

71-9271



Portland General Electric Company

Stephen M. Quennoz
Trojan Site Executive

October 17, 1996

VPN-065-96

William D. Travers
Nuclear Regulatory Commission
11555 Rockville Pike
Rockville, MD 20852-2738

Dear Mr. Travers,

Trojan Nuclear Plant Reactor Vessel Package

The Trojan Decommissioning Plan submitted and approved by the NRC provides for the prompt decommissioning of the plant. This plan currently provides for the removal and segmentation of the internals and the options of segmenting or removing the Reactor Vessel whole. These methods were proposed based on projects completed by other facilities. Since the Decommissioning Plan was submitted, additional evaluation of methods for disposal of the internals and the vessel were performed. This evaluation determined that the intact disposal of the Reactor Vessel and Internals provided significant benefits and advantages.

This evaluation determined that the intact removal of the vessel and internals results in decreased radiation exposure to the plant workers, reduction in the number of radioactive shipments resulting in a decreased exposure to the public during transportation, reduced risk for transportation accidents, elimination of potential risks and problems associated with the segmentation of the internals and disposal of the highly activated components, and a significant cost savings. Based on these advantages, disposal as a single package is the preferred approach.

A major consideration in this project is the ability to design, package, and transport the package safely and in accordance with the design requirements of 10 CFR 71 for a Type B (U) package. PGE developed a proposed method for packaging and transporting the package and has worked with your staff to review our proposal and resolve their concerns. Based on these meetings, PGE has made a significant revision to the previous approach. This includes the addition of impact limiters to the package, analyzing and designing the package to meet a 1' drop, analyzing and designing the package to meet an alternative drop for the Hypothetical Accidents, and modifying our shipment schedule to correspond to summer months.

Attachment I provides a synopsis of the design requirements specified by 10 CFR 71 and PGE's position. Attachment II addresses the specific areas as noted on Attachment I and other concern

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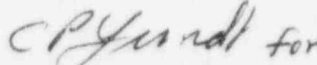
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areas. Based on the design reviews, PGE is confident that the RVP can be designed, packaged, and transported safely and can be licensed as a Type B package. PGE is willing to work with your staff to resolve their concerns.

This issue impacts both the design of the Independent Spent Fuel Storage Installation as well as the Trojan Nuclear Plant decommissioning schedule. PGE needs to resolve any programmatic or policy issues you or your staff may have with this issue. PGE will contact your office in approximately one week to discuss this matter and establish a meeting schedule to resolve concerns. Please feel free to contact Paul Yundt of my staff at (503) 556-7492 if you have any questions.

Sincerely,


Stephen M Quennoz
Trojan Site Executive

Attachments

c: M. T. Masnik, NRC, NRR
C. R. Chappell, NRC, NRR
N. L. Osgood, NRC, NRR

10CFR71 Section	Synopsis of Requirement	Proposed Method of Compliance
SUBPART D APPLICATION FOR PACKAGE APPROVAL		
71.33	The application must include a description of the proposed package in sufficient detail to identify the package accurately and provide a sufficient basis for evaluation of the package.	PGE has determined that the Reactor Vessel Package(RVP) will be classified as a Type B(U) package. A Safety Analysis Report(SAR)will be submitted using the guidance of Regulatory Guide 7.9.
71.35(a)	The application must include a demonstration that the package satisfies the standards specified in Subpart E (71.41 through 71.65) and Subpart F (i.e., 71.71 through 71.77)	Each of the requirements for Subparts E and Supart F and the method of compliance are addressed under Sections 71.41 through 71.77.
71.35(b)	The application for a fissile material package must include the allowable number of packages that may be transported in the same vehicle in accordance with 71.59.	The RVP will constitute a single shipment. The RVP will contain less than 15 gms of fissile material and is therefore exempt from classification as a fissile material classification in accordance with 71.53(a).
71.35(c)	The application for a fissile material shipment must include any special controls and precautions for transport, loading, unloading, and handling and any proposed special controls in case of an accident or delay.	The RVP SAR will include a discussion of the handling and transporting of the package.
71.37	The application shall describe the Quality Assurance (QA) program for design, fabrication, assembly, testing, maintenance, repair, modification, and use of the proposed package.	The QA Program for the RVP will be controlled by the existing 10CFR50 Appendix B program "Trojan Nuclear Plant (TNP) QA Program (PGE-8010). The QA program was revised on November 2, 1994 to include the criteria of 10 CFR 71, Subpart H.

10CFR71 Section	Synopsis of Requirement	Proposed Method of Compliance
SUBPART E PACKAGE APPROVAL STANDARDS		
71.41 Demonstration of Compliance		
71.41(a)	The effects on a package of the test specified 71.71 (Normal Conditions of Transport) and those specified in 71.73 (Hypothetical accident conditions) must be evaluated by a specimen, scale model, or other method acceptable to the NRC.	The effects on the package in accordance with the specified tests will be demonstrated analytically.
71.41(b)	Taking into account the type of vehicle, the method of securing or attaching the package, and the controls to be exercised by the shipper, the NRC may permit the shipment to be evaluated together with the transporter vehicle.	The RVP SAR will contain a description of the transporter, the method of securing the package to the transporter, and the shipping controls.
71.41(c)	Environmental and test conditions different from those approved in 71.71 and 71.73 may be approved by the NRC if the controls proposed to be exercised by the shipper are demonstrated to be adequate to provide equivalent safety of the shipment.	For the hypothetical drop accident (71.73(c)(1)), PGE proposes to perform an analysis based on specific route and method of transport. For the Normal Conditions of Transport 1 foot drop, PGE proposes to define package orientation based on method of transport. Attachment II provides additional information.
71.43 General Standards for all packages		
71.43(a)	The smallest overall dimension of a package may not be less than 10cm (4in.)	The smallest overall dimension of the RVP package will not be smaller than 4 in. The smallest overall dimension of the RVP will be approximately 192 in.

10CFR71 Section	Synopsis of Requirement	Proposed Method of Compliance
71.43(b)	The package must incorporate a feature such as a seal that while intact would demonstrate that the package has not been opened (i.e. Tamper Proof indication)	The RVP will consist of the reactor vessel, welded penetration closures, and the bolted reactor vessel head. A tamper proof indicator will be provided on the head bolts.
71.43(c)	The package must include a containment system securely closed by a positive fastening device that cannot be opened unintentionally or by a pressure that may arise within the package.	The RVP containment boundary will consist of the reactor vessel with the head installed and bolted. Penetrations will have welded enclosures. Calculations will demonstrate that maximum credible pressure will not result in failure of the containment boundary.
71.43(d)	The package must be made of material and construction that assure there will be no significant chemical, galvanic, or other reaction among packaging components and/or contents. The effect of water in leakage must be considered.	The RVP will be constructed of compatible materials and an evaluation will be provided to demonstrate this requirement is met.
71.43(e)	A package valve or other device whose failure could result in allowing the radioactive contents to escape must be protected against unauthorized operation.	The RVP will not be provided with a valve or other device whose failure could result in the release of radioactive failure.
71.43(f)	The package must be designed, constructed, and prepared for shipment so that under the tests specified in §71.71 there would be no loss or dispersal of radioactive contents, no significant increase in external radiation levels, and no substantial reduction in package effectiveness.	The acceptance criteria specified by 71.43(f) will be applied to the test analysis required by 71.71(Normal Conditions of Transport). The test requirements specified for the Normal Conditions of Transport are discussed individually under Section 71.71 of this table.

10CFR71 Section	Synopsis of Requirement	Proposed Method of Compliance
71.43(g)	A package must be designed, constructed, and prepared for transport so that in still air at 38°C and in shade no accessible surface temperature will exceed 85°C (limit is for exclusive use)	An analysis will be performed and presented in the RVP SAR using the conditions specified in 71.71(c)(1) to demonstrate compliance with this acceptance criteria.
71.43(h)	A package may not incorporate a feature intended to allow continuous venting during transport.	The design will not include a feature to allow venting during transportation.
71.45 Lifting and tie-down standards for all packages		
71.45(a)	Any lifting attachment that is a structural part of the package must be designed with a minimum safety factor of 3 against yielding when used to lift the package.	The design of the RVP does not include a lifting attachment that will be a structural component.
71.45(b)(1)	Tie-down devices that are a structural part of the package, must be capable of withstanding a static force of 2g vertical, 5g transverse, and 10g horizontal without generating stress in any material of the package in excess of yield strength.	Attachment II provides a discussion of the method that will be used to secure the RVP to the transporter including design criteria.
71.45(b)(2)	Any other structural part of the package that could be used to tie down the package must be rendered inoperable or meet the requirements of 71.45(b)(1)	Attachment II provides a discussion of the method that will be used to secure the RVP to the transporter including design criteria.

10CFR71 Section	Synopsis of Requirement	Proposed Method of Compliance
71.45(b)(3)	Each tie-down device that is a structural part of a package must be designed so that failure of the device under excessive load would not impair the ability of the package to meet other requirements of this part.	Attachment II provides a discussion of the method that will be used to secure the RVP to the transporter including design criteria.
71.47 External radiation standards for all packages		
71.47(a)	Except as provided in 71.47(b) the package must be designed so that under the normal conditions incident to transport the radiation level does not exceed 200mrem/hr at any point on the external surface of the package and the transport index does not exceed 10.	The RVP will be transported as exclusive use, therefore, the limits of 71.47(b) are applicable.
71.47(b)	A package that exceeds the radiation limits of 71.47(a) must be transported by exclusive use shipment only, and the radiation limits must not exceed 200 mr/hr (a limit of 1000 mr/hr is allowed if additional restrictions are followed)	The RVP shielding will be designed to limit external package dose rates to less than or equal to 200 mr/hr.
71.47(c)	For shipments made under the provisions of 71.47(b) written instructions must be included with the shipping paper information.	The RVP will be a one-time exclusive use shipment. A procedure will accompany the shipment providing written instructions to ensure the requirements/assumptions of the RVP SAR are implemented.

10CFR71 Section	Synopsis of Requirement	Proposed Method of Compliance
71.47(d)	The written instructions required for exclusive use shipments must be sufficient so that when followed they will not unnecessarily delay delivery or result in increased radiation levels or exposures to transport workers or members of the public.	Written instructions (procedure) will be provided to accompany the RVP during transportation.
71.51 Additional requirements for Type B packages		
71.51(a)(1)	A Type B package must be designed, constructed, and prepared for shipment so that under the Normal Conditions of Transport (71.71) there would be no loss or dispersal of radioactive contents, as demonstrated to a sensitivity of 10^{-6} A ₂ per hour, no significant increase in external surface radiation levels, and no substantial reduction in package effectiveness.	The RVP will meet the specified accident conditions for the Normal Conditions of Transport (71.71)
71.51(a)(2)	A Type B package must be designed, constructed, and prepared for shipment so that under Hypothetical Accident Conditions(71.73) there would be no escape of Kr ⁸⁵ exceeding 10A ₂ in 1 week, no escape of other radioactive material exceeding a total amount A ₂ in 1 week, and no external radiation at 1m from external surface of the package.	The RVP will meet the specified condition
71.51(b)	Where mixtures of different radio nuclides are present, the provisions of Appendix A, paragraph IV of this part shall apply except that Kr ⁸⁵ , an effective value of 10A ₂ may be used.	The RVP will contain mixtures of different radio nuclides. The method presented in paragraph IV of Appendix A will be used to determine the effective value of A ₂ .

10CFR71 Section	Synopsis of Requirement	Proposed Method of Compliance
71.51(c)	Compliance with the permitted release limits of 71.51(a) may not rely on filters or mechanical cooling systems.	The RVP design will not incorporate filters or mechanical cooling systems.
71.53 Fissile material exemption		
71.53(a)	A package containing not more than 15g of fissile material is exempt from the fissile material standards of 71.55 and 71.59.	The RVP will contain less than 15g of fissile material (present fissile material content is analyzed to be approximately 3.6grams)
71.55 General requirements for fissile material packages		The RVP will contain less than 15 g of fissile material (present fissile material content is analyzed to be approximately 3.6 grams) and is therefore exempt from the requirements of 71.55 as provided by 71.53.
71.59 Standards for arrays of fissile material packages		The RVP will contain less than 15 g of fissile material (present fissile material content is analyzed to be approximately 3.6 grams) and is therefore exempt from the requirements of 71.59 as provided by 71.53.
71.61 Special requirements for irradiated nuclear fuel shipments		The RVP will not be used for the shipment of irradiated nuclear fuel, therefore this requirement is not applicable.
71.63 Special requirements for plutonium shipments		This requirement is applicable for shipments which contain in excess of 20 Ci of Plutonium. The RVP is anticipated to contain approximately 12Ci of Plutonium, therefore the requirements of this section are not applicable to the RVP SAR.

10CFR71 Section	Synopsis of Requirement	Proposed Method of Compliance
71.64	Special requirements for plutonium air shipments	The RVP will not be shipped by air, therefore the requirements of 71.64 are not applicable.
SUBPART F PACKAGE, SPECIAL FORM, AND LSA-III TESTS		
71.71 Normal Conditions of Transport		
71.71(a)	Evaluation of the package design under the normal conditions of transport must include a determination of the effect on that design of the conditions and test specified in this section. Separate specimens may be used for the free drop test, compression test, and penetration test provided each specimen is subjected to the water spray test prior to performance of other tests.	The RVP SAR will analytically demonstrate compliance with the acceptance criteria for the tests specified for the Normal Conditions of Transport (71.71).
71.71(b)	The initial conditions for the test in this section must be based on ambient temperatures preceding and following the tests remaining constant between - 29°C(-20°F) and +38°C(100°F) which is most unfavorable for the test being conducted. The initial internal pressure within the containment boundary must be considered to be the maximum normal operating pressure, unless a lower internal pressure consistent with the ambient temperature considered for the test is more unfavorable.	The RVP will be analyzed to determine compliance with the test conditions specified for the Normal Conditions of Transport (71.71). Each of these analyses and the assumptions regarding temperature and pressure are discussed for the nine (9) different tests specified in 71.71(c).

10CFR71 Section	Synopsis of Requirement	Proposed Method of Compliance
71.71(c)(1)	(Heat) The package will be evaluated at an ambient temperature of 38°C in still air and insolation according surface shape and orientation during transport.	The RVP will be evaluated using the conservative conditions specified in 71.71(b). The acceptance criteria of 71.43(f), 71.43(g) and 71.51(a)(1) will be imposed to demonstrate compliance.
71.71(c)(2)	(Cold) The package will be evaluated at an ambient temperature of -40°C in still air.	The RVP will be evaluated using the conservative conditions specified in 71.71(b). The acceptance criteria of 71.43(f), 71.43(g) and 71.51(a)(1) will be imposed to demonstrate compliance.
71.71(c)(3)	(Reduced External Pressure) The package will be evaluated at an external pressure of 25 kPa (3.5psi) absolute.	The RVP will be evaluated using the conservative conditions specified in 71.71(b). The acceptance criteria of 71.43(f), 71.43(g) and 71.51(a)(1) will be imposed to demonstrate compliance.
71.71(c)(4)	(Increased External Pressure) The package will be evaluated at an external pressure of 140 kPa (20 psi) absolute.	The RVP will be evaluated using the conservative conditions specified in 71.71(b). The acceptance criteria of 71.43(f), 71.43(g) and 71.51(a)(1) will be imposed to demonstrate compliance.
71.71(c)(5)	(Vibration) The package will be evaluated at vibration normally incident to transportation.	The RVP will be evaluated using the conservative conditions specified in 71.71(b). The acceptance criteria of 71.43(f), 71.43(g) and 71.51(a)(1) will be imposed to demonstrate compliance.

10CFR71 Section	Synopsis of Requirement	Proposed Method of Compliance
71.71(c)(6)	(Water Spray) The package will be evaluated with a water spray that simulates exposure to rainfall of approximately 5 cm/h for at least 1 hour.	The RVP will consist of the reactor vessel, reactor vessel head, and welded steel closure plates for vessel and head penetrations. A qualitative analysis will be provided in the RVP SAR to demonstrate the ability of the package to withstand exposure to the water spray criteria.
71.71(c)(7)	(Free Drop) The package will be evaluated for a free drop through a distance of 1 foot (based on weight of package) onto a flat, unyielding surface, striking the surface in a position for which maximum damage is expected. The test follow within 1.5 to 2.5 hours of conclusion of water spray test.	The RVP will be evaluated using the conservative conditions specified in 71.71(b). The acceptance criteria of 71.43(f), 71.43(g) and 71.51(a)(1) will be imposed to demonstrate compliance. PGE proposes to specify the drop orientation based on the method of transport.
71.71(c)(8)	(Corner Drop) This test applies only to fiberboard, wood, or fissile material not exceeding 110lbs for rectangular packages or 220lbs for cylindrical packages.	This test would not be applicable to the RVP since the minimum estimated weight of the package is 820 tons.
71.71(9)	(Compression) This test is applicable for packages weighing up to 11,000lbs.	This test would not be applicable to the RVP since the minimum estimated weight of the package is 820 tons.
71.71(10)	(Penetration) The package will be evaluated for an impact of a hemispherical end of a vertical steel cylinder of 3.2 cm diameter and 6kg mass dropped from a height of 1m onto the exposed surface of the package that is expected to be most vulnerable to puncture. The long axis of the cylinder must be perpendicular to the package surface.	The RVP will be evaluated using the conservative conditions specified in 71.71(b) for the test specified in 71.71(10) The acceptance criteria of 71.43(f), 71.43(g) and 71.51(a)(1) will be imposed to demonstrate compliance.

10CFR71 Section	Synopsis of Requirement	Proposed Method of Compliance
71.73 Hypothetical accident conditions		
71.73(a)	Evaluation for hypothetical accident conditions is to be based on sequential application of the tests specified in this section in the order indicated to determine the cumulative effect on the package. An undamaged specimen may be used for the water immersion test specified by 71.71(c)(6)	The Hypothetical Accident Conditions (71.73) analyzed conditions will meet the acceptance criteria specified by 71.51.
71.73(b)	The initial conditions for the test (except water immersion test of 71.73(c)(6)) in this section must be based on ambient temperatures preceding and following the tests remaining constant between -29°C and +38°C which is most unfavorable for the test being conducted. The initial internal pressure within the containment boundary must be considered to be the maximum normal operating pressure, unless a lower internal pressure consistent with the ambient temperature considered for the test is more unfavorable.	The initial conditions specified by 71.73(b) will be used in the analysis for each of the required Hypothetical Accident Conditions.
71.73(c)(1)	(Free Drop) The package must be evaluated for a free drop of 30ft onto a flat essentially unyielding horizontal surface in a position for which maximum damage is expected.	Attachment II provides the proposed method of compliance with this requirement.

10CFR71 Section	Synopsis of Requirement	Proposed Method of Compliance
71.73(c)(2)	(Crush) This test is only required for packages with a mass not greater than 1100 pounds, and overall density not greater than 62.4 lbs/ft ³ , and radioactive contents greater than 1000A ₂ not as special form radioactive material.	This test is not applicable to the RVP since its weight is greater than 1100 lbs.
71.73(c)(3)	(Puncture) The package must be evaluated for a free drop of 1m onto the upper end of a solid, vertical cylindrical, mild steel bar mounted on a horizontal, unyielding surface. The position of the package is to be selected to result in maximum anticipated damaged.	An analysis of the RVP for the conditions specified by 71.73(c)(3) will be present in the RVP SAR.
71.73(c)(4)	(Thermal) The package must be evaluated for timed average temperature of 800°C for a period of 30 minutes.	An analysis of the RVP for the conditions specified by 71.73(c)(4) will be present in the RVP SAR.
71.73(c)(5)	(Immersion-fissile material) For fissile material subject to 71.55, in those cases where water in leakage has not been assumed for criticality analysis, immersion under a head of at least 3ft for which maximum leakage is expected.	The RVP contains less than 15g of fissile material and is therefore not subject to the requirements of 71.55 as provided by 71.53. This test is therefore not applicable to the RVP design.
71.73(c)(6)	(Immersion - all packages) A separate undamaged package must be analyzed for immersion under at least 50ft of water. An external pressure of water of 150kPa gauge is considered to meet these conditions	An analysis of the RVP for the conditions specified by 71.73(c)(6) will be present in the RVP SAR.

10CFR71 Section	Synopsis of Requirement	Proposed Method of Compliance
71.74 Accident conditions for air transport of plutonium		The RVP contains less than 20 Ci of plutonium and will not be transported by air, therefore the requirements of 71.74 are not applicable.
71.75 Qualification of special form radioactive material		The RVP does not meet the definition for special nuclear material provided in 71.4, therefore the requirements of 71.75 are not applicable.
71.77 Qualification of LSA-III Material		The RVP does not meet the definition for LSA-III material provided in 71.4, therefore the requirements of 71.75 are not applicable.

Alternative Conditions and Discussion Items

Normal Conditions of Transport - 1 foot Drop

The Reactor Vessel Package will be loaded and secured onto the transporter and will not be handled until the package is off-loaded at the disposal facility. The transporter, loaded with the package will be driven onto a barge and then secured to the barge. The transporter/ package will be barged up the Columbia River to the Port of Benton where it will be driven off the barge and travel overland to the disposal facility. During transport the package will be oriented in the horizontal position (i.e. the centerline longitudinal axis of package will be horizontal). Because of the unique size, mass and bulk of the package, no other orientation is considered feasible during the normal conditions of transport.

Based on this, the analysis will consider a 1 foot horizontal drop and a 1 foot drop of either end with the opposite end considered held in place.

Hypothetical Accident Condition - 30' Drop

The Reactor Vessel Package is a one-time shipment under a well defined, planned, and controlled evolution. The operational controls established for the transport of the Steam Generators will be used for this effort. This transportation methodology is significantly different than the conditions anticipated to occur during the typical transport of a Type B package. PGE proposes to perform a drop analysis based on the specific route and method of transport as provided by 71.41(c), or by an exemption request as provided by 71.8. PGE will work with the NRC staff to establish the acceptable parameters for this condition.

Shielding

The shielding will be designed and installed to remain attached for the analyzed normal and accident conditions.

Regulatory Guide 7.12

PGE will perform an ASME Section XI fracture initiation criterion based analysis as referenced in R.G. 7.12. This analysis will be based on the actual stresses determined in the analysis for the Normal and Accident Conditions. The design of the RVP will include impact limiters to maintain stress on the vessel well below yield conditions. This analysis will show that the intent of R.G. 7.12 is met and that the vessel will not fail. To provide additional margin the actual package shipment will be conducted during the summer months of the year.

Tie-down System

The RVP tie-down system consists of pedestal assemblies positioned on the transporter and located under the upper head flange and vessel barrel near the lower head tangent point. Vertical upward forces are resisted by cables running over the top of the RVP at the pedestal locations. Longitudinal loads are resisted by a blocking beam assembly which captures two of the eight outlet nozzles which project from the vessel.

The reactor vessel nozzles will be analyzed for the ability to withstand the simultaneous application of 2g vertical, 5g transverse, and 10g longitudinal without generating stress in any material of the package in excess of its yield strength.