements. The assigned members to the ISRC were documented in writing and approved by the ISRC Chairman and the Corporate Executive Responsible for Trojan on TIP 02, Attachment 1, *"ISRC Membership Training and Qualification Requirements."* The five members were well qualified individuals to perform the role of ISRC members. The ISRC meetings discussed numerous topics, including staffing level and upcoming retirements, that could result in loss of corporate knowledge, site demolition activities, financial status of ISFSI funding, site security issues, recently conducted audit findings, and implementation of the site quality assurance program. Good discussions were documented in the annual meeting reports indicating the ISRC members were taking a broad look at site activities.

Independent Safety Reviewers were designated by the licensee to perform independent safety reviews, approve 10 CFR 72.48 evaluations, and approve changes to documents specified in the FSAR Section 9.6.1. The Independent Safety Reviewers functioned under the charter established in Procedure TIP 03, *"Independent Safety Reviewer Charter,"* Revision 2. This charter established qualification and training requirements, defined the documents requiring review by the Independent Safety Reviewers, and established documentation requirements for the review and approval. The ISRC chairman reviewed the individual's qualifications and assigned the technical areas the individual was qualified for. This was documented in Attachment 1, *"Independent Safety Reviewer Training and Qualification Form."* A memo to the Site Vice President dated January 27, 2010, identified the personnel qualified as Independent Safety Reviewers. All individuals had previous experience at Trojan when it was an operating plant and were very familiar with the site procedural processes.

h. Records

The ISFSI records providing a complete inventory of all the spent fuel assemblies now at the ISFSI were kept in duplicate in a file system onsite at the Technical Support Center Vault and at Iron Mountain in Beaverton, Oregon, in a storage facility. Procedure TIP 51, "*Quality Assurance Records Management Program,*" Revision 3, was consistent with 10 CFR 72.72(a) that required storage of all records for spent fuel and reactor-related GTCC waste for the life of the ISFSI plus 5 years.

The licensee had established an organized scheduling system that tracked all upcoming required surveillances, maintenances, audits, training, and commitments. This ISFSI Activities Database tracked activities required by the certificate of compliance, license, SAR, and commitment to the NRC.

i. Revisions to the FSAR

Three revisions to the FSAR had been issued since the last NRC inspection. These were Revision 7 dated January 26, 2007, Revision 8, dated November 12, 2007, and Revision 9 dated September 29, 2009.

Revision 7 included changes to the FSAR to delete the cooling tower, which had been imploded on May 21, 2006. Revision 7 also relocated the controlled area from 300 meters down to 200 meters. This change was based on the licensee's review of actual radiological data collected over several years that showed the actual radiation levels around the ISFSI were lower than those previously predicted through modeling using the assumption that all casks were loaded with design basis fuel. Design basis fuel has the maximum burn-up and cooling time that conservatively bounds the actual burn-up and cooling time for all the spent fuel. The controlled area is established to satisfy two requirements in 10 CFR Part 72. For accident conditions, 10 CFR 72.106 defines dose limits at the controlled area boundary. For normal operations, 10 CFR 72.104 defines the dose limits. The controlled area is where the licensee has authority over activities and can remove members of the public or has agreements in place with the responsible agencies to vacate the area if requested by the licensee. PGE requested the reduction in the owner controlled area by letter dated May 23, 2005 (ML051460408). The NRC approved the change with the issuance of Amendment 6 to the license (ML06790069) dated March 17, 2006. Reducing the controlled area boundary removed the Portland & Western Railroad right of way and reduced the area extending into the Columbia River.

Revision 8 to the FSAR increased the estimated costs for maintaining the ISFSI and for shipping the spent fuel to DOE. The original estimate for the ISFSI decommissioning discussed in Revision 0 of the FSAR assumed a decommissioning completion date of 2018 and a cost of $7.9 million (1997 dollars). In Revision 6 of the FSAR, the date for completion of ISFSI decommissioning moved to 2023 based on information released by DOE concerning the delay in opening of a permanent repository. The cost estimate for decommissioning was not changed in Revision 6. Revision 8 revised the ISFSI decommissioning completion date to 2031 and increased the estimated decommissioning cost to $11.6 million (1997 dollars). This was based on a new date issued by DOE of February 2007 as the estimated opening of the repository. Annual costs to maintain the ISFSI were estimated to be $3.7 million (1997 dollars). Revision 8 also changed the description of the ISFSI Specialists qualifications, revised wording to reflect the removal of the Trojan power block from the site, and deleted the reference to the natural gas pipeline and natural gas turbine combined cycle power plant. The natural gas pipeline was never extended to the site as previously planned.

Revision 9 to the FSAR clarified that a loaded failed fuel can was designed to be lifted by its lid using a handling tool. But a loaded damaged fuel container design did not meet code requirements for lifting by its lid. Fuel in a damaged fuel container required that the lid be removed first and then a normal fuel assembly handling tool be used to remove the fuel assembly. This special restriction on handling damaged fuel containers is important to DOE for future handling of the fuel at a permanent repository. In order to ensure an awareness of this restriction, the licensee included in the spent fuel record book for Canister MPC-27 a statement that the damaged fuel container is not to be lifted by the lid lifting bolt, but must be opened and the fuel removed prior to lifting the container out of the canister. The Holtec drawing, included in the fuel record book, will be revised to reflect this change. Placing this notation in the fuel record book, which will be forwarded to DOE along with the spent fuel, provided some level of assurance that the container will be properly handled. The licensee also tagged the lifting tool concerning the restriction.

Revision 9 established a temperature restriction on the multipurpose canister lift cleats. Use of the lift cleats is limited to temperatures above 0ºF. Revision 9 also revised the

decommissioning cost estimates. An additional 3-year delay was incorporated into the completion schedule of the ISFSI decommissioning and the dollar values were converted to 2008 dollars. The bases for the estimates were also changed concerning the number of concrete casks that would require burial as low level waste. Prior to Revision 9, it was assumed that all the concrete casks would be disposed of as low level waste. The new decontamination and burial estimates now assume only one of the concrete casks will require burial. This assumption was based on the cleanliness of the outer surface of the steel canisters after they were removed from the spent fuel pool and loaded into the concrete casks based on contamination surveys conducted during loading. The licensee also assumes that any contamination that may be left in the concrete casks after the canisters are removed can be cleaned with minimal problem. The licensee assumed that neutron activation of the concrete casks will be minimal, based on a contractor study performed in September 2008. This study considered the concrete, inner steel shell and rebar, assuming a 40-year storage period. The estimate for burial costs for the concrete casks was reduced from $3.673 million (1997 dollars) in Revision 8 of the FSAR to $0.508 million (2008 dollars) in Revision 9 of the FSAR. The overall estimate provided in Revision 9 of the FSAR for the ISFSI decommissioning when completed in 2034 was $12.6 million (2008 dollars).

j. Aging Management

Aging management has become an issue with the recent announcement by DOE that a permanent repository will be delayed until additional options for disposal of spent fuel are reviewed. Trojan had already assumed that removal of the spent fuel and decommissioning of the ISFSI would not be completed until 2033. This now appears to be optimistic. As such, issues related to the long-term storage of spent fuel at ISFSIs are being re-evaluated by the NRC. Discussions were held with the licensee staff concerning aging problems that are currently being encountered at the ISFSI and potential problems that could occur with long-term delays in removing the spent fuel from the site. Routine annual ISFSI component inspections of the concrete casks, ISFSI pad, transfer station, and transfer cask have not identified any significant defects. Minor shallow holes (less than ½ inch diameter and ¼ inch deep) in the concrete surfaces on the casks and the pad have been filled with silicone sealant. The transfer station has several rusted areas that will need repair in the future. FSAR Section 9.7.7, *"Concrete Cask Interior Inspection Program,"* required an inspection of the first concrete cask placed in service at 5-year intervals. The first inspection was conducted August 12, 2008, and submitted to the NRC by letter dated September 4, 2008 (ML082520016). The inspection used a small camera (videoprobe) and observed the condition of the outer surface of the canister holding the spent fuel, the interior cask liner plate surfaces, and interior areas around the carbon steel vents. Insects, small amounts of dirt, and light rust were observed in several locations. White residue of calcium from the concrete was observed in several places in the outlet vent inner plenums. The outer surface of the stainless steel spent fuel canister showed no signs of degradation after 5 years in storage.

The licensee has a unique design at their ISFSI that provided the ability to remove the canisters from the concrete cask and place the canister into a new concrete cask or into a shipping cask. This transfer station, located on the western portion of the ISFSI pad, was designed with an impact limiter embedded in the transfer station foundation mat to mitigate the consequences of a hypothetical canister drop during transfer between casks. This steel impact limiter is filled with IL-2 foam which required testing. Tests were completed in 2000, 2004, and 2009. Tests were now required at 10-year intervals (2019, 2029, and 2039). Foam samples for testing had been maintained by the licensee. Three test samples and two spares remain. The foam samples were stored in weather tight containers. During Audit AP 2007-I-011, conducted between September 10 and October 10, 2007, the auditor identified that the foam samples were being stored inside a heated building and not subject to the same weathering conditions that the impact limiter experienced. The licensee relocated the foam samples to an

outside location near the impact limiter and contacted the foam manufacture to discuss the impact on the foam test results due to the difference in storage. The licensee had developed Procedure TIP 19, *"Aging Surveillance Testing Program for Impact Limiter IL-2 Foam."* In an audit in 2009, (AP-2009-015), the auditors presented a concern that, with the recent announcement of delays in a permanent repository, the number of foam sample specimens may become a problem when extending the license for the ISFSI. Currently, enough samples were available for testing through 2059 if the two spare samples were used. Options considered expanding the duration between testing or to trend the test results with the intent to project the performance of the foam beyond the last sample test. The licensee contacted the foam manufacturer and it was decided to divide the five samples into halves, thereby doubling the supply of test samples. The three tests completed to date have not indicated any problems with the foam and its ability to perform its function during a cask drop accident.

A discussion was held concerning the potential for the helium to eventually leak out of the casks due to a crack in the welds. The licensee felt that if this occurred it would be well into the future due to the quality controls placed on the welding and the nondestructive testing of the welds. Additionally, the fuel will have cooled significantly. Once the helium leaks out to a point of equilibrium with the outside pressure, there should be no driving force to continue the helium leakage. This would be generally true, except that over time, as the fuel continues to cool, contraction of the helium may pull some air back into the canister. The effects on the spent fuel would probably be insignificant. No practical way was identified to detect a reduced helium content in the canister or a very small leak of helium at the concentrations that would occur from a weld defect occurring over a long period of time.

Boral degradation may be an issue over the long period of the cask sitting at an ISFSI. This may need to be considered.

1.3 Conclusions

The ISFSI facility was being maintained in good physical condition and was properly posted.

The ISFSI organization was in compliance with FSAR requirements for staffing and qualifications of personnel. Training was being performed and documented for site personnel to meet the requirements of the Certified ISFSI Specialist Training Program and to provide the required radiation protection training for access to the ISFSI.

The site radiation protection program was being implemented to provide personnel radiation protection and to verify radiation conditions at the ISFSI were in compliance with NRC radiation standards. Environmental dosimeters were adequately located around the ISFSI to demonstrate compliance with exposure limits to the public.

The emergency planning program was being maintained current. Drills, exercises, and training were performed in accordance with requirements in the emergency plan. Training and participation in drills/exercises were offered to offsite support agencies. Supplies and equipment were being maintained in onsite emergency cabinets.

Inspections of the casks and pad were being performed at the required intervals. The temperature monitoring system was operational. Records demonstrated that cask temperatures had remained within Technical Specification limits. The 5-year interior cask inspection effort had been completed with no adverse conditions identified that could affect long-term storage of the spent fuel.

The corrective action system was being used to capture issues and document corrective actions. All corrective action reports reviewed had been adequately resolved. No adverse trends were identified.

Internal reviews and audits were being conducted as required. Personnel performing these reviews and audits were well qualified and were current with training. A review of the audit reports and the annual reports of the ISFSI Safety Review Committee indicated a very strong oversight of ISFSI activities was being implemented by the licensee. Audit findings were being adequately resolved.

Records were being maintained in duplicate storage as required by 10 CFR Part 72.

Revisions to the FSAR included a number of changes related to the termination of the Part 50 license and the dismantlement of the reactor facility and cooling tower. The controlled area was reduced from 300 meters to 200 meters based on actual radiation data collected around the site. The ISFSI decommissioning cost estimates were revised based on the uncertainty with the opening of a permanent repository by the Department of Energy.

Aging management programs were adequately implemented at the ISFSI related to the concrete casks and pad the impact limiter for the transfer station and the 5-year cask interior inspection.

2 Review of 10 CFR 72.48 Evaluations (60857)

2.1 Inspection Scope

Changes to the facility and procedures since the last inspection in June 2006 were reviewed to determine if the licensee had performed the required evaluations in accordance with 10 CFR 72.48.

2.2 Observations and Findings

Safety screenings and safety evaluations were performed in accordance with Procedure TIP 05, *"10 CFR 72.48 and other Regulatory and Licensing Basis Requirements,"* Revision 4. Several safety screenings were performed since June 2006, but none of the screenings required the additional level of analysis required by a safety evaluation. Several of the safety screenings were selected for review. No findings of significance were identified.

Training and qualification records for seven personnel approved to perform 72.48 screenings and evaluations were reviewed. All personnel met the current qualifications established in the licensee's 72.48 training program, Module T1-C-07-SG, *"10 CFR 72.48 Training Study Guide."*

2.3 Conclusions

All safety screenings had been performed in accordance with plant procedures. No safety evaluations had been required since the last NRC inspection.

3 Exit Meeting

The inspectors reviewed the scope and findings of the inspection during an exit meeting conducted at the conclusion of the onsite inspection on April 28, 2010. The licensee did not identify any information as proprietary that was provided to, or reviewed, by the inspectors.

SUPPLEMENTAL INSPECTION INFORMATION

PARTIAL LIST OF PERSONS CONTACTED

S. Beri, QA Engineer
B. Eder, ISFSI Lead Specialist
J. Fisher, ISFSI Manager
M. Kramberg, ISFSI Lead Specialist
K. Lehman, Administrative Assistant
J. Reid, ISRC Chairman
L. Rocha, ISFSI Specialist/Radiation Protection
C. Stroms, ISFSI Lead Specialist

INSPECTION PROCEDURES USED

IP 60857	Review of 10 CFR 72.48 Evaluations
IP 60858	Away From Reactor ISFSI Inspection Guidance

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Discussed

None

Closed

None

LIST OF ACRONYMS

ANSI	American National Standards Institute
ccpm	corrected counts per minute
CFR	*Code of Federal Regulations*
CoC	Certificate of Compliance
cpm	counts/minute
DOE	Department of Energy
DPM	disintegrations per minute
DSC	dry storage canister
EPIP	Emergency Plan Implementing Procedure
FSAR	Final Safety Analysis Report
FSS	Final Status Surveys
GTCC	greater than Class C
IP	Inspection Procedure
ISFSI	Independent Spent Fuel Storage Installation
ISRC	ISFSI Safety Review Committee
mR/hr	milliRoentgen per hour
mrem/hr	milliRem per hour
NVLAP	National Voluntary Laboratory Accreditation Program
NCV	noncited violation
NIST	National Institute of Standards and Technology
NRC	Nuclear Regulatory Commission
PAR	Publicly Available Records
PGE	Portland General Electric
TIP	Trojan ISFSI Procedure
TLD	Thermo-Luminescent Dosimeter
TS	Technical Specification
µR/hr	microRoentgens per hour