



**U.S. Department of Energy**  
**Office of River Protection**

P.O. Box 450  
Richland, Washington 99352

02-OSR-0572

Mr. R. F. Naventi, Project Manager  
Bechtel National, Inc.  
2435 Stevens Center  
Richland, Washington 99352

Dear Mr. Naventi:

**CONTRACT NO. DE-AC27-01RV14136 – CLOSURE OF PRETREATMENT CONDITIONS  
OF ACCEPTANCE FROM THE WASTE TREATMENT AND IMMOBILIZATION PLANT  
CONSTRUCTION AUTHORIZATION AGREEMENT**

- References:
1. ORP letter from R. J. Schepens to R. F. Naventi, BNI, "U. S. Department of Energy (DOE) Notice to Proceed with Construction Activities," 02-OSR-0517, dated November 13, 2002.
  2. BNI memorandum from I. Ghosh to D. Houghton, "Response to Additional Information, Requested by OSR, in Relation to the Structural Evaluation of the Pretreatment Below-Grade Pits and Tunnels, and Basemat," CCN: 044586, dated November 19, 2002.

This letter approves closure of five Conditions of Acceptance documented in the Attachment to Reference 1 (Construction Authorization Agreement). The Construction Authorization Agreement, page A-13, Section 4.3.1, "PT Facility Description," documented five conditions that must be completed to demonstrate structural adequacy before the U.S. Department of Energy (DOE), Office of River Protection (ORP) will authorize pretreatment (PT) subsurface pits, tunnels, and basemat structural concrete placement.

The five conditions in the Construction Authorization Agreement are:

1. Develop a structural design evaluation summary table, as committed to in response to Question PT-PSAR-227. (See Section 4.3.1.2, Item 3[b].)
2. From the preliminary soil-structure interaction (SSI) analysis results, for each wall and horizontal seismic motion, tabulate (a) the in-plane shear force in the direction of the length of the wall, (b) the maximum in-plane shear stress in the direction of the length of the wall, and (c) maximum out-of-plane bending moments, one about the horizontal axis and one about the vertical axis.

Compare the out-of-plane bending moments in the subsurface walls from the preliminary SSI analysis for the horizontal seismic motions with those from the GTSTRUDL analysis of the PT building. The applied dynamic soil pressure is based on American Society of Civil Engineers 4-98. These were committed to in responses to Questions PT-PSAR-227. (See Section 4.3.1.2, Item 3[d].)

3. Modify the design moments and shear forces in calculation report 24590-PTF-DGC-S13T-00002, *Design of Pits, Foundations and Below Grade Walls for PT Building*, using a method similar to that used in the High Level Waste facility design. Include this effect on demand-to-capacity ratios in the structural design evaluation summary. These commitments were provided in the responses to Questions PT-PSAR-227 and -231. (See Section 4.3.1.2, Item 3[d].)
4. Include both through-thickness thermal loads and thermal growth loads in design calculations and provide justification for not considering all load combinations, as committed to in responses to Questions PT-PSAR-225, -226, and -227. (See Section 4.3.1.2, Item 3[g].)
5. Provide a code requirement interpretation for shear wall design limits that would provide a basis for concluding that the shear forces were acceptable using American Concrete Institute 349-01, as committed to in response to Question PT-PSAR-227. (See Section 4.3.1.2, Item 4.)

BNI issued Reference 2 with the information required by the five conditions of acceptance. The attachment to this letter documents the ORP evaluation of this information. This information is acceptable and demonstrates the pretreatment facility pits, tunnels, and basemat structural design provides reasonable assurance the structure will provide adequate safety.

If you have any questions, please contact me, or your staff may call Lewis F. Miller, Jr., WTP Safety Regulation Division, (509) 376-6817.

Sincerely,

Roy J. Schepens  
Manager

OSR:RAG

Attachment

## **Evaluation of Information Addressing Pretreatment (PT) Facility Pits, Tunnels, and Basemat Construction Authorization Conditions of Acceptance**

The U.S. Department of Energy, Office of River Protection (ORP), WTP Safety Regulation Division (OSR) reviewers found information in Bechtel National, Inc. (BNI) letter CCN: 044586, "Response to Additional Information, Requested by OSR, in Relation to the Structural Evaluation of the Pretreatment Below-Grade Pits and Tunnels, and Basemat," dated November 19, 2002, and data in referenced calculations satisfied the requirements of Safety Requirements Document (SRD) Safety Criterion 4.1-3 and implementing standards DOE-STD-1020-94, American Society of Civil Engineers (ASCE)-4, and American Concrete Institute (ACI)-349-01. The reviewers found the information on the structural design and analysis acceptable for construction authorization for pretreatment (PT) facility pits, tunnels and basemat as outlined in ORP/OSR-2002-18, *Safety Evaluation Report for Waste Treatment and Immobilization Plant (WTP) Construction Authorization*, Revision 2. The basis for closing each condition is provided below:

**Condition:** Develop a structural design evaluation summary table, as committed to in response to Question PT-PSAR-227. (See Section 4.3.1.2, Item 3[b].)

Reviewers found the demand/capacity ratios and seismic margins in Tables 1, 2, 3, and 4 of CCN: 044586 acceptable. The information provided demonstrated adequate design margin and met the requirements of ACI 349-01, the implementing standard required by SRD Safety Criterion 4.1-3.

**Condition:** From the preliminary soil-structure interaction (SSI) analysis results, for each wall and horizontal seismic motion, tabulate (a) the in-plane shear force in the direction of the length of the wall, (b) the maximum in-plane shear stress in the direction of the length of the wall, and (c) maximum out-of-plane bending moments, one about the horizontal axis and one about the vertical axis.

Compare the out-of-plane bending moments in the subsurface walls from the preliminary SSI analysis for the horizontal seismic motions with those from the GTSTRUDL analysis of the PT building. The applied dynamic soil pressure is based on ASCE 4-98. These were committed to in responses to Questions PT-PSAR-227. (See Section 4.3.1.2, Item 3[d].)

Reviewers found the comparison between SSI and GTSTRUDL in Tables A, B, C, D, and E of CCN: 044586 acceptable. The comparison demonstrated the soil pressure used in the design was adequate as required by ASCE-4, the implementing standard required by SRD Safety Criterion 4.1-3. BNI demonstrated that for a few cases, where GTSTRUDL did not envelope preliminary SSI results, sufficient design margin exists to demonstrate the design for pits, tunnels, and basemat is adequate.

**Condition:** Modify the design moments and shear forces in calculation report 24590-PTF-DGC-S13T-00002, *Design of Pits, Foundations and Below Grade Walls for PT Building*, using a method similar to that used in the High Level Waste facility design. Include this effect on demand-to-capacity ratios in the structural design evaluation summary. These commitments

were provided in the responses to Questions PT-PSAR-227 and -231. (See Section 4.3.1.2, Item 3[d].)

Reviewers found the methodology used in the design of the pits, tunnels, and basemat acceptable as presented in Attachment B, Item 4 of CCN: 044586. The methodology accounts for potential inaccuracies in computing forces and moments in wall-to-slab junctions. BNI modified calculation 24590-PTF-DGC-S13T-00002, *Design of Pits, Foundations and Below Grade Wall for the PT Building*, Revision 2A, as required and reviewers found the revised calculation acceptable.

**Condition:** Include both through-thickness thermal loads and thermal growth loads in design calculations and provide justification for not considering all load combinations, as committed to in responses to Questions PT-PSAR-225, -226, and -227. (See Section 4.3.1.2, Item 3[g].)

Reviewers found the discussion of through-wall thermal gradients as presented in Attachment B, Item 5 of CCN: 044586 acceptable because gradients in the pits, tunnels, and basemat did not exceed the 40°F for normal operating conditions. This methodology has been accepted by OSR for WTP design.

**Condition:** Provide a code requirement interpretation for shear wall design limits that would provide a basis for concluding that the shear forces were acceptable using ACI 349-01, as committed to in response to Question PT-PSAR-227. (See Section 4.3.1.2, Item 4.)

Reviewers found the discussion of code interpretation for shear wall design limits presented in Attachment C of CCN: 044586 acceptable for pits, tunnels, and basemat. Reviewers consider the BNI interpretation of shear wall design limits meets the requirements of ACI 349-01.