

Trojan Independent Spent Fuel Installation License Renewal

STAFF EVALUATION FOR THE ENERGY FACILITY SITING COUNCIL

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ACRONYMS USED IN THIS REPORT

ALARA	As Low As Reasonably Achievable
AMP	Aging Management Program
CDE	Committed Dose Equivalent
CFR	U.S. Code of Federal Regulation
EFSC	Energy Facility Siting Council
EPA	U.S. Environmental Protection Agency
EWEB	Eugene Water & Electric Board
FR	Federal Register
ISFSI	Independent Spent Fuel Storage Installation
LCA	License Change Application
LRA	License Renewal Application
MPC	Multipurpose Canister
NRC	U.S. Nuclear Regulatory Commission
NDCC	Oregon Nuclear Development Coordinating Committee
NTEC	Oregon Nuclear & Thermal Energy Council
OAR	Oregon Administrative Rule
ODOE	Oregon Department of Energy
OERS	Oregon Emergency Response System
ORS	Oregon Revised Statute
PAG	Protective Action Guidelines
PGE	Portland General Electric
PWR	Pressurized Water Reactor
SAR	Safety Analysis Report
SER	Safety Evaluation Report
SNC/BNFL	Sierra Nuclear Corporation/British Nuclear Fuels Ltd.
TEDE	Total Effective Dose Equivalent
TLD	Thermoluminescent Dosimeter
USDOE	U.S. Department of Energy

Contents

Executive Summary.....	1
1 Introduction	2
2 Procedural History	3
3 Description of the ISFSI.....	7
3.1 Facility Location & Site Boundary	8
3.2 ISFSI Components.....	8
3.2.1 ISFSI Pad	9
3.2.2 Multipurpose Canisters (MPCs)	9
3.2.3 Storage Cask.....	10
3.2.4 Transfer Cask.....	10
3.2.5 Transfer Station.....	10
3.2.6 Security facilities	10
4 Evaluation of Applicable Requirements in OAR chapter 345	10
4.1 OAR 345-026-0170(2): Notification of Incidents.....	11
4.2 OAR 345-026-0330: Radiological Environmental Monitoring.....	12
4.3 OAR 345-026-0340: Security Plans for Nuclear Installations.....	14
4.4 OAR 345-026-0350: Emergency Planning for Nuclear Installations	16
4.5 OAR 345-026-0370: Standards for Council Approval of ISFSI Decommissioning Plan...	19
4.6 OAR 345-026-0390: Spent Nuclear Fuel Storage	22
4.6.1 OAR 345-026-0390(2): Capacity and Safety Standards	22
4.6.2 OAR 345-026-0390(3): Radiation Protection Program	25
4.6.3 OAR 345-026-0390(4): Transfer of Materials	26
4.6.4 OAR 345-026-0390(5): 10-year Report on Federal Repository	26
4.6.5 OAR 345-026-0390(6)(a) – (c), (e): Safety Analysis Report & Programs.....	28
4.6.6 OAR 345-026-0390(6)(d) Biennial Status Report.....	34
4.6.7 OAR 345-026-0390(6)(f): Contractors.....	34
5 Evaluation of Aging Management Review.....	34
5.1 Time-Limited Aging Analysis	35
5.1.1 MPC fatigue evaluation.....	35
5.1.2 Neutron absorber depletion evaluation	36
5.1.3 Transfer cask fatigue evaluation.....	36
5.1.4 Fuel cladding integrity evaluation.....	36
5.2 Aging Management Programs.....	36
5.2.1 Multipurpose Canister Aging Management Program.....	37
5.2.2 Concrete Cask Aging Management Program.....	38
5.2.3 Transfer Cask Aging Management Program	39
5.2.4 Transfer Station Aging Management Program	39
5.3 Tollgate Assessments	40
6 Conclusions and Recommendations.....	40

7 Bibliography 0

Attachment: Draft Proposed Revisions to OAR chapter 345, division 026

Executive Summary

The Trojan Nuclear Power Plant was a thermal nuclear plant located near the City of Rainier in Columbia County, Oregon that operated from 1976 to 1993. During decommissioning of the power plant, the certificate holder, Portland General Electric (PGE), transferred the spent nuclear fuel generated during the power plant's 17 years of operation to dry storage at an Independent Spent Fuel Storage Installation (ISFSI) constructed on a portion of the Trojan site. The ISFSI is intended to provide temporary storage of the spent nuclear fuel until the federal government takes possession of it for permanent disposal as required by the Nuclear Waste Policy Act of 1982.

The U.S. Nuclear Regulatory Commission (NRC), which regulates nuclear power plants and nuclear installations at the federal level, originally granted PGE a 20-year operating license for the ISFSI. Because there is still no permanent federal repository for spent nuclear fuel and other waste materials from commercial reactors, Portland General Electric (PGE) requested the NRC renew the license and authorize PGE to continue operating the ISFSI for an additional 40 years. The NRC approved the renewed license on August 9, 2019. This report provides the Oregon Department of Energy's review of the terms and conditions of the renewed license and recommendations to the Energy Facility Siting Council for rulemaking based on its findings.

No major alterations or repairs to the ISFSI were proposed or authorized as part of the license renewal process, but some changes to the terms and conditions of the ISFSI license and its associated Safety Analysis Report (SAR) were made. Of note, the revised SAR includes a new Aging Management Review that identifies how aging could affect ISFSI structures, systems, and components over time and proposed programs and describes activities to ensure the spent nuclear fuel can continue to be safely stored during the renewal term.

The Department's analysis of the provisions of the license renewal application, revised Safety Analysis Report, and the documentation of NRC's evaluation found that the license renewal process did not result in reductions to commitments or programs described in staff's previous evaluations of the ISFSI, and that while the parameters of some of the analysis have changed, there were no changes to the underlying design or assumptions that would affect the certificate holders compliance with OAR 345-026-0300 to 345-026-0390. Staff also found that the Aging Management Programs proposed by the certificate holder provide reasonable assurances that the ISFSI can continue to operate safely over the period of extended operation.

While no compliance issues were identified, staff does recommend that rule changes are needed to ensure that regulatory decisions regarding the ISFSI in the future are based on the most current information, and are consistent with changes in federal regulations that have occurred in the nearly 20 years since the staff published its 2002 Staff Evaluation. In general, these changes include:

- Clarifying the applicability of OAR 345-026-0300 to 345-026-0390 to the Trojan ISFSI specifically, and consolidating rules where possible.

- Removing references to the 2002 Staff Evaluation and previous versions of the ISFSI Safety Analysis Report as the regulatory basis for decisions regarding the ISFSI.
- Updating references to federal regulations, or replacing them with specific criteria, where appropriate
- Aligning criteria for when Council’s approval and review is required with federal regulations
- Replacing requirements for the Structural Inspection Program with the new Aging Management Programs

Draft proposed rules reflecting these changes are attached to this report. Staff recommends that Council adopt the proposed revisions prior to implementation of the new Aging Management Programs in 2022.

1 **Introduction**

This report provides the Oregon Department of Energy’s review of the terms and conditions of the renewed special nuclear materials license for the Trojan Independent Spent Fuel Storage Installation (ISFSI) issued by the US Nuclear Regulatory Commission (NRC) on August 9, 2019 and recommendations for rulemaking based on its findings.

As shown in figure 1 below, the ISFSI is located within the site of the former Trojan Nuclear Plant, in Columbia County, Oregon. The Trojan Nuclear Plant was an 1130-megawatt pressurized water reactor plant that operated from 1976 to 1993. During decommissioning of the power plant, the spent nuclear fuel generated during the 17 years the power plant was in operation was transferred to dry storage at the ISFSI.



Figure 1. Trojan Vicinity Map and Site Layout

Under Oregon law, the ISFSI is considered to be part of the Trojan facility and is subject to the terms and conditions of the Trojan Site Certificate, which the Council’s predecessor, the Nuclear and Thermal Energy Council issued to Portland General Electric (PGE) in 1971. As the Certificate Holder, PGE is responsible for the ongoing operation and maintenance of the ISFSI and is the certificate holder responsible for ensuring ongoing compliance with the Council’s rules, which are located in OAR chapter 345, division 026.

The US Nuclear Regulatory Commission (NRC) is the federal agency with licensing and regulatory authority over the ISFSI. Following a joint review with the Council, the NRC issued a 20-year license to PGE authorizing the construction and operation of the Trojan ISFSI in 1999. In 2017, PGE submitted a license renewal application to the NRC requesting to renew the license for an additional 40 years. The extended operating period was requested due to delays in the establishment of a permanent federal repository for spent nuclear fuel and other high-level commercial nuclear wastes. On August 9, 2019, the NRC issued the renewed license authorizing PGE to continue operating the ISFSI until March 31, 2059.

No major alterations or repairs to the ISFSI were proposed or authorized as part of the license renewal process, but some changes to the terms and conditions of the ISFSI license and its associated Technical Specifications and Safety Analysis Report (SAR) were made. Of note, the revised SAR includes an Aging Management Review that identifies how aging could affect ISFSI structures, systems, and components over time and proposed programs and describes activities to ensure the spent nuclear fuel can continue to be safely stored during the renewal term.

This report provides the Department's analysis of the provisions of the renewed license and its technical specifications to verify continued compliance with the requirements of OAR chapter 345, division 026 and makes recommendations for ensuring ongoing compliance and consistency with the new aging management activities approved as part of the renewed license. The document and associated draft rules are for information only and are not notice of rulemaking action by the Energy Facility Siting Council. The analysis and recommendations within are subject to change based on input from the Energy Facility Siting Council, staff, and stakeholders.

Section 2 of this report provides a procedural history of the Trojan site and the establishment of the ISFSI. Section 3 describes the major components of the ISFSI and the Trojan site. Sections 4 and 5 provide an overview of current Council rules applicable to the ISFSI and evaluates how ongoing compliance may be affected by the Aging Management Program approved as part of the renewed license. The report concludes with Section 6, which provides the Department's conclusions and recommendations for further action.

2 Procedural History

Portland General Electric commissioned the Bechtel Corporation to conduct a site evaluation to identify the site for a nuclear power plant in 1962. The former site of a Trojan Powder Company explosives manufacturing facility near Rainier, Oregon in Columbia County was selected as a result of that study (U.S. Atomic Energy Commission 1973).

On November 6, 1970, the Nuclear Development Coordinating Committee (NDCC) appointed by Governor McCall approved the construction of a nuclear power plant at the Trojan Site. The 1971 legislature enacted HB 1065, which established the Nuclear and Thermal Energy Council (NTEC). The law required NTEC to issue a site certificate to any power plant or nuclear installation that had been approved by the NDCC prior to its enactment, if the applicant agreed

to pay the necessary fees and abide by the terms and conditions of any applicable licenses, permits, certificates, and Council rules.¹ Governor McCall issued the site certificate for the Trojan site to PGE on July 20, 1971.

On February 13, 1975, NTEC adopted rules in OAR chapter 345, division 026 regulating the construction and operation of thermal powerplants and nuclear installations. The rules became effective on March 11, 1975.

In 1975, the legislature enacted SB 483, which established the Energy Facility Siting Council (Council) and the Oregon Department of Energy (Department). The newly formed Council retained authority over the Trojan site certificate, as well as responsibility for implementing rules for the monitoring and oversight of the Trojan Facility.²

The Trojan Power Plant achieved initial criticality in 1975 and began commercial operation in 1976. During a scheduled outage in 1991, PGE discovered numerous flaws in the reactors steam generator tubes. NRC ordered the plant to remain offline while PGE investigated the cause of the flaws and conducted repairs (ODOE 1996).

On November 9, 1992, PGE detected a new leak in the steam generator tubes during another scheduled outage. While the leak was determined to be within allowable parameters PGE ultimately decided to permanently cease power generating operations at the facility. PGE submitted a license change application to the Council and NRC to convert its operating license to be a possession only license, reflecting its decision, on January 27, 1993 (EFSC 1996).

On May 5, 1993, the NRC converted Trojan's operating license to a "Possession Only License," allowing PGE to continue to store spent nuclear fuel from the plant's operation in the power plant's spent fuel pool during decommissioning (NRC 1996).

On June 24, 1994, the Council amended its rules to require PGE to submit a decommissioning plan for the Trojan Plant and established procedures and criteria for Council review and approval (EFSC 1994).

On July 7, 1994, prior to submission of its decommissioning plan, PGE submitted a Large Components Removal Plan to Council for review and approval. The plan proposed to remove several large reactor components from the site and transport them by barge to the waste disposal facility at the Hanford site in Washington. On November 17, 1994, the Council approved the plan and amended its rules to allow for the large component removal. The removal project began in December 1994 and was completed in November 1995 (EFSC 1996).

On January 26, 1995, PGE submitted the Trojan Nuclear Plant Decommissioning Plan to the Council and the NRC (EFSC 1996). Under the plan, PGE proposed to transfer the spent nuclear

¹ 1971 Oregon Laws, chapter 609, section 4.

² 1975 Oregon Laws, chapter 606, section 24.

fuel and other high-level radioactive wastes from the power plant site to a newly constructed ISFSI so that the remaining structures and components at the power plant site could be dismantled and either decontaminated or removed for burial at an offsite disposal facility. The Department and NRC held a joint public informational meeting on the plan at the St. Helens High School on March 29, 1995 (EFSC 1996).

On October 26, 1995, the Council amended OAR 345-026-0390 to allow consideration of the ISFSI. The new rule required PGE to submit a separate plan for the construction, operation and retirement of the ISFSI (EFSC 1995).

On January 22, 1996, the Department issued its evaluation of the Trojan Nuclear Plant Decommissioning Plan recommending approval of the Trojan Nuclear Plant Decommissioning Plan based on the Council's criteria in OAR 345-026-0370 and several conditions related to staff's findings and concerns raised during the initial public hearing (ODOE 1996).

On February 13, 1996, the Department and the NRC conducted a second joint public hearing on the plan and staff's recommendations at the Rainier City Hall. No public comments were received. On March 14, 1996, the Council issued its Final Order Approving the Trojan Power Plant Decommissioning Plan (EFSC 1996). The NRC approved the plan on April 15, 1996 (ODOE 2002).

On March 26, 1996, PGE submitted its application for a Special Nuclear Materials License authorizing the construction and operation of the ISFSI to the Council and NRC. The application and SAR were based on an ISFSI design that used a spent fuel storage system designed and constructed by Sierra Nuclear Corporation (SNC/BNFL) (ODOE 2002).³

On May 18, 1998, PGE petitioned the Council to conduct rulemaking to amend OAR 345-026-0390 to align the decommissioning criteria to align with changes to 10 CFR 20.1204. The new criteria were based on projected dose to persons using the site in future rather than a simple radiation measurement. The Council granted the petition at its meeting on May 29, 1998 (EFSC 1998). The Council adopted the proposed revision effective October 26, 1998.

On January 27, 1999, ODOE staff issued its evaluation of the proposed ISFSI license application and its proposed Safety Analysis Report. The Department recommended that that the proposed ISFSI would generally comply with the applicable requirements of OAR chapter 345 and that the transfer of spent nuclear fuel from the spent fuel pool to the ISFSI could be performed safely. The Department also recommended that the Council amend OAR 345-026-0390(6) to allow transfer of the spent fuel from the plant to the ISFSI (ODOE 1999).

On April 6, 1999, the Council approved PGE's Trojan Decommissioning Plan and adopted staff's recommended rule amendments. On March 31, 1999, the NRC issued the Special Nuclear

³ Sierra Nuclear Corporation was acquired by BNFL Fuel Solutions Corporation in 1998.

Materials License to PGE. The initial license authorized PGE to operate the ISFSI for up to 20 years (ODOE 2002).

On July 11, 1999, PGE began loading the spent nuclear fuel into the first SNC/BNFL fuel-storage canister but had to suspend activities due to an unexpected reaction between the carbon steel components of the canister and the borated water in power plant's spent fuel pool. After an investigation into the causes of the reaction, PGE informed the Council that it would seek a new vendor for affected ISFSI components (ODOE 2002).

On March 9, 2001, PGE informed the Council that it had selected Holtec International (Holtec) as the new vendor for the ISFSI. Holtec would provide multi-purpose canisters constructed of all stainless-steel components and also would design and provide other facility components including a Transfer Cask and Lift Yoke. The original SNC/BNFL Concrete Casks remained in use at the ISFSI. PGE submitted proposed revisions to the ISFSI SAR reflecting the new Holtec components to the Council and NRC on October 26, 2001 (ODOE 2002).

On September 20, 2002, the Department issued its Staff Evaluation of the revised ISFSI design. The 2002 Staff Evaluation recommended that the design and safety features of the Holtec design complied with the Council's approval criteria in OAR 345-026-0390, and recommended amendments to the rules to approve the plan and require specific safety measures and reporting requirements. A rulemaking hearing was held on October 24, 2002 in St. Helens, Oregon. The Council reviewed and approved the plan on November 5, 2002 plan and adopted rule amendments on December 2, 2002. PGE began transferring the spent fuel transfer from the spent fuel pool to the ISFSI in November 2002 and completed the transfer in October 2003. On October 22, 2004, PGE submitted a Petition for Rulemaking to the Council. The Petition requested that the Council amend its rules to reflect the completion of the radiological decommissioning of the power plant site and release of the non-ISFSI portions of the site for unrestricted use. The Council granted the petition at its meeting on November 3, 2004. On December 20, 2004, PGE submitted an application to the NRC for termination of its operating license for the Trojan Power Plant. The application included the results of radiological surveys showing that the Trojan site met the criteria for unrestricted release and use of the site under 10 CFR 20 and OAR 345-026-0370.

On January 28, 2005, NRC staff provided a briefing to the Council on the status of the decommissioning, and NRC's review of the final radiological surveys. In February 2005, the Department released its evaluation and recommendations finding that PGE had demonstrated that the Trojan site met the criteria for unrestricted release in OAR 345-026-0370 (ODOE 2005). On April 8, 2005, the Council adopted several rule amendments to acknowledge the completion of the power plant decommissioning and approving the unrestricted release of areas of the Trojan site not used for the ISFSI. The rule amendments included a repeal of several rules that were specific to the operation of the power plant and amendments to other rules to establish the Trojan ISFSI Safety Analysis Report (PGE-1069) as the regulatory basis for the rules. The NRC found the Nuclear Plant site met the radiological criteria for decommissioning and terminated PGE's operating license in an Order effective May 23, 2005 (NRC 2005).

On May 23, 2005, PGE submitted a request to amend its ISFSI license to reduce the size of the controlled area surrounding the ISFSI. The Controlled Area Boundary was initially set at 300 meters from the edge of the ISFSI Pad based on conservative assumptions used in the initial ISFSI SAR. PGE requested to reduce the Controlled Area to 200 meters from the edge of the Controlled Area based on actual direct radiation measurements collected after the ISFSI began operation. The NRC granted the license amendment on March 17, 2006. (NRC 2006).

PGE's operating license was originally set to expire on March 31, 2019. In accordance with 10 CFR 72.42, PGE submitted its preliminary License Renewal Application to the NRC on March 23, 2017. The Department requested that PGE review the requirements of OAR chapter 345, division 026 and determine whether substantive changes may require the Council's review or action (ODOE 2016). By letter dated July 10, 2018 PGE identified several changes in the License Renewal Application that could affect compliance with the rules, including:

- Extending the design life of the ISFSI from 40 to 60 years
- Updating calculations related to the design and integrity of facility components
- Conversion of existing inspection programs to and establishment of new Aging Management Programs (AMPs)

PGE submitted a revised License Renewal Application containing additional information requested by the NRC on January 23, 2019. The NRC published its Safety Evaluation Report finding that the ISFSI would continue to meet the licensing requirements of 10 CFR 72 and an Environmental Assessment and Finding of No Significant Impact for the renewal of the license on July 8, 2019. The NRC issued the renewed license by a Final Order dated August 9, 2019. The renewed license expires on March 31, 2059 (NRC 2019).

3 Description of the ISFSI

The Trojan ISFSI stores the spent nuclear fuel that was generated during the 17 years of operation of the Trojan Nuclear Plant. The ISFSI is jointly owned by Portland General Electric, the City of Eugene through the Eugene Water and Electric Board (EWEB) and Pacific Power and Light (PacifiCorp). PGE is the principal owner and has responsibility for maintaining the ISFSI and ensuring compliance with the site certificate.



Figure 2. ISFSI Transfer Station (left) and Storage Casks (right)

3.1 Facility Location & Site Boundary

The Trojan ISFSI is located at the former site of the Trojan Nuclear Power Plant in Columbia County, Oregon. The site is on the west bank of the Columbia river, approximately 42 miles north of Portland, Oregon and approximately 4.5 miles southeast of Rainier, Oregon.

The Trojan site occupies approximately 30 acres within a 643-acre tract that is owned by Portland General Electric. The tract extends to the Columbia River on the east, across Highway 30 to the west, and includes the forested area to the north of the power plant site and the public picnic grounds and recreational lake to the south. Portland & Western Railroad maintains a right-of-way within the PGE tract.

The ISFSI site occupies less than one acre within the northeastern portion of the Trojan Site. Most ISFSI components are located on a reinforced concrete pad that is approximately 105 feet long by 110 feet wide. The ISFSI is surrounded on the north and east sides by a 20-foot high earthen berm that was created during the original facility construction.

A security fence restricts access to a radiologically Protected Area that extends approximately 25 to 34 feet from the edge of the ISFSI pad. A second fence is located approximately 20 to 25 feet from the edge of the Protected Area boundary. This second fence defines the Controlled Access Area and surrounds the ISFSI site.

A Controlled Area extends 200 meters from the edge of the ISFSI. PGE must maintain the ability to exclude persons from the Controlled Area in the event of a radiological emergency. Most of the Controlled Area is within the larger PGE property, but a small portion extends over the Columbia River. PGE has a formal arrangement with the U.S. Coast Guard and the State of Oregon to restrict traffic on the river and evacuate persons in the event of an emergency at the ISFSI. The ISFSI is designed to ensure that the expected dose to a person at or outside of the Controlled Area Boundary during any credible accident will be ALARA, and no more than 5 rem to the whole body or any organ as provided in 10 CFR 72.106 (See SAR section 8.2.1)

Most of the structures associated with the power plant were demolished, dismantled, or removed during the power plant decommissioning process. Some buildings and facility components are still in place outside of the ISFSI site, including security facilities, administrative and storage buildings, and a switchyard which is the terminal point for 230kV overhead transmission lines connecting to the Port Westward Power Generation Facility and the Allston Substation. The switchyard supplies power to the ISFSI.

3.2 ISFSI Components

Primary ISFSI components include a fenced reinforced concrete storage pad that supports 34 vertically ventilated concrete casks. Each cask contains a stainless-steel multipurpose canister (MPC) that is loaded with spent nuclear fuel from the Trojan Nuclear Plant. Related and supporting facilities include a transfer station, storage buildings, and security equipment.

3.2.1 ISFSI Pad

The ISFSI is supported by a concrete pad that is approximately 170 feet long by 105 feet wide. The pad is approximately 18 inches thick and is constructed on approximately 24 inches of engineered fill placed on top of bedrock. The portion of the pad that supports the storage systems contains embedded electrical conduits and connectors for the concrete cask temperature monitoring system. The adjacent Service Pad supports cask-movement operations.

3.2.2 Multipurpose Canisters (MPCs)

The Trojan Nuclear Plant generated approximately 345 metric tons of spent nuclear fuel and other high-level radioactive waste during its 17 years of operation. This includes 780 intact fuel assemblies, 10 partial fuel assemblies, and 1 container of damaged fuel rods. Each intact fuel assembly consists of 264 12-ft long uranium fuel rods clad in zirconium alloy. The fuel rods are arranged in a 17 x 17 grid with control rods, instruments, and other inserts arranged in the grid locations not containing fuel rods.

The spent fuel assemblies and fuel debris containers are stored in 34 Multi-Purpose Canisters (MPCs). The MPCs are cylindrical stainless-steel containers that are seal welded and serve as the confinement boundary for the spent fuel. Major components of the MPC include a fuel basket, a baseplate, canister shell, a lid, and a closure ring. All components are made of stainless steel, which provides corrosion resistance, radiation shielding, and heat transferability. The MPCs are “multi-purpose” because they can be used for the storage, transport, and permanent disposal of the spent nuclear fuel, eliminating the need to fuel handling after they are loaded.

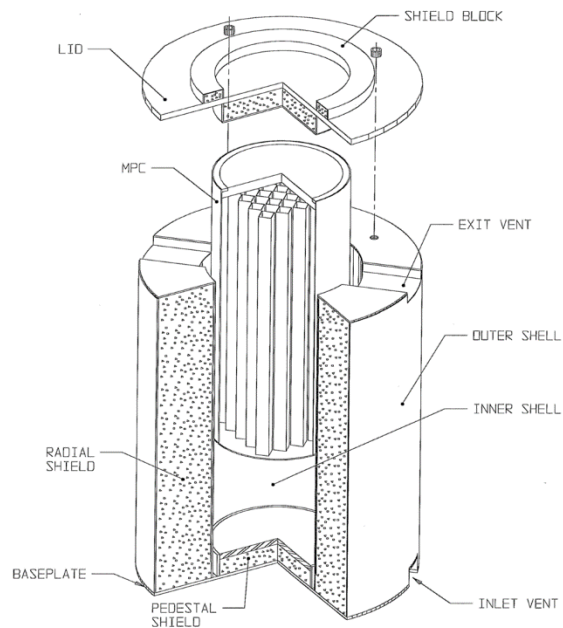


Figure 3. Cross Section of MPC partially inserted into Cask. Source: Holtec International, 2016

The Trojan ISFSI uses MPCs produced by Holtec International.⁴ Each MPC can hold up to 24 intact fuel assemblies. During fuel loading, the fuel assemblies were arranged in the MPC’s honeycombed fuel basket, which is designed with storage cells separated by two panels of neutron absorber with a water gap between them. The geometry and construction of the fuel basket prevent the fuel assemblies from reaching criticality. After the fuel assemblies were loaded into the fuel baskets, the canister shell and lid were welded together and the MPC was backfilled with helium. After backfilling, the port covers and closure rings were welded in place, providing a sealed confinement boundary for the stored fuel assemblies. Each loaded MPC is approximately 15.1 feet tall and 68.4 inches wide and weighs approximately 78,700 pounds.

⁴ The specific designs in use at the ISFSI are MPC-24E and MPC-24EF.

3.2.3 Storage Cask

The Trojan ISFSI uses SNC/BNFL designed Storage Casks to store the loaded MPCs. Each Concrete Cask is cylindrical concrete structure that is approximately 11.3 feet in diameter and 17.6 feet high. The cask walls are 29 inches thick with an additional 2-inch carbon steel liner on the interior. The top of the Cask is covered by a carbon steel lid. Air vents at the top and bottom of the cask allow for heat generated by the spent fuel to be removed by natural circulation.

3.2.4 Transfer Cask

The Transfer cask is a cylindrical carbon steel cask that was used to provide temporary radiation shielding and structural protection for the MPC during fuel loading and transfer of the MPC to the Storage Cask. When the MPCs are transferred to a federal repository, the Transfer Cask will be used with the Transfer Station to transfer an MPC to a Holtec HI-STAR 100 System Transport Cask for transportation off-site. When it is not in use, the transfer cask is stored in the utility building within the ISFSI site.

3.2.5 Transfer Station

The Transfer Station is a structural steel assembly that supports the Transfer Cask during transfer operations. The structure allows a Concrete Cask or Transport Cask to be positioned directly under the Transfer Cask. During transfer operations, a mobile crane is used to lift an MPC into the transfer cask. The lid and lower shield doors of the transfer cask are closed while the receiving concrete cask or transport cask are moved into position using an air pad system. Once the receiving cask is in place, the mobile crane is used to lower the MPC into it.

When the Transfer Station is in use, an impact limiter is inserted into the concrete pad directly below the transfer task. The impact limiter is a rigid polyurethane foam block encased in a thin stainless-steel shell. The impact limiter is designed absorb sufficient force to prevent the release of radioactivity in the event of an accidental drop of an MPC during loading or transfer operations.

3.2.6 Security facilities

The ISFSI is surrounded by fencing and other security related equipment to prevent unauthorized access to the ISFSI site. Because the security facilities were not affected by the relicensing process, and because the precise nature and location of security facilities are protected as Safeguards Information under 10 CFR 73, security facilities are not discussed further in this document.

4 Evaluation of Applicable Requirements in OAR chapter 345

As noted above, the Council issued a site certificate for the Trojan facility on July 20, 1971. The site certificate requires the certificate holder to comply with the rules adopted by the Council. This section provides the Department's analysis of the provisions of the renewed license and its

technical specifications to verify continued compliance with the requirements of OAR chapter 345, division 26.

The license renewal process did not result in changes to the design of the ISFSI and did not affect the majority of programs required under the Council's rules. The changes that were primarily related to incorporation of additional analysis, calculations, and programs needed to demonstrate that the ISFSI could be operated safely for the extended period of operation authorized by the renewed license. One significant change is the addition of new Aging Management Programs (AMPs) designed to identify and manage any effects that aging may have on the ability of facility components to perform their intended safety functions. These programs, which are discussed in more detail in Section 5 of this report, will replace the structural inspection program and concrete cask interior inspection programs that are currently required under OAR 345-026-0390(6)(a).

Staff did not find that the relicensing resulted in changes that reduce commitments or change the assumptions and conclusions in the Department's 2002 Staff Evaluation, however, staff notes that there have been changes to the Safety Analysis Report, implementing programs and procedures, and federal law in the nearly 20 years since its publication. The remainder of this section provides a summary of significant changes related to rule requirements that have occurred since 2002 and recommends rule changes to bring the rules up to date.

Rule revisions to improve the clarity of the rules and simplify future review processes have also been proposed for the Council's consideration. These changes include consolidating ISFSI specific requirements into OAR 345-026-0390, eliminating references to the 2002 Staff Evaluation in rule to ensure that future review is based on the most recent information, and updating citations to federal regulations to include more specific requirements or criteria.

4.1 OAR 345-026-0170(2): Notification of Incidents

OAR 345-026-0170(2) requires the certificate holder to notify the Department of incidents and accidents that may occur at the ISFSI. The rule relies on requirements imposed by the NRC, and in the Emergency Plan, Security Plan, and other agreements to establish the scope and timing of required notifications. The NRC's reporting requirements for emergencies and non-emergency incidents and accidents are provided in 10 CFR 72.75. Generally, the regulations provide that the NRC must be notified by telephone within 1 hour of an emergency event and within 4, 8, or 24 hours after a non-emergency event depending on the type and severity of the incident. A written follow-up report is also required for certain types of incidents.

OAR 345-026-0170(2) requires the certificate holder to notify the Department of incidents or accidents that would require notification of the NRC, and to comply with any notification requirements in the facilities Emergency Plan, Security Plan, or other agreements. The license renewal did not result in any changes to the Emergency Plan or Security Plan, or other agreements related to notifications. Because there were no changes to the plans, staff recommends that the certificate holder's compliance with the rule was not affected.

Staff recommends administrative changes to improve the clarity and enforceability of the rule. First, staff recommends relocating OAR 345-026-0170(2) to OAR 345-026-0390, which provides other ISFSI specific requirements. Second, staff recommends amending the specific language in the rule to provide more specific direction and criteria for when notification is required based on the requirements of 10 CFR 72.75 and the ISFSI Emergency Plan. This includes requiring notification of the Oregon Emergency Response System of emergency events and notifying the department of other nonemergency incidents and accidents. Staff's recommended rule changes are shown below, and are reflected in the draft proposed rules provided as Appendix B to this report.

OAR 345-026-0170:

~~(2) For the Trojan Independent Spent Fuel Storage Installation:~~

~~(a) In the event of incidents or accidents requiring notification of the Nuclear Regulatory Commission by telephone, the certificate holder also shall notify the Department on the same time schedule.~~

~~(b) The certificate holder shall notify the Department of all incidents in accordance with the Emergency Plan, Security Plan, and other agreements as established.~~

OAR 345-026-0390:

(X) The certificate holder must notify the Department of incidents and accidents in accordance with the Emergency Plan, Security Plan, and other agreements as established, and must:

(a) Notify the Oregon Emergency Response System immediately upon declaration of an emergency under the approved Emergency Plan for the facility;

(b) Notify the Department of non-emergency incidents or accidents as described in 10 CFR 72.75.

4.2 OAR 345-026-0330: Radiological Environmental Monitoring

(1) The certificate holder shall establish a radiological environmental monitoring program.

(2) The certificate holder shall maintain a written radiological environmental monitoring program that describes applicable quality assurance measures.

(3) The certificate holder shall not make any changes to the radiological environmental monitoring program that involve a reduction in the number of environmental monitoring locations or associated monitoring data collection periodicity as approved in the

Department of Energy "Staff Evaluation of Holtec Design for Portland General Electric's Independent Spent Nuclear Fuel Installation (ISFSI)," September 2002, without Department approval prior to implementation.

(4) Except as required by section (3), the certificate holder may make modifications to the radiological environmental monitoring program without prior Department approval. The certificate holder shall notify the Department of these changes within 60 days after implementation of the change. The Department shall promptly notify the Council of any such changes at a scheduled meeting of the Council.

OAR 345-026-0330 requires the certificate holder to establish and maintain a Radiological Environmental Monitoring Program. This requirement, which mirrors 10 CFR 72.44(d)(2), and is intended to provide assurance that the annual dose to any individual outside of the ISFSI Controlled Area does not exceed regulatory limits. The rule was amended in 2006 to remove a requirement for the certificate holder to provide an annual radioactive effluent monitoring report because there are no gaseous or liquid effluents discharged from the ISFSI during normal operations.

The Radiological Environmental Monitoring Program uses thermoluminescent dosimeters (TLD) to monitor direct radiation from the ISFSI. The program requires 8 TLDs to be placed near the ISFSI perimeter fence near the concrete casks and 8 TLDs to be placed at the 200-meter Controlled Area boundary perimeter. The TLDs are replaced and evaluated approximately every 92 days to monitor radiation levels in the vicinity of the ISFSI (PGE 2012).

The license renewal did not result in changes to the Radiological Environmental Monitoring Program. There have been other changes to specific procedures and monitoring locations have changed since the program was approved in 2002, but the number of environmental monitoring locations and associated monitoring data collection periodicity have not been reduced. As a result, staff recommends that the certificate holder continues to comply with the requirements of OAR 345-026-0330.

Staff recommends administrative changes to improve clarity and simplify procedures for future review. First, because the rule provides program requirements that are specific to the ISFSI, we recommend that OAR 345-026-0330 be repealed and the requirement for the radiological environmental monitoring program be relocated to OAR 345-026-0390, which describes other programs required for the ISFSI. Second, to reduce the need for future rulemaking and to ensure that future review is based on the most current version of the program, staff recommends that references to the 2002 Staff evaluation be removed from the rule, and that the criteria for determining when the Council's prior approval of changes to the program is required be amended as described in Section 4.6.5 of this report.

4.3 OAR 345-026-0340: Security Plans for Nuclear Installations

(1) The operator of a nuclear installation shall establish and maintain a security plan with capabilities for protection of special nuclear material.

(2) Upon assurance satisfactory to the Council and the certificate holder that confidentiality can be maintained, the certificate holder shall make the security plan for nuclear installations available to authorized Council representatives in accordance with U.S. Nuclear Regulatory Commission regulation 10 CFR §73.21(c)(1)(iii).

(3) The certificate holder shall not make modifications to the security plan that involve a reduction in the ability to detect or prevent unauthorized entry, or a reduction in the ability to detect or prevent the introduction of unauthorized material into a Protected Area or otherwise lessen the effectiveness of the physical security plan without written Department approval prior to implementation.

(4) Except as required by section (3), the certificate holder may make modifications to the plan without prior Department approval. The certificate holder shall notify the Department of these modifications within 60 days of their implementation and shall make the revised plan available to authorized Department representatives following implementation of the changes. The Department shall promptly notify the Council of the plan modifications at a scheduled Council meeting, subject to U.S. Nuclear Regulatory Commission regulation 10 CFR §73.21(c)(1)(iii).

OAR 345-026-0340 requires the operator of a nuclear installation to establish and maintain a security plan with capabilities for protection of special nuclear material. The rule mirrors the requirements of 10 CFR 72. PGE maintains the Security Plan (PGE-1073) consistent with the requirements of 10 CFR 72, Subpart H and this rule. The license renewal process did not result in any changes to the Security Plan, and as a result, staff recommends that the certificate holder's compliance with the rule was not affected.

The Security Plan contains Safeguards Information (SI), which is information that identifies procedures for the physical protection of special nuclear materials.⁵ Safeguards Information must be protected from unauthorized disclosure under 10 CFR 73.21 and 73.22 and the OAR chapter 345, division 070.⁶ The federal regulations for the protection of Safeguards information referenced in rule have been amended since the rule was adopted.

The regulation referenced, 10 CFR 73.21(c)(1)(iii), provided that no person may have access to safeguards information unless the person has an established "need to know for the information and is a "governor of a State or designated representative." This section appears to have been

⁵ See 10 CFR 73.2 and OAR 345-070-0015

⁶

replaced by 10 CFR 73.22(b) in 2008.⁷ Because 10 CFR Part 73 generally describes the responsibilities of PGE, the Director, and the Council to protect Safeguards Information, staff recommends that the reference be replaced with a more general reference. In addition, staff recommends the language describing the criteria for when changes to the Security plan requires the prior approval from the Director or Council be amended to better align with the NRC's regulation under 10 CFR 72.44(e):

OAR 345-026-0340

(1) ~~The operator of a nuclear installation shall~~ certificate holder must establish and maintain a security plan ~~with capabilities for protection of special nuclear material that complies with 10 CFR 72.44(e).~~

(2) ~~Upon assurance satisfactory to the Council and the certificate holder that confidentiality can be maintained, t~~ The certificate holder shall ~~must~~ make the security plan ~~for nuclear installations, and any revisions, available to authorized Council representatives of the Council and Director upon request. The certificate holder, Department, and Council must protect information in the plan that falls within the definitions of "security program" or "safeguards information" in OAR 345-070-0015 from unauthorized disclosure in accordance with U.S. Nuclear Regulatory Commission regulation 10 CFR 73.21-(c)(1)(iii), 73.22, and OAR chapter 345, division 070.~~

(3) The certificate holder ~~shall~~ may not make ~~modifications~~ changes to the security plan that involve a reduction in ~~the ability to detect or prevent unauthorized entry, or a reduction in the ability to detect or prevent the introduction of unauthorized material into a Protected Area or otherwise lessen would reduce the effectiveness of the physical security plan without prior written approval from the Director and Council prior, as required by ORS 469.530~~ Department prior to implementation.

(4) ~~Except as required by section (3), t~~ The certificate holder may make ~~modifications~~ changes to the security plan that would do not reduce the effectiveness of the plan without prior ~~Department~~ approval from the Council and Director. The certificate holder ~~shall~~ must notify the Department of ~~these modifications~~ any changes made under this section within 60 days ~~of~~ after their implementation ~~and shall make the revised plan available to authorized Department representatives following implementation date of the changes. The Department shall~~ must promptly notify the Council of the ~~plan modifications~~ changes at a scheduled Council meeting, subject to the provisions of OAR chapter 345, division 070 ~~U.S. Nuclear Regulatory Commission regulation 10 CFR §73.21(c)(1)(iii).~~

In comments on a draft version of this report provided on September 14, 2021, PGE recommended additional changes to the rules in OAR chapter 345, division 070, to clarify the

⁷ 73 FR 63575

applicability of those rules to the Trojan ISFSI. Consistent with this recommendation, staff recommends Council amend OAR 345-070-0015 to clarify that the term “nuclear power plant” includes the Trojan Independent Spent Fuel Installation. In addition, the rules contain a definition of “Safeguards Information” which is different than the definition used by the NRC, and for consistency, staff recommends that the Council replace that definition with a reference to 10 CFR 72.2. These changes are included in the draft proposed rules attached to this document.

4.4 OAR 345-026-0350: Emergency Planning for Nuclear Installations

(1) The operator of a nuclear installation shall prepare, comply with, and maintain in readiness an emergency plan. The plan must ensure adequate measures will be taken in the event of a radiological emergency.

(2) Proposed modifications to the emergency plan that involve one of the following require Council approval prior to implementation:

(a) A change (other than editorial) in the Emergency Action Levels; or

(b) A decrease in the planned staff augmentation capabilities; or

(c) A reduction in the plan requirements for notification of off-site agencies.

(3) Except as required by section (2), the certificate holder may make modifications to the plan without prior Council approval. The certificate holder shall submit copies of the revised plan to the Department within 30 days after the implementation date. The Department shall promptly notify the Council of the modifications at a scheduled Council meeting.

This rule requires the certificate holder to maintain an emergency plan. This rule mirrors the requirements of 10 CFR 72.32. The Emergency Plan (PGE-1075), which was originally approved by the Council on November 14, 1997, describes the actions the certificate holder will take to respond to emergencies that may arise at the ISFSI, and to minimize adverse effects that could result from accidents or events involving or potentially involving a radiological release at the ISFSI.

The plan is based on the accident analysis provided in the SAR. As discussed in more detail in Section 4.6, the accident analysis evaluated the potential radiological impacts that could result from a wide range of accidents that could occur at the ISFSI, including explosions, fires, earthquakes, tornados, floods, and accidents during transfer operations. The analysis demonstrated that there are no credible accidents that are expected to result in a radiological release that could result in exposure levels outside of the Controlled Area exceeding the EPA Protective Action Guidelines. The analysis showed that a limited number of accident scenarios could result in some radiological impacts within the Controlled Area Boundary, and as a result,

the actions in the plan are primarily designed to ensure the safety of on-site personnel in the event of this type of accident.

The plan contains a single emergency classification, the Alert, which includes any incident that has led or could lead to an inadvertent release of radioactive material. The plan describes conditions that could initiate an Alert as:

- A severe natural phenomenon or incident that compromises or affects the integrity of ISFSI structures or components containing radioactive materials (i.e. earthquake, flood, or hurricane force winds damaging the ISFSI; tornado striking the ISFSI; or aircraft crash into the ISFSI);
- An elevated radiation or removable contamination levels within or around the ISFSI that indicate severe loss of control of radioactive material stored within the ISFSI (a factor of 100 over normal levels);
- An MPC handling accident or other ISFSI-related event resulting in detectable airborne contamination;
- A loss of security control of the ISFSI (for example: total loss of ISFSI communications or security response capability); or
- Other conditions that warrant increased awareness by offsite agencies or activation of PGE's emergency response measures.

The specific emergency action levels that indicate whether or not one of these initiating conditions have begun are provided in the plan's implementing procedures, so it is not clear that subsection (2)(a) has any substantive effect.

The plan describes PGE's augmented response capabilities. Under the plan, PGE must maintain a minimum of two trained responders with radiation protection expertise, two responders with security expertise, and two responders with repair expertise. The plan also explains that the ISFSI Incident Coordinator may request assistance in providing fire, medical, and law enforcement support, and river traffic control in response to an ISFSI emergency. Columbia River Fire and Rescue provides the Trojan ISFSI site with fire support and transportation of contaminated and non-contaminated injured persons who require hospital treatment. Medical care and treatment for contaminated and non-contaminated injured persons requiring hospital treatment will be provided by one of the local area hospitals. Law enforcement support for the Trojan ISFSI is described and provided in accordance with the Trojan ISFSI Security Plan. The U.S. Coast Guard provides river traffic control for the portion of the ISFSI Controlled Area which is on the Columbia River. The plan requires the State of Oregon, Columbia County, and the NRC to be notified of any Alert within 1 hour.

The plan also contains provisions for training and drills. ISFSI incident responders are required to be trained annually on emergency classification, organizational response, emergency facilities and equipment, and position-specific tasks. On-shift responders are trained in fire response and first aid. Training is offered biennially to local offsite agency responders such as

fire, medical, and other local offsite agency responders on how to respond to an emergency at the Trojan ISFSI, including special instructions and orientation tours.

A radiological/health physics drill, a medical drill, and a fire drill are conducted annually. Drills are based on incident or accident conditions determined to be most probable for the ISFSI. Exercises are conducted biennially. Communications tests with state, local, and federal agencies are also conducted semi-annually.

No changes to the Emergency Plan were made as a result of the license renewal, and as such PGE's compliance with this rule was not affected,⁸ however, staff recommends administrative changes to improve the clarity of the rule and consistency with federal requirements. Particularly, staff recommends that sections (2) and (3) of the rule be replaced with a more generic standard that aligns the criteria for when Council review and approval of changes is required with the NRC's regulations under 10 CFR 72.44(e). Staff's proposed rule language is shown below, and the changes are reflected in the draft proposed rules attached to this report.

345-026-0350 - Emergency Planning for Nuclear Installations

(1) ~~The operator of a nuclear installation shall prepare, comply with, certificate holder must follow and maintain in readiness an emergency plan that is approved by the Council. The plan must ensure adequate measures will be taken in the event of a radiological emergency.~~

(2) ~~Proposed modifications to~~ The certificate holder may not make changes to the emergency plan that would decrease the effectiveness of the plan or involve one of the following require Council approval prior to implementation:

~~(a) A change (other than editorial) in the Emergency Action Levels; or~~

~~(b) A decrease in the planned staff augmentation capabilities; or~~

~~(c) A reduction in the plan's requirements for notification of off-site agencies without the Council's prior approval.~~

(3) ~~Except as required by section (2), t~~ The certificate holder may make modifications changes to the emergency plan that would not decrease the effectiveness of the plan without the Council's prior Council approval. The certificate holder shall must submit copies of the revised plan to notify the Department of any changes made under this section within 30 days after the implementation date of the changes. The Department

⁸ A subsequent amendment to the license updated the risk analysis in the Safety Analysis Report to reflect the potential for an explosion to occur at a new mooring on the Columbia river near the ISFSI site, but this updated analysis did not result in changes to the Emergency Plan.

~~shall~~must promptly notify the Council of the ~~modifications~~ changes at a scheduled Council meeting.

4.5 OAR 345-026-0370: Standards for Council Approval of ISFSI Decommissioning Plan

(1) The operator of the Trojan Independent Spent Fuel Storage Installation (ISFSI) shall submit 15 copies of a plan for decommissioning the ISFSI to the Department for Council approval. The plan shall be submitted to the Council on a schedule consistent with that required by the U.S. Nuclear Regulatory Commission. When the Department receives a decommissioning plan, the Department shall:

(a) Issue notice to the Council's mailing list that the decommissioning plan has been submitted. The notice shall include:

(A) The time and place of at least one informational hearing;

(B) The locations where copies of the proposed plan may be reviewed by the public; and

(C) A contact name for further information.

(b) Perform a technical review, and produce a staff report containing the Department's technical conclusions and recommendations on specific issues raised in the proposed plan;

(c) To the extent practicable, coordinate its technical review with that of the U.S. Nuclear Regulatory Commission;

(d) Issue notice of availability of the Department report to the Council mailing list. The notice shall include:

(A) A summary of the Department's recommendations;

(B) Time and place of a hearing on the staff report;

(C) Places where the Department's staff report may be reviewed by the public; and

(D) A contact for additional information and copies of the staff report.

(2) The Council shall review the proposed decommissioning plan to verify that the proposed activities will not adversely affect the health and safety of the public or the environment. The Council will ensure the following when evaluating acceptability of a proposed decommissioning plan:

(a) The plan contains the radiological criteria for unrestricted release and use of the site as set forth in Title 10 of the Code of Federal Regulations, Part 20, Section 1402 (10 CFR 20.1402) in effect August 20, 1997.

(b) The plan contains provisions that require removal from the site of all radioactive waste as defined in ORS 469.300 on a schedule acceptable to the Council.

(c) The plan contains a program for radiological monitoring to ensure the environment is not being adversely affected. This program may be incorporated by reference if it has previously been approved by the Department.

(d) The plan contains provisions for removal or control of hazardous waste that are consistent with applicable federal and state regulations.

(3) The certificate holder shall include in the plan an estimate of funding necessary for implementation. The Council shall determine whether provisions for funding are adequate to implement the plan.

(4) The certificate holder shall not implement significant revisions to the decommissioning plan unless the Council has reviewed and approved the revisions. A revision is significant if it involves one of the following items:

(a) The potential to prevent the release of the site for unrestricted use;

(b) A change in the criteria for site release;

(c) A departure in the methodology for determining background radiation levels to a method not generally accepted by the industry;

(d) A change in the provisions made for hazardous or radioactive waste material removal;

(e) A significant change in the types or significant increase in the amounts of any effluents that may be released offsite; or

(f) A significant increase in radiological or hazardous material exposure to site workers or to members of the public, including exposure due to transport of radioactive or hazardous material.

(5) The certificate holder shall evaluate revisions to the decommissioning plan by the criteria listed in section (4) of this rule. The certificate holder shall maintain records of all changes and associated evaluations for audit by the Department. The certificate holder

shall notify the Department of revisions to the plan that are not significant within 30 days after implementation of the revision. The Department shall promptly notify the Council of such revisions at a regularly scheduled meeting.

(6) Changes to the decommissioning plan that are mandated by the federal government may be implemented without prior Council approval.

OAR 345-026-0370 requires that PGE submit a decommissioning plan and provides criteria for approval of the plan. We note that PGE submitted its Preliminary Radiological Decommissioning Plan (PGE-1082) to the NRC and ODOE on December 13, 2012. The plan explains that because the design of the ISFSI ensures that the spent nuclear fuel will be contained within a sealed MPC, radiological decommissioning will primarily consist of contamination and radiation surveys. The preliminary plan explains that while no contamination or activation of the Concrete Cask or other ISFSI components is expected, the certificate holder will perform surveys to determine the level of neutron activation in the Concrete Casks after the USDOE begins taking possession of the spent fuel and removing it from the site. Based on the results of these surveys, PGE will prepare a final plan describing the procedures for dismantling, decontaminating, and disposing of the remaining ISFSI components. PGE anticipates that the final plan will be available approximately three to four years prior to the last spent fuel shipment (PGE 2020).

PGE provided updated financial assurance information as part of the license renewal process, however, because PGE is not required to submit its final decommissioning plan until after the USDOE begins taking possession of the spent nuclear fuel stored at the ISFSI, compliance with this rule was not affected.

Under OAR 345-026-0370(2)(a), to be acceptable a proposed decommissioning plan must contain the radiological criteria for unrestricted release and use of a site as set forth in 10 CFR 20.1402 in effect on August 20, 1997. The criteria in 10 CFR 20.1402 require that residual radioactivity be reduced to levels that are as low as reasonably achievable (ALARA) and to result in a total effective dose equivalent of 25 mrem or less to an average member of the group that is reasonably expected to have the greatest exposure.⁹ The criteria have not been amended since the rule was established. Staff recommends that the rule be revised to clarify that the final decommissioning plan must not only contain these criteria, but also demonstrate that they will be satisfied.

Because the certificate holder's compliance with the rule was not affected, and because there have been no changes to federal law affecting the substantive requirements of the rule, staff does not recommend any substantive changes to the rule at this time, however, some administrative changes to clarify language have been included in the draft proposed rules attached to this report.

⁹ 62 FR 39088, July 21, 1997.

4.6 OAR 345-026-0390: Spent Nuclear Fuel Storage

OAR 345-026-0390 provides requirements that are specific to the ISFSI. A summary of recommendations related to specific provisions of the rule are provided in the sections that follow. We note that OAR 345-026-0390(1) provides a policy statement reflecting the legislative findings related to the storage of spent fuel in ORS 469.593 and 469.310. Because it does not provide substantive requirements for the ISFSI or procedural requirements for the Council, it is not necessary to provide an analysis of the effects of the license renewal on this section.

Because it provides non-substantive provisions that are not related to compliance, staff recommends that this section be relocated to OAR 345-026-0300. We note that OAR 345-026-0300 currently establishes that OAR 345-026-0300 to 345-026-0390 apply to nuclear installations generally, but we note that these rules have been amended to provide specific requirements for the Trojan ISFSI, and no other nuclear installations are currently in operation in Oregon. In addition, the Trojan ISFSI is not technically considered to be a “nuclear installation” under ORS 469.300 because it was established as part of, and governed by the site certificate for, the Trojan Nuclear Power Plant. Amending OAR 345-026-0300 and 345-026-0390(1) to clarify that the rules are specific to the ISFSI will help reduce any confusion about the applicability of the rules in the future and will underscore the need to conduct additional rulemaking if an application to establish a new nuclear installation is submitted in the future. Staff’s proposed revisions to OAR 345-026-0300 and the removal of OAR 345-026-0390(1) are reflected in the draft proposed rules attached to this document.

4.6.1 OAR 345-026-0390(2): Capacity and Safety Standards

(2) Capacity and Safety Standards: The certificate holder may store a maximum of 791 complete and partial fuel assemblies and storage of containers with nuclear fuel materials. Storage of spent nuclear fuel and related radioactive material and waste at the site of a nuclear installation by a certificate holder who has executed a contract with the United States of America pursuant to the Nuclear Waste Policy Act, shall be deemed a permitted use of the site pending transfer of spent nuclear fuel to the U.S. Department of Energy provided that:

(a) Storage facilities are designed to maintain discharges within the limits specified in applicable licenses authorized under the Atomic Energy Act of 1954, as amended, and any applicable permits issued under the National Pollutant Discharge Elimination System;

(b) Storage facilities are designed such that in case of accidents off-site radiation exposures will not exceed the Environmental Protection Agency Protective Action Guidelines (October, 1991) for off-site protective actions; and

(c) The facility is not used to store any spent nuclear fuel or radioactive materials and wastes other than that generated or used in the operation of the former Trojan Nuclear Plant.

The rule establishes a number of capacity and safety standards that apply to the design of the ISFSI. The rule specifies that the ISFSI may contain a maximum of 791 complete and partial fuel assemblies and storage of containers with nuclear fuel materials and may not be used to store any materials wastes other than that generated or used in the operation of the former Trojan Nuclear Plant.

Subsection (2)(b) of the rule requires the ISFSI design to ensure that offsite exposures will not exceed the EPA's Protective Action Guidelines (PAGs) under any postulated event scenario. In the initial licensing process for the ISFSI, the certificate holder demonstrated that there was no credible accident scenario that would result in a dose to a person outside of the controlled access area in exceedance of the evacuation thresholds established in the PAGs in effect as of October 1991. Staff was unable to locate the October 1991 version of the PAGs, but the 1999 and 2002 Staff evaluations specified that the thresholds were a projected dose of:

- 1 rem Total Effective Dose Equivalent (TEDE)
- 5 rem Committed Dose Equivalent (CDE) to the thyroid; or
- 50 rem CDE to the skin

The EPA Manual of Protective Action Guides and Protective Actions for Nuclear Incidents published in May 1992 provides similar guides. Staff notes that the PAGs were not intended to be used in regulatory contexts, and their use provides a more conservative design basis than NRC regulations, which require the facility to be designed to ensure that a person beyond the Controlled Area Boundary will not receive a 5 rem TEDE in the event of a design basis-accident. The EPA has published several updates to the Protective Action Guide Manual since 1992. In the most recent update, the organ-dose based evacuation thresholds were removed, and the guides now specify that protective actions such as evacuation or sheltering-in-place will be justified when the projected dose to an individual is 1 rem over four days (US EPA 2017).

Section 8.2 of the SAR examines 12 accident scenarios, which with some exceptions, are the same as were reviewed in the 2002 Staff Evaluation. The accident analysis shows that three of these accident scenarios have potential radiological consequences. In one such scenario a tornado-driven projectile, like a rock or metal object, strikes a storage cask at an angle and velocity sufficient to dislodge some of the concrete from the cask exterior, leading to a loss of shielding and a localized increase in the dose rate near the damaged area. In the worst-case scenario, the accident analysis in the SAR estimates that this could cause a loss of up to 5.69 inches of concrete from the concrete cask in the area of impact. The analysis estimated that the resulting dose rate at the surface of the cask near the damaged area that would be 103.0 mrem/hour, compared to a normal rate of 20.4 mrem/hour. The accident analysis assumes that it would take two technicians approximately 30 minutes to repair the casks by filling the damaged area with grout, resulting in a collective dose of approximately 0.238 person-rem to the repair crew. Staff previously found this risk to be acceptable, particularly in light of the extremely low probability of a tornado in this area producing a worst-case scenario projectile (ODOE 2002).

A second scenario involves postulated lightning strike entering or exiting through the concrete shell of a storage cask, resulting in similar damage to the cask exterior as the tornado scenario. The accident analysis notes that this scenario is unlikely because the steel cask lid and interior components, including the cask liner, air ducts, and base plate provide a ground path with less resistance than the concrete shell.

A third scenario with radiological consequences involves the hypothetical failure of 100 percent of the fuel rods in 24 fuel assemblies in the MPC and a subsequent breach of MPC integrity. There is no causal factor that would result in this scenario, and the analysis was conducted as an exercise to help establish the appropriate Controlled Area Boundary. In this scenario, the hypothetical breach in the MPC could result in a whole-body dose of 1.18 mrem at the Controlled Area Boundary in the first 30 days after the accident (PGE 2019). This is below the levels specified by the EPA PAGs and 10 CFR 72.106 and demonstrates that the design of the ISFSI and Controlled Area continues to comply with the requirements of the rule.

Because no repairs or alterations to the ISFSI were authorized as part of the license renewal process, the certificate holder's compliance with the rule was not affected. In addition, as described above, there does not appear to have been changes to federal law that would affect the rule since the rule was last amended. Staff does recommend that replacing the reference to the Protective Action Guide Manual in section (2)(b) with the specific TEDE threshold provided in the 1992 manual and the 2017 update described above would improve the clarity of the rule and would not substantively change the required design basis for the ISFSI. Staff also recommends additional clarifying changes to improve the readability of the rule:

(2) ~~Capacity and Safety Standards:~~ The certificate holder may store a maximum of 791 complete and partial fuel assemblies and storage of containers with nuclear fuel materials at an Independent Spent Fuel Storage Installation (ISFSI) at the site of the former Trojan Nuclear Plant, subject to the requirements of OAR 345-026-0300 through 345-026-0390. ~~Storage of spent nuclear fuel and related radioactive material and waste at the site of a nuclear installation by a certificate holder who has executed a contract with the United States of America pursuant to the Nuclear Waste Policy Act, shall be deemed a permitted use of the site pending transfer of spent nuclear fuel to the U.S. Department of Energy provided that:~~

(a) ~~Storage facilities are~~ The ISFSI must be designed to maintain discharges within the limits specified in applicable licenses authorized under the Atomic Energy Act of 1954, as amended, and any applicable permits issued under the National Pollutant Discharge Elimination System;

(b) ~~Storage facilities are~~ The ISFSI must be designed such that in case of accidents ~~off-site radiation exposures~~ the projected dose to an individual outside of the Controlled Area Boundary will not exceed 1 rem over four days ~~the Environmental Protection Agency Protective Action Guidelines (October, 1991) for off-site protective actions; and.~~

(c) ~~The facility is ISFSI~~ may not be used to store any spent nuclear fuel or radioactive materials and wastes other than that generated or used in the operation of the former Trojan Nuclear Plant.

4.6.2 OAR 345-026-0390(3): Radiation Protection Program

(3) The certificate holder shall perform activities related to transfer, storage and handling of fuel and other radioactive waste in accordance with a radiation protection program that complies with 10 CFR 20, including a program to maintain personnel radiation exposure As Low As Reasonably Achievable (ALARA) as that term is defined in 10 CFR 20.

The Radiation Protection Program for the ISFSI is described in Section 7 of the SAR. Because the ISFSI is designed to ensure that the dose to a person at or outside the Controlled Area Boundary is below regulatory limits, the program is primarily designed to ensure that ISFSI personnel exposures are ALARA. The Radiological Environmental Monitoring Program discussed in Section 4.2 of this report ensures the dose to the public is below regulatory limits and ALARA.

As described in Section 7.4 of the SAR, the Radiation Protection Program primarily relies on the design features of the ISFSI, such as non-planar paths for air inlet and outlet vents to minimize radiation streaming, embedded radiation shielding in the concrete casks, multiple pass welds on all MPC seal closures, and the arrangement of storage casks on the storage pad to provide additional shielding for more radioactive casks. As a result, the average external surface dose from the casks is 100 mrem/hr on the sides and 300 mrem/hr on the top and at the air vents. The passive design of the storage systems and absence of mechanical equipment minimize the need for workers to be near the casks for extended periods of time, and when work is being performed only trained personnel, or persons escorted by trained personnel, are permitted within the Controlled Access Area. TLDs are worn by personnel within the controlled access area to ensure that the dose to any person does not exceed the annual occupational dose or ALARA limits.

The SAR estimated that the collective dose per year for weekly surveillances, annual and quarterly surveys, and regular ISFSI maintenance would be 1.6 person-rem per year. This estimate was considered in the 2002 Staff Evaluation's conclusion that the Radiation Protection Program was sufficient to ensure that personnel radiation exposures would be ALARA. The estimate was based on conservative assumptions, and PGE's annual reporting of results from personnel TLD monitoring has not shown any dose to workers in the last decade of operating experience.

There were no changes to the radiation protection program made as part of the license renewal process, however, as described in section 5.2.1 and 5.2.2, the Aging Management Programs for the MPCs and Concrete Casks do result in some changes to inspection procedures that could affect occupational doses. Specifically, the AMPs require the lid of the concrete casks to be removed during 5-year inspections to allow greater access to the MPC exterior and the interior

surfaces of the cask. Staff notes that this change, which was made at the request of the NRC, could result of higher occupational doses, utilizing the cask with the lowest level of radioactivity and performing inspections using remote videography is intended to help maintain ALARA exposure levels.

Because there have been no changes to the Radiation Protection Program, staff recommends that the certificate holder's compliance with the rule was not affected. To improve the clarity of the rule, staff recommends this section be relocated to the section providing the program requirements for the ISFSI.

4.6.3 OAR 345-026-0390(4): Transfer of Materials

(4) Except as required for accident mitigation as described in the Safety Analysis Report, the certificate holder shall not transfer spent fuel from an interim spent fuel storage installation to new casks or shipping containers without approval by the Council prior to the transfer.

No significant construction activities or repairs were authorized as part of the license renewal process, and no transfer activities are expected to occur until the USDOE takes possession of the spent nuclear fuel. Because no transfer of materials has occurred, the certificate holder's compliance with this rule is not affected.

Staff notes that this rule was initially adopted as part of a requirement to ensure that the ISFSI would be designed in a manner that minimized the handling of spent nuclear fuel. In the 2002 Staff Evaluation, staff recommended that use of the Holtec MPCs at the ISFSI met this requirement because, once loaded, the MPCs could be used to store, transfer, and permanently dispose of the spent nuclear fuel. The SAR also demonstrates that there is no credible accident scenario that would result in a breach of the MPC or otherwise require the spent nuclear fuel to be moved into a new Storage Cask. To better reflect the final design of the ISFSI and the provisions of the SAR, staff recommends the rule be amended to clarify that the certificate holder may not remove or transfer an MPC from its concrete storage casks without the Council's prior approval.

~~(4) Except as required for accident mitigation as described in the Safety Analysis Report, the certificate holder shall may not remove or transfer spent fuel from an interim spent fuel storage installation to new casks or shipping containers a multipurpose canister from its storage cask without approval by the Council's prior approval to the transfer.~~

4.6.4 OAR 345-026-0390(5): 10-year Report on Federal Repository

(5) Reporting Requirements: The operator of an interim spent fuel storage facility shall submit every ten years and, in addition, no later than September 3, 2038, a report containing the actual or expected date when the Federal government will accept the High Level Waste and an analysis of the facility's continued acceptability for use if a Federally licensed High level Waste site remains unavailable. This report need not be submitted if

the Council or its successor determines that a Federally licensed high level waste site is available and that spent nuclear fuel from the facility will be accepted prior to September 3, 2043.

Under OAR 345-026-0390(5), the certificate holder for an ISFSI must submit a report every ten years that contains the actual or expected date when the Federal government will accept the spent fuel stored at the ISFSI and an analysis of the facility's continued acceptability for use if a federal waste site remains unavailable.

PGE submitted its second 10-year report on April 2, 2019. In the report PGE noted that the USDOE had not updated its projected schedule for taking possession of waste stored at the ISFSI since the licensing proceedings for Yucca Mountain were suspended, and that PGE was unable to forecast an accurate timeline as a result. In lieu of providing an updated estimate, the second 10-year report maintained the projected timeline provided in 2009 which assumed that a permanent repository would become operational in 2020, transfer of spent fuel from the Trojan ISFSI would begin in 2024, and the site would be fully decommissioned by 2034. PGE acknowledged that it was highly unlikely that this timeline would be met.

Permanent disposal of the spent fuel stored at the Trojan ISFSI is ultimately the responsibility of the US Department of Energy (USDOE). The Nuclear Waste Policy Act of 1982 (NWPA) directed the U.S. Department of Energy (USDOE) to investigate sites for a permanent repository for spent nuclear fuel and other high-level nuclear wastes, and a 1987 amendment narrowed this investigation to a single location: Yucca Mountain, Nevada. USDOE completed its investigation of the Yucca Mountain Site in 1998, and in 2002 recommended congress approve of the site as the location for the federal geologic repository. In 2008, USDOE submitted an application to the NRC for a license to construct and operate the repository at Yucca Mountain. Just two years later, USDOE filed a motion to withdraw the application "with prejudice," stating that the site was not a workable option. The NRC licensing board denied the motion, but formally suspended the licensing process in September 2011 (USGAO 2017).

In 2012, the Blue Ribbon Commission on America's Nuclear Future formed under the Obama Administration recommended that Congress amend the NWPA to allow for consideration of a permanent repository other than Yucca Mountain, to authorize construction of interim storage facilities after a permanent repository has been licensed, and to prioritize transfer of spent fuel from nuclear plants that are no longer in operation when an interim storage facility is available. Congress has not acted on these recommendations to date.

Staff notes that two private companies have submitted applications for authorization to construct and operate consolidated interim storage facilities. Interim Storage Partners, LLC, submitted a license application for an interim storage facility in Andrews County, Texas in 2016. Holtec International submitted a license application for a facility in Lea County, New Mexico in 2017. In early 2020, the NRC released draft environmental impact statements recommending approval of both license applications but there is considerable legal uncertainty around NRC's authority to authorize either license before a permanent repository is available.

Based on the absence of any substantive progress towards the establishment of a permanent repository, staff agrees with PGEs assessment that it is unlikely that the federal government will take possession of the waste stored at the Trojan Site in time for the ISFSI to be decommissioned by 2034. Staff also agrees that until Congress provides clear direction to USDOE on a permanent waste management solution, there is no reliable information on which to base an updated timeline.

The second requirement of the 10-year report is to provide an analysis of the continued acceptability of use of the ISFSI until a federal repository is available. PGE explained that the initial Safety Analysis Report for the Trojan ISFSI provided an analysis demonstrating that all ISFSI components could provide safe storage of the spent nuclear fuel over a 40-year design life. The expiration of this 40-year design life would have roughly corresponded with the 2043 date in rule allowing suspension of the 10-year reporting requirement.

As part of the license renewal application, PGE provided updated analyses supporting findings that the ISFSI components could continue to perform their intended safety functions for the extended 60-year service life authorized under the renewed license. The NRC's 2019 Final Environmental Assessment for the proposed license renewal agreed that "the continued operation of the Trojan ISFSI...will not significantly affect the quality of the environment" and that "no significant radiological or nonradiological impacts are expected from continued normal operations." These findings were based in part on the "Generic Environmental Impact Statement for Continued Storage of Spent Nuclear Fuel" published by the NRC on September 19, 2014. The GEIS concluded that the potential impacts of continuing to store spent fuel in an ISFSI for an additional 60 years after the expiration of the reactor's license to operate would be small (NRC 2014).

Due to the uncertainty surrounding the timing of the establishment of a permanent repository, and because the license renewal process demonstrated that the ISFSI is likely to continue to have minimal radiological and other environmental impacts during the extended period of operation, staff believes there may be limited value in continuing to require 10-year reports. As a result, staff recommends that this section be removed and replaced with a new requirement for the certificate holder to conduct and report on aging management activities to ensure the ISFSI will perform its intended safety functions in the extended period of operation as required by the new Aging Management Programs described further in Sections 4.6.5 and 5 of this report.

- 4.6.5 OAR 345-026-0390(6)(a) – (c), (e): Safety Analysis Report & Programs
"(6) The Council approves the plan, as may be amended under Part (c) below, for an Independent Spent Fuel Storage Installation (ISFSI) as described in the ISFSI Safety Analysis Report (SAR) (PGE-1069), Revision 2. In addition to the criteria in OAR 345-026-0390(2)(a), (b), and (c), and (3) and (4), the plan is subject to the following criteria:

(a) Programs: Portland General Electric (PGE) shall establish and maintain programs for Temperature Monitoring and Air Vent Inspection and Structural Inspection that are consistent with maintaining exposures to ionizing radiation As Low As Reasonably Achievable (ALARA) and with the assumptions and conclusions in the Department "Staff Evaluation of Holtec Design for Portland General Electric's Independent Spent Nuclear Fuel Installation (ISFSI)," September 2002.

(b) Contingency Plans: PGE shall establish and maintain a plan for maintaining equipment onsite and having equipment available within a reasonable time period to respond to credible accident scenarios and a plan for construction of new concrete casks.

(c) Changes to Commitments: PGE may make changes to the ISFSI as described in the Safety Analysis Report without prior Council approval if such changes do not reduce commitments or change the assumptions and conclusions in the Department "Staff Evaluation of Holtec Design for Portland General Electric's Independent Spent Nuclear Fuel Installation (ISFSI)," September 2002. If proposed changes would reduce commitments or change the assumptions or conclusions of the Department "Staff Evaluation of Holtec Design for Portland General Electric's Independent Spent Nuclear Fuel Installation (ISFSI)," September 2002, PGE shall obtain prior approval from the Department. Prior Department approval is not required when the proposed change would not have the above effects, is required for compliance with the regulations or orders of the U.S. Nuclear Regulatory Commission or is necessary to protect the health and safety of the public when there is insufficient time to obtain prior Department approval.

** * **

“(e) Frequency of Temperature Monitoring and Air Vent Inspection: The Temperature Monitoring and Air Vent Inspection Program established by PGE pursuant to Section (6)(a) of this rule shall include daily readings of Concrete Cask air outlet and ambient temperatures. The program shall include provisions for more frequent measurements if temperatures approach Technical Specification limits. The program shall also include a requirement to check air inlet and outlet vents for blockage weekly. PGE may reduce these surveillance frequencies with Department approval. PGE may apply extensions of up to 25 percent of individual surveillance intervals to accommodate minor variations in work scheduling.

OAR 345-026-0390(6) establishes Revision 2 of the SAR as the regulatory basis for the ISFSI and requires PGE to obtain the Council’s approval for any changes to the ISFSI that would reduce commitments or change the assumptions or conclusions of the 2002 Staff Evaluation.

Section (6)(a) requires the certificate holder to maintain a Thermal Monitoring and Air Vent Inspection Program and a Structural Inspection Program. The specific requirements for the Thermal Monitoring and Air Vent Inspection Program, as described in subsection (6)(e) of the rule requires the air outlet temperature and the ambient air temperature to be measured and recorded daily, and for air inlet vents to be inspected and verified free of blockage weekly. As described in Section Technical Specification 5.5.3 describes the thermal monitoring program used to monitor the thermal performance of each concrete cask at the ISFSI. The program continues to require the air outlet temperature and the ambient air temperature to be measured and recorded daily, and for air inlet vents to be inspected and verified free of blockage weekly. The program also describes situations in which the frequency of monitoring or inspections may be increased, such as in the event of an unexplained difference between the air vent temperature and the ambient temperature or the occurrence of an unusual environmental phenomenon. No changes to the thermal monitoring program were made a result of license renewal process.

Subsection (6)(a) also requires the Certificate Holder to establish and maintain a Structural Inspection Program. The 2002 Staff Evaluation explained that the program described in Section 9.7.7 of the SAR and Trojan ISFSI Procedure (TIP) 09 satisfied the rule requirements. The program required an annual visual inspection of the exterior surfaces of each concrete cask as well as the ISFSI pad surfaces and the transfer station, and repair and radiation monitoring of any defect on any surface that exceeded one-half inch in diameter and one-quarter inch in depth or any exposed reinforcing steel. The SAR also required a Concrete Cask Interior Inspection Program, which required the interior of the first cask placed in service at the ISFSI be inspected at five-year intervals. The first cask was selected because it is expected to have the lowest heat load and lowest dose rate, which helps to maintain exposures at ALARA levels. Interior Inspections were conducted in 2008, 2013, and 2018 using remote visual inspection systems. The inspections have shown calcium residue and areas of light rust in the interiors as well as wasp nests and cobwebs, but no evidence of degradation of either the MPC surface or the Concrete Cask Exterior (PGE 2019).

The renewed license and revised SAR will replace both the Structural Inspection Program and the Concrete Interior Inspection Programs with new long-term Aging Management programs. As described further in Section 5 of this report, the Department has reviewed the programs and does not believe their implementation will result in a reduction in commitment or significant change in the assumptions and conclusions relied upon in the 2002 evaluation. Staff further notes that while it is the Department's assessment that the Council's prior approval is not required for the Aging Management Programs, PGE took appropriate steps to notify the Department and Council of the changes prior to their implementation. As such, staff recommends that the certificate holder's compliance with the rule will not be affected; however, because the Structural Inspection Program referenced in the rule will be replaced, we recommend that a new section be added to the rule requiring PGE to follow and maintain the new Aging Management Programs.

Subsection (6)(b) requires a PGE to establish and maintain a plan for maintaining equipment onsite and having equipment available within a reasonable time period to respond to credible accident scenarios and a plan for construction of new concrete casks. Staff was unable to locate such a contingency plan, but the Emergency Plan required under OAR 345-026-0350 appears to satisfy the requirements of this rule.

Subsection (6)(c) provides that changes to the ISFSI and SAR, which staff believes includes changes the programs described in subsections (6)(a), (b), and (e), require the Department's prior approval if the changes would reduce commitments or change the assumptions and conclusions in the Department's "Staff Evaluation of Holtec Design for Portland General Electric's Independent Spent Nuclear Fuel Installation (ISFSI)," September 2002 unless the change "is required for compliance with the regulations or orders of the U.S. Nuclear Regulatory Commission or is necessary to protect the health and safety of the public when there is insufficient time to obtain prior Department approval." While the changes to the ISFSI or SAR over the nearly 20 years since the 2002 Staff Evaluation was produced have generally not, as documented in this report, reduced commitments or changed assumptions, staff recommends that continued reliance on a specific staff evaluation or SAR revision over the period of extended operation granted by the license renewal is untenable. To ensure the decisions on change requests are made using the most up to date information, and to better align the rules requirements with federal regulations, staff recommends that the NRC's standard for changes that require a license amendment under 10 CFR 72.48(c)(2) would be a more appropriate basis for the rule:

*"(2) A specific licensee shall obtain a license amendment pursuant to § 72.56 * * * prior to implementing a proposed change, test, or experiment if the change, test, or experiment would:*

(i) Result in more than a minimal increase in the frequency of occurrence of an accident previously evaluated in the FSAR (as updated);

(ii) Result in more than a minimal increase in the likelihood of occurrence of a malfunction of a system, structure, or component (SSC) important to safety previously evaluated in the FSAR (as updated);

(iii) Result in more than a minimal increase in the consequences of an accident previously evaluated in the FSAR (as updated);

(iv) Result in more than a minimal increase in the consequences of a malfunction of an SSC important to safety previously evaluated in the FSAR (as updated);

(v) Create a possibility for an accident of a different type than any previously evaluated in the FSAR (as updated);

(vi) Create a possibility for a malfunction of an SSC important to safety with a different result than any previously evaluated in the FSAR (as updated);

(vii) Result in a design basis limit for a fission product barrier as described in the FSAR (as updated) being exceeded or altered; or

(viii) Result in a departure from a method of evaluation described in the FSAR (as updated) used in establishing the design bases or in the safety analyses.”

Staff recommends that the rule be updated to incorporate the criteria under 10 CFR 72.48(c)(2) by reference, and to make changes to the programs required under OAR 345-026-0390(6) to be subject to this criteria. As described under Sections 4.2, 4.6.2, and 4.6.4, this criteria would also apply to the Radiation Protection Program, the Radiological Environmental Monitoring Program, and the new Aging Management Programs, the requirements for which staff recommends be relocated to this rule. To reflect these changes, staff recommends that OAR 345-026-0390(6) be amended as follows:

~~(6) The Council approves the plan, as may be amended under Part (c) below, for an Independent Spent Fuel Storage Installation (ISFSI) as described in the certificate holder must operate the ISFSI consistent with a Safety Analysis Report (SAR) (PGE 1069), Revision 2. In addition to the criteria in OAR 345-026-0390(2)(a), (b), and (c), and (3) and (4), the plan is subject to the following criteria: submitted in compliance with 10 CFR 72.70 and the following requirements:~~

~~(a) Programs The Safety Analysis Report must provide for the following programs:~~

~~(A) Portland General Electric (PGE) shall establish and maintain programs for A Temperature Monitoring and Air Vent Inspection Program and Structural Inspection that are consistent with maintaining exposures to ionizing radiation As Low As Reasonably Achievable (ALARA) and with the assumptions and conclusions in the Department "Staff Evaluation of Holtec Design for Portland General Electric's Independent Spent Nuclear Fuel Installation (ISFSI)," September 2002. The program must include daily readings of Concrete Cask air outlet and ambient temperatures. The program must include provisions for more frequent measurements if temperatures approach Technical Specification limits. The program must also include a requirement to check air inlet and outlet vents for blockage weekly. The certificate holder may extend individual surveillance intervals by up to 25 percent to accommodate minor variations in work scheduling.~~

~~(B) A Radiation Protection Program that complies with 10 CFR 20.1101 and ensures exposures to ISFSI personnel and the public are As Low As Reasonably Achievable as that term is defined in 10 CFR 20.1003.~~

(C) A Radiological Environmental Monitoring Program that ensures the ISFSI complies with section (2) of this rule.

(D) An Aging Management Program for management of issues associated with aging that could adversely affect ISFSI components that are important to safety.

(bE) Contingency Plans: PGE shall establish and maintain a plan A program for maintaining equipment onsite and having equipment available within a reasonable time period to respond to credible accident scenarios and a plan for construction of new concrete casks.

~~(e) Changes to Commitments: PGE shall obtain prior approval from the Department for any change to the ISFSI as described in the or Safety Analysis Report that would require prior approval from the NRC under 10 CFR 72.48 without requesting the Council's prior Council approval if such changes do not reduce commitments or change the assumptions and conclusions in the Department "Staff Evaluation of Holtec Design for Portland General Electric's Independent Spent Nuclear Fuel Installation (ISFSI)," September 2002. If proposed changes would reduce commitments or change the assumptions or conclusions of the Department "Staff Evaluation of Holtec Design for Portland General Electric's Independent Spent Nuclear Fuel Installation (ISFSI)," September 2002, PGE shall obtain prior approval from the Department. Prior Department approval is not required when the proposed change would not have the above effects, unless the proposed change is required for compliance with the regulations or orders of the U.S. Nuclear Regulatory Commission or is necessary to protect the health and safety of the public when there is insufficient time to obtain prior Department approval.~~

* * *

~~(e) Frequency of Temperature Monitoring and Air Vent Inspection: The Temperature Monitoring and Air Vent Inspection Program established by PGE pursuant to Section (6)(a) of this rule shall include daily readings of Concrete Cask air outlet and ambient temperatures. The program shall include provisions for more frequent measurements if temperatures approach Technical Specification limits. The program shall also include a requirement to check air inlet and outlet vents for blockage weekly. PGE may reduce these surveillance frequencies with Department approval. PGE may apply extensions of up to 25 percent of individual surveillance intervals to accommodate minor variations in work scheduling.~~

4.6.6 OAR 345-026-0390(6)(d) Biennial Status Report

(d) Reporting requirements: In lieu of the requirements described in OAR 345-026-0080, within one year of the first cask loading and biennially thereafter, PGE shall provide a written report to the Council on the status of the ISFSI. The report shall include, at a minimum, the results of radiation monitoring programs, a summary of personnel exposure related to ISFSI storage operations, a statement of expenses related to ISFSI storage operations, a statement of the estimated costs of continuing ISFSI storage operations through decommissioning and the estimated costs of decommissioning, including a discussion of the methods and assumptions used to estimate operations and decommissioning costs, an estimate of funds available for continuing ISFSI storage operations through decommissioning and funds available for ISFSI decommissioning, and a statement of any significant developments regarding the opening of a Federally licensed High Level Waste facility.

OAR 345-026-0390(6)(d) requires the certificate holder to provide a biennial status report, similar to the reports required under 10 CFR 72.48(d)(2) and 10 CFR 72.30. As described in section 4.5, PGE was required to submit an updated decommissioning funding plan as part of the license renewal process, but PGE's compliance with this rule was not otherwise affected. To better align with federal requirements and changes proposed to section (6)(c) of the rule, staff recommends that a provision requiring a summary of any changes to the ISFSI or SAR that would not require prior approval from the Council or NRC that occurred since the last biennial report be added to the rule. PGE currently provides this information to the NRC in its biennial report designated PGE-1081.

4.6.7 OAR 345-026-0390(6)(f): Contractors

(f) Contractors: PGE shall require contractors who perform portions of the ISFSI storage or transporting operations to adhere to all applicable provisions of OAR 345-026-0390.

At this time, the ISFSI continues to be staffed by ISFSI personnel, and pursuant to the radiation protection program described under section 4.6.2, only trained personnel or visitors that are accompanied by trained personnel are permitted to enter the ISFSI controlled access area. The certificate holder's compliance with this rule was not affected by the license renewal process, and staff does not recommend any substantive changes to the rule.

5 Evaluation of Aging Management Review

Under 10 CFR 72.42, each application for a renewal of an NRC issued ISFSI license must contain time-limited aging analyses (TLAAs) that demonstrate that structures, systems, and components that are important to safety will continue to perform their intended function for the extended period of operation and a description of the Aging Management Programs (AMPs) for management of issues associated with aging that could adversely affect structures, systems, and components important to safety.

In its License Renewal Application, PGE provided a review to identify aging effects requiring management to determine the activities required to manage the effects. In the review, PGE

identified the aging mechanisms and effects applicable to each subcomponent of components in the scope of the review based on the combination of materials and environments and a review of known literature, industry operating experience, and maintenance and inspection records. Finally, for each identified aging mechanism and effect, the applicant identified an AMP or TLAA to ensure that the intended function of the ISFSI component would be maintained during the period of extended operation. NRC staff reviewed the process and found that it was consistent with NRC's recommended methodology and adequate for identifying credible aging effects for the components within the scope of renewal. NRC's full review is included in a Safety Evaluation Report published in August 2019. We include a summary of the aging effects requirement management, PGE's proposed aging management activities, and NRC's findings and recommendations below.

5.1 Time-Limited Aging Analysis

TLAAs are safety relevant calculations that involve time-limited assumptions. These are typically calculations that were conducted during the initial licensing to support the basis for the approved design life of the facility and that must be updated to demonstrate that an ISFSI can continue to operate safely during the extended period of operation following a license renewal. PGE identified four TLAAs that required further evaluation as part of the license renewal.

The NRC reviewed the renewal application and design-basis documentation and confirmed that PGE had appropriately identified all necessary TLAAs and that the evaluation provides reasonable assurance that the structures, systems, and components that are important to safety will perform their intended functions during the period of extended operation.

The Department reviewed both PGE's application and the Safety Evaluation Report containing the NRC's review and findings. While staff did not independently verify the calculations performed as part of the TLAAs, staff finds the results and NRC's review to provide reasonable assurance that the ISFSI can continue to operate safely during the period of extended operation. A summary of the TLAAs and the NRC's review is provided below.

5.1.1 MPC fatigue evaluation

In its initial evaluation for the ISFSI, PGE performed a fatigue evaluation to determine if temperature cycling could lead to embrittlement of the MPC's stainless steel components over time. The evaluation concluded that this was not a significant concern because the concrete storage casks limit exposure of the MPC to ambient temperature and sunlight cycling. The Department reached similar conclusions in its 1999 and 2002 staff evaluations. PGE proposed that this analysis continues to be valid for the period of extended operation. The NRC found this to be acceptable.

The initial evaluation also considered the effect that multiple lifts of the MPC could have on the fatigue life of the MPC. The MPCs are only expected to be lifted when they are being transferred to the transport cask for permanent disposal, but additional lifting could be required if a concrete cask needed to be replaced. PGE conducted an evaluation of the effect

that repeated lifting of the MPC might have on the fatigue life of the MPC, as described in Section 3.8 of the license renewal application. The results of the evaluation showed that an MPC could be lifted 6,750 times without incurring fatigue failure. NRC staff found the evaluation acceptable for demonstrating adequate MPC fatigue performance during the extended storage period.

5.1.2 Neutron absorber depletion evaluation

PGE's License Renewal Application provided an evaluation for the potential loss of boron in the neutron poison plates inside the MPC and its impact on the criticality safety of the ISFSI during the period of extended operation. The result shows that it would take approximately 20 billion years to deplete all the Boron in the poison plates at the neutron flux level when the casks were loaded. Based on this result, PGE concluded over a 500-year period, less than 1 part per million of total boron atoms in the fuel assemblies would be depleted. NRC staff verified that this result was consistent with its independent calculations and that the results provided reasonable assurance that the ISFSI would continue to meet the criticality safety requirement of 10 CFR 72.124(a) without a need for an AMP.

5.1.3 Transfer cask fatigue evaluation

PGE provided a cyclic loading fatigue evaluation of the transfer cask. The evaluation showed that the transfer cask could be used for 3,730 lift cycles without incurring fatigue failure. This far exceeds the number of lifts and MPC support cycles of the transfer cask that are expected to be needed. NRC Staff determined that the evaluation was done appropriately, and that the results were acceptable.

5.1.4 Fuel cladding integrity evaluation.

Section 4.2.6.1 of the Trojan ISFSI SAR describes a calculation for the fuel cladding temperature limit, which is a function of temperature versus time as well as internal rod pressurization. The original fuel cladding temperature limit was established to keep the probability of cladding breach less than 0.5 percent per fuel rod over a 40-year storage term. PGE reviewed the Calculation for the 60-year term authorized under the revised license and determined that the 60 years of storage will use just 6 percent of the cladding life. NRC staff found this evaluation to be acceptable for demonstrating that the cladding damage will not result in a loss of safety functions during the period of extended operation.

5.2 Aging Management Programs

In addition to the TLAAs, the License Renewal Application described Aging Management Programs proposed by PGE for the management of issues associated with aging that could adversely affect structures, systems, or components that are important to safety. These include AMPs for the MPCs, Transfer Cask, Concrete Casks, and the Transfer Station.

Each AMP is described further below, generally the AMPs use visual inspections to identify defects or irregularities that may indicate degradation of an ISFSI components that may impair its ability to perform important to safety functions during the period of extended operation.

The NRC reviewed the programs and found that they provide reasonable assurance that aging mechanisms and effects will be adequately managed during the period of extended operation, in accordance with 10 CFR Part 72.42(a)(2).

The Department reviewed the programs and found that the programs do not reduce commitments or substantially change the assumptions and conclusions in the Department 2002 Staff Evaluation. The Department has attempted to identify areas where the AMPs differ from the previously reviewed procedures and programs in the descriptions below.

5.2.1 Multipurpose Canister Aging Management Program

The Aging Management Program for the MPC will use visual inspections to manage loss of material due to corrosion, pitting and crevice corrosion, and stress corrosion cracking on the external MPC surfaces material. The inspections will look for visual evidence of discontinuities and imperfections, such as localized corrosion, including pitting corrosion and cracking of the accessible canister welds and weld-heat-affected zones. The inspections also look for the appearance and location of deposits on the canister surfaces.

The AMP requires an ASME VT-3 visual inspection to be performed on one canister every 5 years. To allow for the best continued monitoring and trending, the inspection will be performed on the same cask that was previously inspected as part of the Concrete Cask Interior Inspection Program described under Section 4.12 of this report. This cask is also the oldest and lowest heat-load cask at the ISFSI. The first three inspections were performed in 2008, 2013, and 2018, and the next inspection will serve as the Baseline Inspection for the MPC AMP. The MPC AMP inspections will be concurrent with the concrete cask inspections described in the following sections.

The AMP requires the concrete storage cask lid to be removed, and the shield ring lifted or removed to provide access to the concrete cask interior space above the MPC. A visual inspection of the MPC lid and closure ring will be performed using a borescope or equivalent. A visual inspection of the MPC surfaces below the shield ring will be performed using a borescope or equivalent run through each outlet vent.

The current concrete cask interior inspection does not require removal of the concrete cask lid, in part based on the certificate holder's representation that lid removal was unnecessary, and that lid removal could result in increased risk of exposure to ISFSI personnel during the inspections. The Department concurred with this assessment in its 2002 Staff Evaluation. The certificate holder initially proposed that the AMP inspection program also be conducted entirely through the use of borescopes inserted through the cask vents, however, during its review, the NRC determined that removal of the concrete cask lid was needed to provide access to the MPC lid and closure ring and to allow for inspection of the bottom of the concrete cask lid. The department deferred to the NRC and did not raise this issue during the license renewal process, however, implementing procedures for the new AMPs are in development and the Department will continue to monitor to ensure that ALARA protections are maintained. In addition, the certificate holder noted in its License Renewal Application that if the baseline AMP

inspection results for these components are acceptable, it may consider requesting a change to the inspection intervals for these subcomponents so that the cask lid is only required to be removed every 10 years, instead of every 5. The Department will provide an update to the Council if this occurs and may also provide additional recommendations based on the results of the baseline survey.

The acceptance criteria for the inspection of the MPC surface are no indication of localized corrosion pits, etching, stress corrosion cracking, or red-orange-colored corrosion products in the vicinity of accessible canister fabrication welds and closure welds. If corrosion is discovered, the certificate holder may upgrade the inspection to an ASME VT-1 or volumetric inspection to determine whether the identified corrosion is indicative of the formation of stress-corrosion cracking. Additional Corrective Actions may include removal of the deposits and rust stains in accessible locations to confirm that localized corrosion or cracking has not begun. In addition, this process may result in an engineering evaluation to determine the extent and impact of the condition on the ability of the MPC to perform its intended function.

5.2.2 Concrete Cask Aging Management Program

The AMP for the Concrete Casks will use visual inspections and radiation monitoring to manage loss of material (steel) due to corrosion and concrete aging effects (loss of strength, spalling, cracking, and scaling) caused by freeze-thaw cycles, alkali-silica reaction, calcium hydroxide leaching, and corrosion of embedded reinforcing steel.

The AMP requires visual inspection of the Concrete Cask exterior annually to identify defects or irregularities to detect the deterioration of the exposed steel and concrete surfaces. Defects associated with the concrete surface are defined as damage or degradation (scabbing, spalling, cracking) larger than 0.5 inches in diameter or width and with a depth greater than 1/4 inch. Defects also include evidence of leachate deposits, staining, or stalactite growth on the concrete surface. Contact radiation dose rate measurements will be taken at the location of any identified defect in the concrete surface and at an unaffected location adjacent to the defect. The results of these measurements are compared to each other to assess whether the defect has compromised the radiation shielding function of the concrete. Defects associated with the cask lid are defined as chipped, cracked, blistered, or missing coating that exposes base metal, and corrosion products showing through the coating. Defects associated with the inlet and outlet air assemblies are visible signs of blockage in the air flowpath.

The AMP requires the accessible interior steel surfaces of the concrete cask to be inspected for visual indications of corrosion every 5-years. The inspection is performed on the first concrete cask placed in service at the Trojan ISFSI, which is the cask previously inspected as part of the site's Concrete Cask Interior Inspection Program, allowing for the best continued monitoring and trending. If aging-related degradation is discovered on the currently selected concrete cask and a second sample concrete cask is determined to be necessary, the new cask will be selected based on the aging mechanism of concern, fabrication history, heat load, and time in service.

Visual inspection of the concrete cask lid, shield ring, and top-end surfaces of the cask liner will be performed using a borescope (or equivalent) after removal of the cask lid and removal or lifting of the shield ring. Visual inspection of the accessible concrete cask liner surfaces below the shield ring, the annular space, and the interior areas of the vents will be performed using a borescope (or equivalent) run through each outlet vent to cover the full surface of the vent. The results of the inspections will be documented and compared against previous inspections in order to monitor and trend the progression of the aging effects over time.

In 2019, the Department contracted Woods Environment & Infrastructure Solutions, Inc. to conduct an inspection of the concrete cask exteriors at the ISFSI and provide a report on the appropriateness of the Concrete Cask AMP to manage future aging effects. During the inspection, the contractor documented some signs of distress on the concrete cask, but found that these were commensurate with the age of the ISFSI. The final report recommended that the exposed concrete is capable of performing its intended function during the extended service life of the facility. The contractor also found that the visual inspection program outlined in the Aging Management Plan provided acceptable mechanisms to identify and address aging effects on the concrete cask exteriors.

5.2.3 Transfer Cask Aging Management Program

The aging effect requiring management for the transfer cask uses inspections to manage loss of material due to general, pitting, and crevice corrosion to ensure that the equipment maintains its intended function during the extended storage period.

The visual inspections will be used to identify defects or irregularities on the accessible surfaces of the transfer cask that may be evidence of degradation. Defects are defined as water jacket leakage; chipped, cracked, blistered or missing coating that exposes base metal; and corrosion products showing through the coating. Irregularities are defined as degradation that is noted but is less severe than a defect. This inspection will be performed before the use of the transfer cask and, at a minimum, once a year while in use.

If the inspections show the existence of loss of material on the external surfaces of the transfer cask, observations about the material condition will be recorded in accordance with inspection procedures. Concerns about condition will be corrected or evaluated as satisfactory before use of the transfer cask.

5.2.4 Transfer Station Aging Management Program

The transfer station is used for the short duration of MPC transfer between the transfer cask, concrete casks, and transportation cask. The AMP for the Transfer station will use visual inspections to manage loss of material due to corrosion for the transfer station and impact limiter top plate is loss of material due to corrosion, and concrete aging for concrete aging (loss of strength, spalling, cracking, scaling) caused by freeze-thaw cycles, alkali-silica reaction, calcium hydroxide leaching, and corrosion of embedded reinforcing steel for the transfer station pad. Degradation of the transfer station surfaces will be detected by identification of

defects or irregularities. Defects for the transfer station are defined as chipped, cracked, blistered, or missing coating that exposes base metal, and corrosion products showing through the coating. An irregularity is defined as damage or degradation to a component that is noted but is less severe and does not meet the definition of a defect. Defects for the transfer pad are defined as visible signs of movement, or holes or large cracks greater than 1.3 cm [1/2 inch] across or extending into rebar. Defects also include evidence of leachate deposits or staining on the concrete surface.

Visual inspection of the transfer station will be performed before its use and at least once a year while in use. As a part of the transfer station visual inspection of coated metal components, the impact limiter top plate will be inspected for chipped, cracked, blistered, or missing coating that exposes base metal and corrosion products showing through the coating. Observations about the material condition of transfer station surfaces will be recorded in accordance with inspection procedures. Concerns about condition will be corrected or evaluated as satisfactory before use of the transfer station.

The AMP will monitor chemical changes to the impact limiter that may affect the dynamic crush strength of the impact limiter foam. Samples of foam representative of the impact limiter foam will be tested for static crush strength every 10 years to identify changes in the impact limiter properties. While in storage, the foam samples shall be maintained in environmental conditions similar to those for the impact limiter. The test results will be compared against limits in the MPC drop analysis to verify that the material properties are adequate for the intended function of structural integrity under hypothetical accident conditions. In addition, visual inspection observations about the material condition will be recorded in accordance with inspection procedures and will be corrected or evaluated as satisfactory before use of the impact limiter.

5.3 Tollgate Assessments

In addition to the AMPs for individual facility components, the revised SAR requires periodic “Tollgate Assessments” to be performed to evaluate the effectiveness of the overall aging management program and perform a safety assessment that confirms the safe storage of spent nuclear fuel. The tollgate assessments also require the certificate holder to consider information collected by other ISFSI operators, and to take corrective actions when necessary. Corrective actions may include the adjustment of aging-related degradation monitoring and inspection programs in AMPs, modification of TLAAs, and performance of mitigation activities.

6 Conclusions and Recommendations

The Department’s analysis of the provisions of the license renewal application, revised Safety Analysis Report, and the documentation of NRC’s evaluation found that the license renewal process did not result in reductions to commitments or programs described in staff’s previous evaluations of the ISFSI, and that while the parameters of some of the analysis have changed, there were no changes to the underlying design or assumptions that would affect the certificate holders compliance with OAR 345-026-0300 to 345-026-0390.

In its Safety Evaluation Report, the NRC found that the aging management activities, including the AMPs and Tollgate Assessments, were sufficient to demonstrate that the ISFSI structures, systems, and components that are important to safety will continue to perform their intended safety functions over the period of extended operation. Staff concurs with the NRC's assessment, and finds that generally the inspection programs described in the AMPs enhance, rather than reduce, the commitments described in the 2002 Staff Evaluation.

While no compliance issues were identified, staff does recommend that rule changes are needed to ensure that regulatory decisions regarding the ISFSI in the future are based on the most current information and are consistent with changes in federal regulations that have occurred in the nearly 20 years since the staff published its 2002 Staff Evaluation. In general, these changes include:

- Clarifying the applicability of OAR 345-026-0300 to 345-026-0390 and OAR 345-070 to the Trojan ISFSI specifically and consolidating rules where possible.
- Removing references to the 2002 Staff Evaluation and previous versions of the ISFSI Safety Analysis Report as the regulatory basis for decisions regarding the ISFSI.
- Updating references to federal regulations, or replacing them with specific criteria, where appropriate
- Aligning criteria for when changes to the ISFSI or SAR require the Council's prior approval and review with federal regulations
- Replacing requirements for the Structural Inspection Program with the new Aging Management Programs

Staff has attached draft proposed rules reflecting these changes to this report. Staff recommends that Council adopt the proposed revisions prior to PGE's implementation of the Aging Management Programs on January 1, 2022.

7 Bibliography

Blue Ribbon Commission on America's Nuclear Future. 2012. "Report to the Secretary of Energy." January.

Energy Facility Siting Council. 1994. "Administrative Order EFSC 3-1994." June 28.

— . 1994. "Administrative Order EFSC 5-1994." 1994, November 30.

— . 1995. "Administrative Order EFSC 2-1995." November 3.

— . 1996. "Order Approving Decommissioning Plan for the Trojan Nuclear Plant." March 15.

— . 1998. "Hearing Officer's Report on EFSC Trojan Decommissioning Rule." September 14.

— . 1998. "Administrative Order EFSC 4-1998." October 26.

— . 1999. "Administrative Order EFSC 2-1999." April 14.

— . 1999. "Administrative Order EFSC 3-1999." April 21.

— . 2002. "Administrative Order EFSC 2-2002." December 3.

— . 2003. "Administrative Order EFSC 1-2003." September 3.

— . 2005. "Administrative Order EFSC 1-2005." May 23.

— . 2007. "Administrative Order EFSC 1-2007." May 15.

Holtec International. 2016. "Holtec International Final Safety Analysis Report for the HI-STORM 100 Cask System, Revision 13." March 31.

Nuclear-Thermal Energy Council. 1975. "Administrative Order NTEC-9." March 11.

Oregon Department of Energy. 1996. "Review of PGE's Decommissioning Plan for the Trojan Nuclear Plant." January 22.

— . 1999. "Staff Evaluation of Portland General Electric Independent Spent Fuel Storage Installation (ISFSI)." January 27.

— . 2002. "Staff Evaluation of Holtec Design for Portland General Electric's Independent Spent Nuclear Fuel Storage Installation (ISFSI)." September 20.

- . 2005. "Energy Facility Siting Council Briefing on Trojan Final Site Radiological Survey." February.
- . 2016. "Letter Re: Oregon Department of Energy Participation in Portland General Electric's Application to Renew the Trojan Independent Spent Nuclear Fuel Storage Installation with the Nuclear Regulatory Commission." September 12.

Portland General Electric.

- 2012. "Trojan ISFSI Procedure (TIP) 14, Radiological Environmental Monitoring Program, Revision 8." December 12.
- . 2013. "Trojan ISFSI Procedure (TIP) 09, Structural Inspection Program, Revision 7." January 30.
- . 2018. "Letter RE: Trojan License Renewal Meeting." July 10.
- . 2019. "License Change application 72-07." January 23.
- . 2019. "Trojan Independent Spent Fuel Storage Installation (ISFSI) Safety Analysis Report (PGE-1069), Revision 15." October 31.
- . 2020. "Trojan Independent Spent Fuel Storage Installation Preliminary Radiological Decommissioning Plan (PGE-1082), Revision 2." March 23.

U.S. Atomic Energy Commission. 1973. "Final Environmental Statement Related to Operation of the Trojan Nuclear Plant." U.S. Atomic Energy Commission.

US Environmental Protection Agency. 1992. "Manual of Protective Action Guides and Protective Actions for Nuclear Incidents." May.

- . 2017. "Protective Action Guides and Planning Guidance for Radiological Incidents."

U.S. Government Accountability Office. 2017. "Commercial Nuclear Waste: Resuming Licensing of the Yucca Mountain Repository Would Require Rebuilding Capacity at DOE and NRC, Among Other Key Steps." Washington, DC, April 26.

U.S. Nuclear Regulatory Commission. 1996. "Environmental Assessment Related to the Construction and Operation of the Trojan Independent Spent Fuel Storage Installation." November 25.

- . 2005. "Letter to S. Quennoz RE: Termination of Trojan Nuclear Plant Facility Operating License No. NPF-1." May 23.

- . 2006. "Amendment 6 to Materials License No. SNM-2509." March 17.
- . 2014. "Generic Environmental Impact Statement for Continued Storage of Spent Nuclear Fuel." Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, DC.
- . 2019. "Final Environmental Assessment of the Proposed Renewal of the US Nuclear Regulatory Commission License Number SNM-2509 for the Trojan Independent Spent Fuel Storage Installation in Columbia County, Oregon ." June. Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, DC. August.
- . 2019. "Safety Evaluation Report for the Trojan Independent Spent Fuel Installation." August.
- . 2019. "Notice of License Renewal Issuance, 84 FR 42023 ." August 16

**Trojan Independent Spent Fuel Storage Installation License Renewal
Staff Evaluation for the Energy Facility Siting Council
Attachment: Draft Proposed Revisions to OAR chapter 345
October 2021**

DRAFT

345-026-0170 - Notification of Incidents

~~(1)~~ The certificate holder ~~shall~~ must notify the Department of Energy within 72 hours of any occurrence involving the facility if:

~~(a1)~~ There is an attempt by anyone to interfere with its safe operation.

~~(b2)~~ There is a significant natural event such as a fire, earthquake, flood, tsunami or tornado, or human-caused event such as a fire or explosion.

~~(c3)~~ There is any fatal injury at the facility.

~~(2) For the Trojan Independent Spent Fuel Storage Installation:~~

~~(a) In the event of incidents or accidents requiring notification of the Nuclear Regulatory Commission by telephone, the certificate holder also shall notify the Department on the same time schedule.~~

~~(b) The certificate holder shall notify the Department of all incidents in accordance with the Emergency Plan, Security Plan, and other agreements as established.~~

Statutory/Other Authority: ORS 469.470

Statutes/Other Implemented: ORS 469.310, 469.410, 469.430, 469.507 & 469.530

Rules for ~~Nuclear Installations~~ The Trojan Independent Spent Fuel Installation

345-026-0300 - Regulations Applicable to ~~Nuclear Installations~~ the Trojan Independent Spent Fuel Installation

(1) The requirements of OAR 345-026-0300 through ~~345-026-0390~~ apply exclusively to the Trojan Independent Spent Fuel Installation (ISFSI) nuclear installations in Oregon as defined in ORS 469.300.

~~(2) OAR 345-026-0300 through 0390 do not apply to research reactors as described in OAR 345-030-0005.~~

(2) The purpose of these rules is to cooperate with the federal government in accordance with Oregon's siting policy in ORS 469.310 to ensure the safety of interim on-site storage and to ensure spent nuclear fuel and related radioactive materials and waste will not be an undue financial burden to utilities or people of Oregon.

(3) References to the Code of Federal Regulations in these rules refer to regulations in place as of August 9, 2019.

Statutory/Other Authority: ORS 469.470

Statutes/Other Implemented: ORS 469.501

~~345-026-0330~~ Radiological Environmental Monitoring

~~(1) The certificate holder shall establish a radiological environmental monitoring program.~~

~~(2) The certificate holder shall maintain a written radiological environmental monitoring program that describes applicable quality assurance measures.~~

~~(3) The certificate holder shall not make any changes to the radiological environmental monitoring program that involve a reduction in the number of environmental monitoring locations or associated monitoring data collection periodicity as approved in the Department of Energy "Staff Evaluation of Holtec Design for Portland General Electric's Independent Spent Nuclear Fuel Installation (ISFSI)," September 2002, without Department approval prior to implementation.~~

~~(4) Except as required by section (3), the certificate holder may make modifications to the radiological environmental monitoring program without prior Department approval. The certificate holder shall notify the Department of these changes within 60 days after implementation of the change. The Department shall promptly notify the Council of any such changes at a scheduled meeting of the Council.~~

Statutory/Other Authority: ORS 469.470

Statutes/Other Implemented: ORS 469.501 & 469.507

345-026-0340 - Security Plans for Nuclear Installations

(1) ~~The operator of a nuclear installation shall~~certificate holder must establish and maintain a security plan ~~with capabilities for protection of special nuclear material that complies with 10 CFR 72.44(e).~~

(2) ~~Upon assurance satisfactory to the Council and the certificate holder that confidentiality can be maintained, t~~The certificate holder shall~~must~~ make the security plan ~~for nuclear installations, and any revisions, available to for inspection by authorized Council representatives of the Council and Director upon request. The certificate holder, Department, and Council must protect information in the plan that falls within the definitions of "security program" or "safeguards information" in OAR 345-070-0015 from unauthorized disclosure in accordance with U.S. Nuclear Regulatory Commission regulation 10 CFR §73.21(c)(1)(iii), 73.22 and OAR chapter 345, division 070.~~

(3) The certificate holder ~~shall~~may not make ~~modifications~~changes to the security plan that involve a reduction in the ~~ability to detect or prevent unauthorized entry, or a reduction in the ability to detect or prevent the introduction of unauthorized material into a Protected Area or otherwise lessen the effectiveness of the physical security plan without prior written approval from the Council and Director, as required by ORS 469.530. Department approval prior to implementation.~~

(4) ~~Except as required by section (3), t~~The certificate holder may make ~~modifications~~changes to the security plan ~~that do not reduce the effectiveness of the plan without prior Department approval from the Council and Director. The certificate holder shall~~must notify the Department of ~~these modifications~~any changes made under this section within 60 days ~~of after their implementation and shall make the revised plan available to authorized Department representatives following implementation date of the changes. The Department shall~~must promptly notify the Council of the ~~plan modifications~~changes at a scheduled Council meeting, subject to ~~the provisions of OAR chapter 345, division 070~~U.S. Nuclear Regulatory Commission regulation 10 CFR §73.21(c)(1)(iii).

Statutory/Other Authority: ORS 469.470

Statutes/Other Implemented: ORS 469.501 & 469.530

345-026-0350 - Emergency Planning ~~for Nuclear Installations~~

(1) The ~~operator of a nuclear installation shall prepare, comply with,~~ certificate holder must follow and maintain ~~in readiness~~ an emergency plan that is approved by the Council. ~~The plan must ensure adequate measures will be taken in the event of a radiological emergency.~~

(2) ~~Proposed modifications to~~ The certificate holder may not make changes to the emergency plan that would decrease the effectiveness of the plan or involve one of the following ~~require Council approval prior to implementation:~~

~~(a) A change (other than editorial) in the Emergency Action Levels; or~~

~~(b) A decrease in the planned staff augmentation capabilities; or~~

~~(c) A reduction in the~~ the plan's requirements for notification of off-site agencies without the Council's prior approval.

(3) ~~Except as required by section (2),~~ The certificate holder may make ~~modifications~~ changes to the plan that would not reduce its effectiveness without the Council's prior ~~Council~~ approval. The certificate holder ~~shall~~ must submit copies of the revised plan ~~to notify~~ the Department of any changes made under this section within 30 days after the implementation date of the changes. The Department ~~shall~~ must promptly notify the Council of the ~~modifications~~ changes at a scheduled Council meeting.

Statutory/Other Authority: ORS 469.470

Statutes/Other Implemented: ORS 469.501, 469.530 & 469.533

345-026-0370 - ~~Standards for Council Approval of~~ ISFSI Decommissioning Plan

(1) The ~~operator of the Trojan Independent Spent Fuel Storage Installation (ISFSI) shall~~ certificate holder must submit ~~15 copies of a~~ final plan for decommissioning the ISFSI to the Department for Council approval. The plan ~~shall~~ must be submitted to the Council in a form and in ~~on~~ a schedule consistent with that required by the U.S. Nuclear Regulatory Commission. When the Department receives a decommissioning plan, the Department ~~shall~~ must:

(a) Issue notice to the Council's mailing list that the decommissioning plan has been submitted. The notice ~~shall~~ must include:

(A) The time and place of at least one informational hearing;

(B) The locations where copies of the proposed plan may be reviewed by the public; and

(C) A contact name for further information.

(b) Perform a technical review, and produce a staff report containing the Department's technical conclusions and recommendations on specific issues raised in the proposed plan;

(c) To the extent practicable, coordinate its technical review with that of the U.S. Nuclear Regulatory Commission;

(d) Issue notice of availability of the Department report to the Council mailing list. The notice ~~shall~~ must include:

- (A) A summary of the Department's recommendations;
- (B) Time and place of a hearing on the staff report;
- (C) Places where the Department's staff report may be reviewed by the public; and
- (D) A contact for additional information and copies of the staff report.

(2) The Council ~~shall~~must review the proposed decommissioning plan to verify that the proposed activities will not adversely affect the health and safety of the public or the environment. The Council will ensure the following when evaluating acceptability of a proposed decommissioning plan:

- (a) The plan contains the radiological criteria for unrestricted release and use of the site as set forth in ~~Title 10 of the Code of Federal Regulations, Part 20, Section 1402~~ (10 CFR 20.1402) ~~in effect August 20, 1997.~~
- (b) The plan contains provisions that require removal from the site of all radioactive waste as defined in ORS 469.300 on a schedule acceptable to the Council.
- (c) The plan contains a program for radiological monitoring to ensure the environment is not being adversely affected. This program may be incorporated by reference if it has previously been approved by the Department.
- (d) The plan contains provisions for removal or control of hazardous waste that are consistent with applicable federal and state regulations.

(3) The certificate holder ~~shall~~must include in the plan an estimate of funding necessary for implementation. The Council ~~shall~~must determine whether provisions for funding are adequate to implement the plan.

(4) The certificate holder ~~shall~~must not implement significant revisions to the decommissioning plan unless the Council has reviewed and approved the revisions. A revision is significant if it involves one of the following items:

- (a) The potential to prevent the release of the site for unrestricted use;
- (b) A change in the criteria for site release;
- (c) A departure in the methodology for determining background radiation levels to a method not generally accepted by the industry;
- (d) A change in the provisions made for hazardous or radioactive waste material removal;
- (e) A significant change in the types or significant increase in the amounts of any effluents that may be released offsite; or
- (f) A significant increase in radiological or hazardous material exposure to site workers or to members of the public, including exposure due to transport of radioactive or hazardous material.

(5) The certificate holder ~~shall~~must evaluate revisions to the decommissioning plan by the criteria listed in section (4) of this rule. The certificate holder ~~shall~~must maintain records of all changes and associated evaluations for audit by the Department. The certificate holder ~~shall~~must notify the Department of

revisions to the plan that are not significant within 30 days after implementation of the revision. The Department ~~shall~~must promptly notify the Council of such revisions at a regularly scheduled meeting.

(6) Changes to the decommissioning plan that are mandated by the federal government may be implemented without prior Council approval.

Statutory/Other Authority: ORS 469.470

Statutes/Other Implemented: ORS 469.410 & 469.501

345-026-0390 - Spent Nuclear Fuel Storage

~~(1) Purpose:~~

~~(a) Storage of spent nuclear fuel and related radioactive material and waste at a nuclear installation is an interim measure; otherwise utilities and residents of Oregon would face the financial burden of maintaining, operating, and safeguarding the on-site storage facilities indefinitely;~~

~~(b) The purpose of this rule is to cooperate with the federal government in accordance with Oregon's siting policy in ORS 469.310 to ensure the safety of interim on-site storage and to ensure spent nuclear fuel and related radioactive materials and waste will not be an undue financial burden to utilities or people of Oregon.~~

~~(2) Capacity and Safety Standards: The certificate holder may store a maximum of 791 complete and partial fuel assemblies and storage of containers with nuclear fuel materials at an Independent Spent Fuel Storage Installation (ISFSI) at the site of the former Trojan Nuclear Plant, subject to the requirements of OAR 345-026-0300 through 345-026-0390. Storage of spent nuclear fuel and related radioactive material and waste at the site of a nuclear installation by a certificate holder who has executed a contract with the United States of America pursuant to the Nuclear Waste Policy Act, shall be deemed a permitted use of the site pending transfer of spent nuclear fuel to the U.S. Department of Energy provided that:~~

~~(a) Storage facilities are The ISFSI must be designed to maintain discharges within the limits specified in applicable licenses authorized under the Atomic Energy Act of 1954, as amended, and any applicable permits issued under the National Pollutant Discharge Elimination System;~~

~~(b) Storage facilities are The ISFSI must be designed such that in case of accidents off-site radiation exposures the projected dose to an individual outside of the Controlled Area Boundary will not exceed 1 rem over four days the Environmental Protection Agency Protective Action Guidelines (October, 1991) for off-site protective actions; and~~

~~(c) The facility is ISFSI may not be used to store any spent nuclear fuel or radioactive materials and wastes other than that generated or used in the operation of the former Trojan Nuclear Plant.~~

~~(3) The certificate holder shall perform activities related to transfer, storage and handling of fuel and other radioactive waste in accordance with a radiation protection program that complies with 10 CFR 20, including a program to maintain personnel radiation exposure As Low As Reasonably Achievable (ALARA) as that term is defined in 10 CFR 20.~~

~~(42) Except as required for accident mitigation as described in the Safety Analysis Report, the certificate holder shall may not remove or transfer spent fuel from an interim spent fuel storage installation to new casks or shipping containers, a multipurpose canister from its storage cask without approval by the Council's prior approval to the transfer.~~

~~(3) The certificate holder must notify the Department of incidents and accidents in accordance with the Emergency Plan required under OAR 345-026-0340, the Security Plan required under OAR 345-026-0350, and other agreements as established, and must:~~

~~(a) Notify the Oregon Emergency Response System immediately upon declaration of an emergency under the approved Emergency Plan for the facility;~~

~~(b) Notify the Department of non-emergency incidents or accidents as described in 10 CFR 72.75.~~

~~(5) Reporting Requirements: The operator of an interim spent fuel storage facility shall submit every ten years and, in addition, no later than September 3, 2038, a report containing the actual or expected date when the Federal government will accept the High Level Waste and an analysis of the facility's continued acceptability for use if a Federally licensed High level Waste site remains unavailable. This report need not be submitted if the Council or its successor determines that a Federally licensed high level waste site is available and that spent nuclear fuel from the facility will be accepted prior to September 3, 2043.~~

~~(64) The Council approves the plan, as may be amended under Part (c) below, for an Independent Spent Fuel Storage Installation (ISFSI) as described in the certificate holder must operate the ISFSI consistent with a Safety Analysis Report (SAR) (PGE-1069), Revision 2. In addition to the criteria in OAR 345-026-0390(2)(a), (b), and (c), and (3) and (4), the plan is subject to the following criteria submitted in compliance with 10 CFR 72.70 and the following requirements:~~

~~(a) Programs The Safety Analysis Report must provide for the following programs:~~

~~(A) Portland General Electric (PGE) shall establish and maintain programs for A Temperature Monitoring and Air Vent Inspection Program and Structural Inspection that are consistent with maintaining exposures to ionizing radiation As Low As Reasonably Achievable (ALARA) and with the assumptions and conclusions in the Department "Staff Evaluation of Holtec Design for Portland General Electric's Independent Spent Nuclear Fuel Installation (ISFSI)," September 2002. The program must include daily readings of Concrete Cask air outlet and ambient temperatures. The program must include provisions for more frequent measurements if temperatures approach Technical Specification limits. The program must also include a requirement to check air inlet and outlet vents for blockage weekly. The certificate holder may extend individual surveillance intervals by up to 25 percent to accommodate minor variations in work scheduling.~~

~~(B) A Radiation Protection Program that complies with 10 CFR 20.1101 and ensures exposures to ISFSI personnel and the public are As Low As Reasonably Achievable as that term is defined in 10 CFR 20.1003.~~

~~(C) A Radiological Environmental Monitoring Program that ensures the ISFSI complies with section (2) of this rule.~~

(D) An Aging Management Program for management of issues associated with aging that could adversely affect ISFSI components that are important to safety.

(bE) Contingency Plans: PGE shall establish and maintain a planA program for maintaining equipment onsite and having equipment available within a reasonable time period to respond to credible accident scenarios and a plan for construction of new concrete casks.

(eb) Changes to Commitments: PGEThe certificate holder may not make changes to the ISFSI as described in the or Safety Analysis Report that would require prior approval from the U.S. Nuclear Regulatory Commission (NRC) under 10 CFR 72.48 without requesting the Council's prior Council approval if such changes do not reduce commitments or change the assumptions and conclusions in the Department "Staff Evaluation of Holtec Design for Portland General Electric's Independent Spent Nuclear Fuel Installation (ISFSI)," September 2002. If proposed changes would reduce commitments or change the assumptions or conclusions of the Department "Staff Evaluation of Holtec Design for Portland General Electric's Independent Spent Nuclear Fuel Installation (ISFSI)," September 2002, PGE shall obtain prior approval from the Department. Prior Department approval is not required when the proposed change would not have the above effects, unless the proposed change is required for compliance with the regulations or orders of the U.S. Nuclear Regulatory Commission NRC or is necessary to protect the health and safety of the public when there is insufficient time to obtain prior Department approval.

(d5) Reporting requirements: In lieu of the requirements described in of OAR 345-026-0080, within one year of the first cask loading and biennially thereafter, PGE the certificate holder shallmust provide a written report to the Council on the status of the ISFSI biennially. The report shallmust include, at a minimum:_i

(a) A summary of changes to the ISFSI or Safety Analysis Report since the last report that did not require prior approval from the Council or NRC under section (4)(b) of this rule;

(b) theThe results of radiation monitoring programs;_i

(c) aA summary of personnel exposure related to ISFSI storage operations;_i

(d) aA statement of expenses related to ISFSI storage operations;_i

(e) aA statement of the estimated costs of continuing ISFSI storage operations through decommissioning and the estimated costs of decommissioning, including a discussion of the methods and assumptions used to estimate operations and decommissioning costs;_i

(e) anAn estimate of funds available for continuing ISFSI storage operations through decommissioning and funds available for ISFSI decommissioning;_i and

a(f) A statement of any significant developments regarding the opening of a Federally licensed High Level Waste facility.

(e) Frequency of Temperature Monitoring and Air Vent Inspection: The Temperature Monitoring and Air Vent Inspection Program established by PGE pursuant to Section (6)(a) of this rule shall include daily readings of Concrete Cask air outlet and ambient temperatures. The program shall include provisions for

~~more frequent measurements if temperatures approach Technical Specification limits. The program shall also include a requirement to check air inlet and outlet vents for blockage weekly. PGE may reduce these surveillance frequencies with Department approval. PGE may apply extensions of up to 25 percent of individual surveillance intervals to accommodate minor variations in work scheduling.~~

(6f) Contractors: ~~PGE shall~~The certificate holder must require contractors who perform portions of the ISFSI storage or transporting operations to adhere to all applicable provisions of ~~OAR 345-026-0390~~this rule.

Statutory/Other Authority: ORS 469.470

Statutes/Other Implemented: ORS 469.410 & 469.501

DRAFT

Division 70 - CONFIDENTIAL TREATMENT OF SECURITY PROGRAM INFORMATION

345-070-0005 - Purpose

The purpose of these rules is to protect the confidentiality of information submitted to the ~~Energy Facility Siting~~ Council and the ~~Secretary~~ Director regarding security programs for nuclear ~~-fueled~~ power plants, nuclear installations, and the transportation of radioactive materials to and from such facilities.

Statutory/Other Authority: ORS 469.530

Statutes/Other Implemented: ORS 469.530

345-070-0010 - Legislative Authority

These rules are promulgated concurrently by the Council and the Director pursuant to their respective rulemaking authorities contained in ORS Chapter 183, ORS 469.470, 469.501 to, 469.507, 469.530, 469.560 and 192.500, in order to implement their joint responsibility under 469.530.

Statutory/Other Authority: ORS 469.530

Statutes/Other Implemented: ORS 469.530

345-070-0015 - Definitions

(1) "Nuclear installation" is defined in ORS 469.300.

(2) "Nuclear power plant" includes the Trojan Independent Spent Fuel Installation.

(3) "Security program" means any plan or procedure the primary function of which is to protect nuclear power plants, nuclear installations, transportation and storage of new or irradiated nuclear fuel elements or transportation and storage of fissile material against any deliberate act that could directly endanger the public health and safety including exposure to radiation, including, but not limited to, plans or procedures for:

- (a) Controlling entry to the site or portions of the site of fixed installations;
- (b) Deterring or discouraging penetrations of sites or carriers by unauthorized persons;
- (c) Detecting such penetrations in the event they occur;
- (d) Apprehending in a timely manner unauthorized persons or authorized persons acting in a manner constituting a threat of sabotage or theft;
- (e) Providing for appropriate authorities to take custody of violators.

(4) "Fissile material" means fissile plutonium, uranium-233, and uranium-235 in any combination sufficient to cause $(\text{gm Pu}/200 \text{ gm}) + (\text{gm U-233}/200 \text{ gm}) + (\text{gm U-235 contained in uranium enriched to more than 20 percent in U-235})/350\text{gm}$ to be greater than unity.

(5) "Safeguards information (SI)" ~~means information that specifically identifies:~~

~~(a) Detailed security measures for the protection of special nuclear material; or~~

~~(b) Detailed security measures for the physical protection and location of certain plant equipment vital to the safety of production or utilization facilities as defined in 10 CFR 72.2.~~

Statutory/Other Authority: ORS 469.470

Statutes/Other Implemented: ORS 469.530

345-070-0020 - Confidential Treatment Required

The Council and the Director shall receive, and maintain as confidential, information submitted by any person pursuant to ORS 469.530 for review and approval to the extent the information falls within the definitions of "security program" or "safeguards information" in OAR 345-070-0015. The Council and Director shall take all reasonable precautions to:

- (1) Limit the number of persons ~~within the Department of Energy~~ having access to such information; and
- (2) Physically safeguard such information.

Statutory/Other Authority: ORS 469.530

Statutes/Other Implemented: ORS 469.530, [192.533](#)

345-070-0025 - Releases of Non-Confidential Information

In reviewing information submitted to them under ORS 469.530, the Council and Director shall jointly determine whether specific portions of such information are not within the definition of "security program" in OAR 345-070-0015 and shall promptly arrange for the physical segregation and public availability of all information not entitled to confidential treatment.

Statutory/Other Authority: ORS 469.530

Statutes/Other Implemented: ORS 469.530

345-070-0030 - Public Statements on the Security Program

(1) Upon completing their review and approval of a security program and modifications to the program, the Council and Director shall promptly issue a joint statement that describes, without directly or indirectly breaching the confidentiality of the security program:

- (a) The nature and scope of the review conducted;
- (b) The adequacy of the security program; and
- (c) A general description of the security measures.

(2) In the event of discovery of noncompliance with approved security programs, the Council and Director will issue a joint statement describing the general nature of the noncompliance without directly or indirectly breaching the confidentiality of the security program.

Statutory/Other Authority: ORS 469.530

Statutes/Other Implemented: ORS 469.530