Portland General Electric Company
James E. Cross
Vice President and Chief Nuclear Officer

June 30, 1994

Trojan Nuclear Plant
Docket 50-344
License NPF-1

VPN-024-94

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

Dear Sirs:

Response to Nuclear Regulatory Commission (NRC) Bulletin 94-01

This letter confirms Portland General Electric Company's (PGE's) completion of the actions requested in NRC Bulletin 94-01, "Potential Fuel Pool Draindown Caused by Inadequate Maintenance Practices at Dresden Unit 1".

The attachment provides PGE's detailed response to each of the requested actions identified in the bulletin.

Sincerely,

S. M. Quennoz
for J. E. Cross

Attachment

c:

L. J. Callan, NRC, Region IV
S. J. Collins, NRC, Region IV
D. Stewart-Smith, ODOE
F. A. Wenslawski, NRC Region IV/WCFO

JE11

121 S.W. Salmon Street, Portland, Oregon 97204 (503) 464-8897

STATE OF OREGON)
)
COUNTY OF COLUMBIA)

I, S. M. Quennoz, being duly sworn, subscribe to and say that I am the General Manager, Trojan Plant for Portland General Electric Company, the applicant herein; that I have full authority to execute this oath; that I have reviewed the foregoing; and that to the best of my knowledge, information, and belief the statements made in it are true.

Date June 30, 1994

Steve M. Quennoz
General Manager
Trojan Plant

On this day personally appeared before me S. M. Quennoz, to me known to be the individual who executed the foregoing instrument, and acknowledged that he signed the same as his free act.

GIVEN under my hand and seal this 30th day of June, 1994.

OFFICIAL SEAL
KIMBERLEY A. LEHMAN
NOTARY PUBLIC-OREGON
COMMISSION NO. 024926
MY COMMISSION EXPIRES JUNE 1, 1997

Kimberley A. Lehman
Notary Public in and for the
State of Oregon

Residing at Columbia County
My commission expires 6-1-97

Background

Nuclear Regulatory Commission (NRC) Bulletin 94-01 requested that certain actions be taken by permanently shut down nuclear power reactors with spent fuel in their spent fuel pools. These actions include ensuring that structures, systems, and components directly associated with the safe storage of the fuel in the spent fuel pool (SFP) are operable and adequate, SFP area heating and ventilation are adequate and maintained, and operating procedures associated with maintaining the required SFP water level (including leak detection) are appropriate. This attachment provides PGE's responses to the four specific requested actions contained in NRC Bulletin 94-01.

Requested Actions

1. **Verify that the structures and systems required for containing, cooling, cleaning, level monitoring, and makeup of water in the SFP are operable and adequate, consistent with the licensing basis, to preclude high levels of radionuclides in the pool water and adverse effects on stored fuel, the SFP, fuel transfer components, and related equipment.**

   PGE Response:

   SFP Water Containment

   The SFP is a reinforced concrete structure with seam-welded stainless steel plate liners. The SFP structure and spent fuel racks are designed to Seismic Category I requirements with the exception of the gates to the cask load pit (CLP) and fuel transfer canal (FTC). Failure of the FTC and CLP gates is assumed in the bounding accident analysis discussed in Defueled Safety Analysis Report (DSAR) Section 6.3.

   The design basis for the SFP is presented in DSAR Section 3.2.2.1. DSAR Figures 3.2-16 through 3.2-21 present plan and elevation drawings of the SFP. The SFP was designed with a leak detection system to identify leakage through the liner. The drains from this system are monitored for leakage at least once per shift in accordance with Operations Guideline (OG) 13-1, "Auxiliary Operator Rounds". Each gate is equipped with an inflatable seal around its periphery which is inflated when the gate is closed. Currently, the CLP is filled with water and its gate to the SFP is open. If necessary, the gate to the CLP can be closed. The FTC is currently drained and its gate to the SFP is closed and sealed.

The water containment function of the SFP is intended to keep the water level above the spent fuel assemblies. Lines entering the SFP which could provide a siphon path resulting in the SFP level falling below the elevation of 83 feet 11 inches, are equipped with siphon breakers to limit the SFP water loss to this elevation (83 feet 11 inches). Loss of cooling with and without loss of water inventory is analyzed in DSAR Section 6.3.

SFP Cooling

The SFP Cooling System is currently operated per Operating Instruction (OI) 4-4, "Spent Fuel Pool Cooling System Operation". This cooling system consists of two SFP cooling pumps installed in parallel and two SFP cooling water heat exchangers installed in parallel with cross-connection lines allowing the use of either pump with either heat exchanger. A single SFP cooling pump and a single SFP cooling water heat exchanger can maintain SFP water temperature $\leq$ 140 °F. The SFP Cooling System is described in DSAR Section 3.3.2. DSAR Section 6.2 describes the analysis of a loss of forced SFP cooling due to failures of the non-Seismic Category I piping/systems and failure of both SFP gates.

SFP Water Purification

Operation of the SFP Purification System is currently controlled by OI 4-6, "Spent Fuel Pool Purification, Skimmer, and Demineralizer Operation". This procedure requires that SFP water chemistry be analyzed and maintained within prescribed limits per Chemistry Manual procedure CM-3, "Shutdown Chemistry Analyses Program". The following table depicts these analyses and the frequency of performance. In addition, the SFP purification demineralizer effectiveness (decontamination factor) is required to be checked monthly per procedure CM-3. The SFP chemistry program is used to maintain SFP water chemistry such that the likelihood of undue corrosion of the SFP liner, spent fuel and its associated handling equipment is minimized.

CHEMISTRY ANALYSES	
SFP Analysis	Frequency
Gross Gamma	Monthly
Gross Beta	Quarterly

CHEMISTRY ANALYSES (contd.)	
SFP Analysis	Frequency
Tritium	Monthly
pH	Weekly
Boron Concentration	Weekly
Conductivity Concentration	Weekly
Chloride Concentration	Weekly
Fluoride Concentration	Monthly
Suspended Solids	Monthly
Sodium Concentration	Weekly

The SFP purification system filter and demineralizer have sufficient capacity to recirculate the entire SFP water inventory at least once every two days. This purification loop is adequate for controlling fission products and other contaminants which may be introduced by a leaking fuel assembly.

SFP Level Monitoring

The SFP level indicator is a metal scale fixed to the side of the SFP. SFP water level is recorded at least once per shift in accordance with the procedure OG 13-1, "Auxiliary Operator Rounds". The Auxiliary Operator Round Sheet indicates the normal range of SFP level. In addition, Technical Specification Limiting Condition for Operation 3.9.11 states that the minimum SFP level shall be 23 feet above the fuel assemblies. The associated Surveillance Requirement requires that the water level in the SFP be verified, at least once per 7 days when irradiated assemblies are in the SFP, to be at least its minimum required level. Procedure POT 24-3, "Weekly Operation Routines", is used to implement this Surveillance Requirement.

A SFP water level alarm is installed to indicate abnormal water levels and actions are proceduralized for response to these abnormal SFP level changes in Off-Normal Instruction (ONI) 4-4, "SFP System Trouble".

SFP Water Makeup

Normal periodic makeup to the SFP is controlled by Operating Instruction OI 4-4, "Spent Fuel Pool Cooling System Operation". Procedure ONI 4-4 provides instructions for adding makeup water to the SFP during abnormal conditions, via both normal and emergency water sources. These procedures specify that normal makeup water to the SFP is supplied by the demineralized water system, and several options are provided for emergency makeup of water to the SFP (including Primary Makeup Water and Seismic Category I Service Water). In the event of a loss of forced SFP cooling, the rate at which water inventory is lost due to evaporation and boiling of the SFP water is less than the capacity of the makeup sources and there is adequate time to initiate makeup water flow. Systems relied upon for SFP makeup are maintained available for operation.

2. **Ensure that systems for essential area heating and ventilation are adequate and appropriately maintained so that potential freezing failures that could cause loss of SFP water inventory are precluded.**

PGE Response:

Trojan is located in the western part of Oregon where the climate is typically characterized by wet winters and dry summers with mild temperatures. The maritime air has a moderating influence throughout the year. Rainy weather is predominant throughout the winter months. Occasional outbreaks of cold air are generally of short duration. Although there are days in the winter months when the ambient temperature at TNP falls below 32 °F, the average winter season temperature in the area is 40 °F. Thus, a freezing failure of SFP area piping is not likely since an extended period of very cold weather is not likely to occur at Trojan.

Trojan's fuel transfer canal and fuel transfer tube are currently drained with the gate between the FTC and SFP closed. Therefore, the transfer tube is not currently subject to freeze damage. A portion of the fuel transfer tube is located in a cubicle adjacent to the Auxiliary Building and the cubicle is not directly heated except through air exchange. However, as described above, winter weather at Trojan is historically mild and prolonged periods of sub-freezing weather do not typically occur. In addition, the transfer tube is made of stainless steel and is surrounded by a larger diameter stainless steel sleeve, which is in turn surrounded by shielding and concrete. Procedure OG 13-2, "Routines", contains recommended instructions for performance of cold weather routines (when

outside temperature will be less than 32 °F) during each shift. These routines have the operator check that building heaters are on and, as necessary, reduce air turnover by shifting the fan lineup. Additional steps were added to OG 13-2 to ensure that during periods of severe cold or extended periods of sub-freezing weather, special attention is given to the SFP, associated equipment, and the fuel transfer tube.

Ventilation systems associated with spent fuel storage are maintained for operational flexibility, but are not required to support the integrity of the SFP. Auxiliary Building Ventilation Supply (AB-2) and Exhaust (AB-3) systems ventilate the Fuel and Auxiliary buildings, providing normal ventilation for the general SFP area. System AB-2 was designed to maintain the temperature of areas inside the buildings at less than 104 °F and greater than 50 °F.

3. **Ensure that piping or hoses in or attached to the SFP cannot serve as siphon or drainage paths in the event of piping or hose degradation or failure or the mispositioning of system valves.**

PGE Response :

Permanently installed lines (piping and hoses) entering the SFP which could provide a siphon path resulting in the SFP level falling below elevation 83 feet 11 inches, are equipped with siphon breakers to limit the SFP water loss to this elevation (83 feet 11 inches). Mispositioning of valves, or certain accident events, could result in siphon paths in the lines, but the siphon breakers ensure siphoning does not occur below this level. A review was performed that included piping or hoses in or attached to the SFP, including the FTC and the CLP. Lines in or attached to the SFP were identified using the SFP System piping and instrumentation drawing. Additionally, the SFP area was walked down by Engineering personnel performing the piping review. Isometric drawings of piping configuration were then reviewed to verify elevations of piping and to confirm that siphon holes were present in lines entering the SFP.

During this review, it was determined that water supply lines used to fill the CLP and the FTC, from the Spent Fuel Pool Cooling and Demineralizer system, extend below elevation 83 feet 11 inches. These supply lines do not enter the SFP, but with the corresponding gate open, the CLP and FTC are effectively a part of the SFP. The piping review identified that the CLP and FTC water supply lines did not have siphon breakers, and a possible siphon path could be created. Siphon breaker holes have since been drilled in the FTC and CLP supply lines above elevation 83 feet 11 inches.

The SFP skimmer system includes floating skimmers and hoses which remove material that collects at the pool surface. The skimmer hoses in the pool are sufficiently short to eliminate the possibility of creating a siphon path below the current siphon breaker level.

4. **Ensure that operating procedures address conditions and observations that could indicate changes in SFP level and address appropriate maintenance, calibration, and surveillance of available monitoring equipment. This should include any leak detection systems.**

PGE Response:

As discussed in the response to Requested Action 1, SFP water level is checked shiftly and weekly in accordance with operations procedures. A level sensor provides input to a Control Room annunciator for high and low SFP water level. Procedure ONI 4-4, "SFP System Trouble", contains corrective actions to restore water level in the SFP. This procedure provides instructions for adding makeup water to the SFP, via both normal and emergency water sources.

The pool level indicator is a metal scale fixed to the side of the SFP that does not require periodic maintenance or calibration. The SFP level alarms are currently scheduled to be functionally tested every two years.

As stated in the response to Item 1, the SFP was designed with a leak detection system to identify leakage through the liner. The drains from this system are monitored for leakage at least once per shift in accordance with procedure OG 13-1, "Auxiliary Operator Rounds".