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AREVA

April 28, 2011

Ms. Trina Howard
Subcontract Administrator
Bechtel National, Inc.
2435 Stevens Center Place
Richland, Washington 99354

Dear Ms. Howard:

BECHTEL NATIONAL, INC. CONTRACT NO. 24590-CM-HC4-HXYG-00211 IQRPE STRUCTURAL INTEGRITY ASSESSMENT REPORT FOR HLW SECONDARY CONTAINMENT (IA-3005092-000)

The integrity assessment of the HLW building secondary containment has been completed per the contract requirements and is enclosed for your use. The assessment found that the design is sufficient to ensure that the secondary containment rooms are adequately designed and have sufficient structural strength, compatibility with the waste(s) to be processed/stored/treated, and corrosion protection to ensure that they will not collapse, rupture, or fail.

If you have any questions, please contact Tarlok Hundal at (509) 371-1975, or via email at tarlok.hundal@areva.com.

Sincerely,

Fred R. Renz
Contracts Administration
AREVA Federal Services LLC
Richland Office

Enclosure (1)

llm

cc: D. C. Pfluger, MS 5-L w/enclosure (2)

AREVA Federal Services LLC

2101 Horn Rapids Road, RC-19, Richland, WA 99354, P.O. Box 840, Richland, WA 99352
Tel.: 509-375-8096 - Fax: 509-375-8495 - www.areva.com

IQRPE STRUCTURAL INTEGRITY ASSESSMENT REPORT FOR HLW SECONDARY CONTAINMENT

Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

IQRPE STRUCTURAL INTEGRITY ASSESSMENT REPORT FOR HLW SECONDARY CONTAINMENT

"I, Tarlok Singh Hundal have reviewed and certified a portion of the design of a new tank system or component located at the Hanford Waste Treatment Plant, owned/operated by Department of Energy, Office of River Protection, Richland, Washington. My duties were independent review of the current design for the HLW Secondary Containment, as required by the Washington Administrative Code, *Dangerous Waste Regulations*, Section WAC-173-303-640(3) (a) through (g) applicable components."

"I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

The documentation reviewed indicates that the design fully satisfies the requirements of the WAC.

The attached review is sixteen (16) pages numbered one (1) through sixteen (16).

T S Hundal
Signature

4/28/11
Date

Scope	Scope of this Integrity Assessment	This Integrity Assessment addresses the dangerous waste permit (DWP) affecting Secondary Containment rooms in HLW building from floor Elevation (-) 21'-0" to Elevation 37'-0". These rooms are listed in 24590-HLW-RPT-ENV-09-001 document and are shown on the General Arrangement Plan drawings listed in the References below. The aforementioned document identifies each room and the plant items and/or ancillary equipment it houses at various floor elevations of the HLW building. The DWP affecting rooms considered in this assessment report are: **Rooms at Elevation (-) 21'-0":** H-B005, H-B014, H-B021, H-B032, H-B035, H-B039A, and H-B039B. **Rooms at Elevation 0'-0" and other Elevations between 0'-0" and (-) 21'-0':** H-0106, H-0115, H-0117, H-0121, H-0136, H-0137 (including H-0304A, H-0310A, and pipe chase HCH15). **Rooms at Elevation 37'-0":** H-0302, H-0308 (including pipe chase HCH14).
Summary of Assessment		For each item of "Information Assessed" (i.e., Criteria) on the following pages, the items listed under "Source of Information" were reviewed and found to furnish adequate design requirements and controls to ensure that the design fully satisfies the requirements of Washington Administrative Code (WAC), Chapter 173-303 WAC, *Dangerous Waste Regulations,* WAC-173-303-640, *Tank Systems.*

References	Drawings	24590-HLW- P1- P01T- 00001, Rev. 9, HLW Vitrification Building General Arrangement Plan at El. (-) 21'-0"; 24590-HLW- P1- P01T- 00002, Rev. 7, HLW Vitrification Building General Arrangement Plan at El. 0'-0"; 24590-HLW- P1- P01T- 00004, Rev. 7, HLW Vitrification Building General Arrangement Plan at El. 37'-0"; 24590-HLW- P1- P01T- 00008, Rev. 11, HLW Vitrification Building General Sections A-A, B-B & C-C; 24590-HLW- P1- P01T- 00009, Rev. 11, HLW Vitrification Building General Sections D-D, E-E & F-F; 24590-HLW- P1- P01T- 00010, Rev. 11, HLW Vitrification Building General Section G-G & H-H; 24590-HLW- P1- P01T- 00011, Rev. 11, HLW Vitrification Building General Section J-J & K-K; 24590-HLW-DD-S13T-00013, Rev. 5, HLW Vitrification Building Structural Melter Cave #2 Liner Plate Plan, Section and Details; 24590-HLW-DD-S13T-00014, Rev. 4, HLW Vitrification Building Structural Melter Cave #2 Liner Plate Plan and Section; 24590-HLW-DD-S13T-00015, Rev. 4, HLW Vit Bldg Struct Canister Handling Cave Flr. Grillage, Insulation & SS Liner Plate Plan and Sections; 24590-HLW-DD-S13T-00021, Rev. 3, HLW Vitrification Building Structural Canister Handling Cave SS Wall Liner Partial Plan and Details; 24590-HLW-DD-S13T-00033, Rev. 3, HLW Vitrification Building Structural Concrete Embedment Details; 24590-HLW-DD-S13T-00041, Rev. 1, HLW Vitrification Building Structural Active Services Cell Melters I and II Liner Plate Plan; 24590-HLW-DD-S13T-00150, Rev. 5, HLW Vitrification Building Conc. SS Liner Plate & Insulation Pour Tunnels 1 and 2 Plan at El. (-) 21'-0"; 24590-HLW-DD-S13T-00002001, Rev. 20, HLW Vitrification Building Concrete Stainless Steel Liners Plan at El. (-) 21'-0", Sheet 1; 24590-HLW-DD-S13T-00002002, Rev. 5, HLW Vitrification Building Concrete Stainless Steel Liners Plan at El. (-) 21'-0", Sheet 2; 24590-HLW-DD-S13T-00002003, Rev. 5, HLW Vitrification Building Concrete Stainless Steel Liners Sections and Details El. (-) 21'-0"; 24590-HLW-D0-S13T-00002, Rev. 3, HLW Vitrification Building Concrete General Notes Abbreviation & Legend; 24590-HLW-D0-S13T-00003, Rev. 9, HLW Vitrification Building Notes on Concrete and Reinforcing Steel; 24590-HLW-DB-S13T-00001, Rev. 13, HLW Vitrification Building Concrete General Arrangement Plan at El. (-) 21'-0"; 24590-HLW-DB-S13T-00002, Rev. 5, HLW Vitrification Building Concrete Overall Plan at El. 0'-0"; 24590-HLW-DB-S13T-00004, Rev. 3, HLW Vitrification Building Concrete Overall Plan at El. 37'-0"; 24590-HLW-DB-S13T-00007, Rev. 15, HLW Vitrification Building Structural Concrete Placement Plan at El. (-) 21'-0"; 24590-HLW-DB-S13T-00015, Rev. 12, HLW Vitrification Building Structural Concrete Wall Placement Plan at El. 0'-0"; 24590-HLW-DB-S13T-00021, Rev. 2, HLW Vitrification Building Structural Concrete Forming Partial Plan El. 0'-0"; 24590-HLW-DB-S13T-00022, Rev. 2, HLW Vitrification Building Structural Concrete Forming Partial Plan El. 0'-0"; 24590-HLW-DB-S13T-00026, Rev. 4, HLW Vitrification Building Structural Concrete Forming Partial Plan El. 0'-0"; 24590-HLW-DB-S13T-00071, Rev. 3, HLW Vitrification Building Structural Concrete Forming Partial Plan El. 37'-0" Area 1; 24590-HLW-DB-S13T-00072, Rev. 2, HLW Vitrification Building Structural Concrete Forming Partial Plan El. 37'-0" Area 2; 24590-HLW-DB-S13T-00079, Rev. 2, HLW Vitrification Building Structural Concrete Forming Partial Plan El. 37'-0" Area 9; 24590-HLW-DB-S13T-00105, Rev. 7, HLW Vitrification Building Structural Concrete Wall Reinforcement Sections and Details; 24590-HLW-DB-S13T-00151, Rev. 3, HLW Vitrification Building Structural Concrete Forming Plan at El. (-) 21'-0"; 24590-HLW-DB-S13T-00156, Rev. 6, HLW Vitrification Building Structural Concrete Forming Plan at El. (-) 21'-0"; 24590-HLW-DB-S13T-00166, Rev. 3, HLW Vitrification Building Structural Concrete Forming Partial Section NE; 24590-HLW-DB-S13T-00263, Rev. 6, HLW Vitrification Building Structural Concrete Forming Elevations @ Col Line N and South Face; 24590-HLW-DB-S13T-00324, Rev. 2, HLW Vitrification Building Structural Concrete Forming Elevation @ Col Line 13.1 East and West Face; 24590-HLW-DB-S13T-00651, Rev. 6, HLW Vitrification Building Structural Concrete Wall Reinforcement Sections and Details;

References (cont'd)	Drawings	24590-HLW-DG-S13T-00001001, Rev. 7, HLW Vitrification Building Structural Concrete Base Mat Reinf. Plan El. (-) 21'-0" Top Reinf.; 24590-HLW-DG-S13T-00001002, Rev. 7, HLW Vitrification Building Structural Concrete Base Mat Reinf. Plan El. (-) 21'-0" Bottom Reinf.; 24590-HLW-DG-S13T-00002, Rev. 8, HLW Vitrification Building Structural Concrete Reinf. Plan (Top) at El. 0'-0"; 24590-HLW-DG-S13T-00003, Rev. 6, HLW Vitrification Building Structural Concrete Reinf. Plan (Bottom) at El. 0'-0"; 24590-HLW-DG-S13T-00033, Rev. 3, HLW Vitrification Building Structural Concrete Reinf. Partial Plan at El. 37'-0"; 24590-HLW-DG-S13T-00034, Rev. 2, HLW Vitrification Building Structural Concrete Reinf. Partial Plan at El. 37'-0"; 24590-HLW-DG-S13T-00090, Rev. 12, HLW Vitrification Building Structural Concrete Wall Reinforcement Partial Section NN; 24590-HLW-DG-S13T-00148, Rev. 3, HLW Vitrification Building Structural Wall & Floor Reinforcement Sections and Details; 24590-HLW-SS-S15T-00002, Rev. 6, HLW Vitrification Building Structural Steel Framing Overall Plan El. 0'-0"; 24590-HLW-SS-S15T-00004, Rev. 2, HLW Vitrification Building Structural Steel Framing Overall Plan El. 37'-0"; 24590-HLW-SS-S15T-00022, Rev. 7, HLW Vitrification Building Structural Steel Framing Partial Plan at El. 0'-0" in (Area 2); 24590-HLW-SS-S15T-00023, Rev. 10, HLW Vitrification Building Structural Steel Framing Partial Plan at El. 0'-0" (Area 3); 24590-HLW-SS-S15T-00042, Rev. 4, HLW Vitrification Building Structural Steel Framing Partial Plan El. 37'-0" in (Area 2); 24590-HLW-SS-S15T-00043, Rev. 6, HLW Vitrification Building Structural Steel Framing Partial Plan El. 37'-0" (Area 3); 24590-HLW-SS-S15T-00102, Rev. 3, HLW Vitrification Building Structural Steel Framing Elevation Col Line A; 24590-HLW-SS-S15T-00103, Rev. 3, HLW Vitrification Building Structural Steel Framing Elevation Col Line A; 24590-HLW-SS-S15T-00149, Rev. 1, HLW Vitrification Building Structural Steel Framing Elevation Col Line T Sheet 1; 24590-HLW-SS-S15T-00150, Rev. 0, HLW Vitrification Building Structural Steel Framing Elevation Col Line T Sheet 2; 24590-HLW-SS-S15T-00153, Rev. 1, HLW Vitrification Building Structural Steel Framing Elevation Col Line 1; 24590-HLW-SS-S15T-00157, Rev. 3, HLW Vitrification Building Structural Steel Framing Elevation Col Line 5 Sheet 1; 24590-HLW-SS-S15T-00168, Rev. 0, HLW Vitrification Building Structural Steel Framing Elevation Col Line 10 Sheet 2; 24590-HLW-SS-S15T-00190, Rev. 3, HLW Vitrification Building Structural Steel Framing Elevation Col Line 21; 24590-HLW-SS-S15T-00260, Rev. 11, HLW Vitrification Building Structural Steel Details; 24590-HLW-SS-S15T-00265, Rev. 5, HLW Vitrification Building Structural Steel Typical Connection Details; 24590-HLW-SS-S15T-00332, Rev. 5, HLW Vitrification Building Structural Steel Column Base Plate Details.

Information Assessed		Source of Information	Assessment
Foundation Design	Description of subsurface conditions and soil bearing capacity are adequate.	24590-HLW-RPT-ENV-09-001, Rev. 0, Dangerous Waste Permit Secondary Containment Requirements for HLW Facility; 24590-WTP-DC-ST-01-001, Rev. 12D, Structural Design Criteria; 24590-BOF-3PS-CE01-T0001, Rev. 6, Engineering Specification for Excavation and Backfill; 24590-BOF-3PS-C000-T0001, Rev. 6, Engineering Specification for Material Testing Services; 24590-HLW-DGC-S13T-00001, Rev. 0, Verification of HLW Basemat Thickness in Support of LCAR; 24590-HLW-DGC-S13T-00002, Rev. 3, Foundation Slab Rebar Below Grade; 24590-HLW-S0C-S15T-00006, Rev. E, HLW Vitrification Building Seismic Analysis- Structural Model; WTSC99-1036-42-17B, RPP-WTP Final Report Geotechnical Investigation, Shannon & Wilson Inc. (H-1616-51), July 2000; 24590-BOF-3PS-CE00-T0001, Rev. 0, Technical Specification for Site Work.	The Dangerous Waste Permit document lists the rooms at various elevations in HLW building requiring the secondary containment. Details of the secondary containment requirements in each room are identified in the above document. The Structural Design Criteria adequately presents design guidance for both mat and spread footings based on the Geotechnical Investigation report for the site. This report concluded that the liquefaction of the subsurface soil is unlikely during an earthquake event because the ground water table is about 275 ft below the ground surface. Bearing capacity and settlement design parameters are furnished for the dense Hanford Upper and Lower Sand Units and Structural Fill. Use of the loose wind blown (dune) sands for foundations is precluded. The Verification of HLW Basemat Thickness calculations reviewed indicates that the allowable bearing of subsurface soil below the foundation mat is more than the maximum computed value. The Excavation and Backfill Specification provides structural backfill requirements based on the Geotechnical Investigation report and adequate current codes and standards for selection, placing, and compacting structural backfill including testing of candidate fill materials and completed backfills. The Specification for Material Testing Services provides current adequate codes and standards for testing of candidate structural fill materials and in-situ testing of structural fills as they are constructed. The codes and standards are consistent with those called out in the Excavation and Backfill Specification. Review of the sample calculations shows that appropriate values of the soil parameters including allowable bearing capacity, were used for the secondary containment structures' design.

Information Assessed		Source of Information	Assessment
Foundation Design (cont'd)	Foundation design loads (including full tanks) and estimated settlement are adequately considered.	24590-WTP-DC-ST-01-001, Rev. 12D, Structural Design Criteria; ASCE 7-98, Minimum Design Loads for Buildings and Other Structures; ACI 349-01, Code Requirements for Nuclear Safety-Related Concrete Structures; ACI 318-99, Building Code Requirements for Structural Concrete; 24590-HLW-DGC-S13T-00001, Rev. 0, Verification of HLW Basemat Thickness in Support of LCAR; 24590-HLW-DGC-S13T-00002, Rev. 3, Foundation Slab Rebar Below Grade; 24590-HLW-DGC-S13T-00010, Rev. B, HLW Concrete Subsidence Evaluation; 24590-HLW-DGC-S13T-00044, Rev. A, EL.+ 0 ft Slab Rebar Design –Area 2; 24590-HLW-DGC-S13T-00046, Rev. B, EL.+ 0 ft Slab Rebar Design –Area 4; 24590-HLW-DGC-S13T-00073, Rev. A, EL.+ 0 ft Slab –Wall Dowel Design; 24590-HLW-DGC-S13T-00100, Rev. 0, Construction Equipment on Elev. 0'-0"; 24590-HLW-DGC-S13T-00115, Rev. A, HLW-Validation of Conc. for Slab at EL.(-) 21' and Walls from EL.(-) 21' to 0' for RGM; 24590-HLW-DGC-S13T-00130, Rev. A, HLW Slab Reinforcing @ Floor Elevation +37'-0" Bounded by Col. Lines 1-11 and B-M; 24590-HLW-DGC-S13T-00131, Rev. A, HLW Slab Reinforcing @ Floor Elevation +37'-0" Bounded by Col. Lines 11-20 and B-M.	The Structural Design Criteria uses current adequate standards to define design loads and load combinations (ASCE 7-98, ACI 349-01 and ACI 318-99). Dead and fluid loads are included in these loads and load combinations. Settlement design parameters are included in the Structural Design Criteria subsection on "geotechnical design parameters and foundation design." Review of the sample calculations for various floor elevation slabs shows that the full loads of the tanks and other applicable equipment including the in-structural seismic response and displacement's induced forces from other components and soil loads have been appropriately considered in the foundation design.

Information Assessed		Source of Information	Assessment
Foundation Design (cont'd)	Design calculation approach and design basis of footings with design standard references (e.g., ACI) are adequate.	24590-WTP-DC-ST-01-001, Rev. 12D, Structural Design Criteria; ACI 349-01, Code Requirements for Nuclear Safety-Related Concrete Structures; ACI 318-99, Building Code Requirements for Structural Concrete; 24590-WTP-PER-CSA-02-001, Rev. 9, Secondary Containment Design; 24590-HLW-DGC-S13T-00001, Rev. 0, Verification of HLW Basemat Thickness in Support of LCAR; 24590-HLW-DGC-S13T-00002, Rev. 3, HLW Foundation Slab Rebar Below Grade; 24590-HLW-DGC-S13T-00044, Rev. A, El. 0'-0" Slab Rebar Design Area 2; 24590-HLW-SSC-S15T-00030, Rev. E, HLW Elevation 0'-0" Primary Steel - Release 4; 24590-HLW-SSC-S15T-00076, Rev. B, HLW Elevation 37'-0" Forming and Primary Steel – Supporting Concrete; 24590-HLW-SSC-S15T-00305, Rev. A, HLW Design of Connections for Steel Framing Elevation 15'-30', and 37' and Melter Roof for HLW Building; 24590-WTP-VV-ST-01-001, Rev. 5A, Verification and Validation Test Plan and Test Report for GTSTRUDL; 24590-HLW-DVR-ST-02-102, Rev. 0, HLW Building Vitrification Structural Drop Analysis.	The Structural Design Criteria references current adequate design criteria for the design of concrete foundations and footings. ACI 349-01 is referenced for design of "safety" grade structures and ACI 318-99 is referenced for the strength design of "commercial grade" structures. The Secondary Containment Design document provides the design approach, basis, and methodology used for the design of the secondary containment foundations/footings. The input parameters used in the GTSTRUDL computer code utilized for this secondary containment design are appropriate and the output results have been appropriately validated via the Verification and Validation Test Plan and Test Report document. Review of the requirement documents and sample calculations shows that the design basis and approach, methodology, and the codes and standards used are appropriate for the foundation design to adequately withstand the applicable loads including the seismic and soil loads.

Information Assessed		Source of Information	Assessment
Foundation Design (cont'd)	Foundation material is compatible with the soil.	24590-WTP-3PS-D000-T0001, Rev. 7, Engineering Specification for Concrete Work; 24590-WTP-3PS-DB01-T0001, Rev. 8, Engineering Specification for Furnishing and Delivering Ready-Mix Concrete; 24590-BOF-3PS-C000-T0001, Rev. 6, Engineering Specification for Material Testing Services; 24590-WTP-DB-ENG-01-001, Rev. 1P, Basis of Design. 24590-WTP-3PS-DG00-T0001, Rev. 4, Engineering Specification for Furnishing of Reinforcing Steel.	The specification documents for Concrete Work and Furnishing and Delivering Ready-Mix Concrete provide adequate current requirements for design, testing, and the selection of coarse and fine aggregates and the procurement of cementitious materials. Adequate test procedures are provided in the Material Testing Services specification for testing candidate aggregates for chemical reactivity. Instructions for mixing and delivering Ready-Mix Concrete are adequate and current. As noted in Section 4.7 of the Basis of Design document, the water table lies about 250 feet below the ground surface elevation of the HLW Facility Site, so there is little reason to expect compatibility problems between the concrete foundations and the site soils.
	Foundation will withstand the effects of frost heave	Drawings listed above under References; 24590-WTP-DC-ST-01-001, Rev. 12D, Structural Design Criteria.	The Structural Design Criteria includes adequate provisions to preclude frost heave in the section addressing lateral earth pressure loads. All structural foundations are required to extend into the soil below the frost line to preclude frost heave. The frost line is 30 inches below the finished grade (El. 0'-0"), however, the drawings show that majority of the top of HLW foundation mat is at (-) 21'-0" and some sections are even lower than this. Therefore, the secondary containment foundations will not be subjected to frost heave effects.

Information Assessed		Source of Information	Assessment
Seismic Design	Seismic considerations have been adequately addressed.	24590-WTP-PER-CSA-02-001, Rev. 9, Secondary Containment Design; 24590-WTP-DC-ST-01-001, Rev. 12D, Structural Design Criteria; ACI 349-01, Code Requirements for Nuclear Safety-Related Concrete Structures; ACI 318-99, Building Code Requirements for Structural Concrete; ANSI/AISC N690, Specification for the Design, Fabrication and Erection of Steel Safety-Related Structures for Nuclear Facilities; AISC MO16-89, Manual of Steel Construction - Allowable Stress Design; ASCE 4-98, Seismic Analysis of Safety Related Nuclear Structures and Commentary; 24590-HLW-S0C-S15T-00006, Rev. E, HLW Virtification Building Structural Analysis- Structural Model; 24590-HLW-S0C-S15T-00011, Rev. 0, Structural Analysis of HLW Building – In Support of LCAR; 24590-HLW-S0C-S15T-00013, Rev. 0, HLW Virtification Building Structural Drop Analysis –for PCAR; 24590-HLW-DGC-S13T-00002, Rev. 3, Found. Slab Rebar Below Grade; 24590-HLW-DGC-S13T-00044, Rev. A, El. +0 ft Slab Rebar Design Area 2; 24590-HLW-DGC-S13T-00046, Rev. B, El. +0 ft Slab Rebar Design Area 4; 24590-HLW-DGC-S13T-00100, Rev. 0, Construction Equip. on Elev. 0'-0". 24590-HLW-DGC-S13T-00073, Rev. A, El. +0 ft Slab-Wall Dowell Design; 24590-HLW-DGC-S13T-00115, Rev. A, HLW-Validation of Conc. for Slab at EL.(-) 21' and Walls from EL.(-) 21' to 0' for RGM; 24590-HLW-DGC-S13T-00130, Rev. A, HLW Slab Reinforcing @ Floor Elevation +37'-0" Bounded by Col. Lines 1-11 and B-M; 24590-HLW-DGC-S13T-00131, Rev. A, HLW Slab Reinforcing @ Floor Elevation +37'-0" Bounded by Col. Lines 11-20 and B-M; 24590-HLW-SSC-S15T-00030, Rev. E, Elev. 0' Primary Steel-Release 4; 24590-HLW-SSC-S15T-00076, Rev. B, Elev. 37' Forming and Primary Steel Supporting Concrete; 24590-HLW-SSC-S15T-00305, Design of Connections for Steel Framing at Elevation 15'-30', 37' and Melter Roof for HLW Building; 24590-WTP-VV-ST-01-001, Rev. 5A, Verification and Validation Test Plan and Test Report for GTSTRUDL; 24590-WTP-VV-ST-05-004, Rev. 3B, SAP 2000 Verification and Validation Test Report.	The Secondary Containment Design document describes and provides references for the design methodology, materials, loads, and load combinations (including seismic loads) for the HLW Building secondary containment. The Structural Design Criteria provides detailed discipline specific codes and standards for the design of Seismic Category (SC-I/II) HLW secondary containment foundations and structures by the design engineers. ACI-349-01 and ACI 318-99 provide the design codes and load combinations for design of the secondary containment reinforced concrete foundations and structures. Structural steel components of the secondary containment structures and stainless steel liners are designed using ANSI/AISC N690 and the AISC Allowable Stress Design code. ASCE 4-98 is used for guidance on seismic analysis of safety-related nuclear structures. The GTSTRUDL and SAP 2000 structural software codes were used for concrete and steel members design. The codes and standards listed above are adequate and acceptable for addressing seismic considerations. Review of the sample calculations shows that the requirements of the applicable codes and standards are appropriately incorporated in these documents and output results were verified per V & V Test Reports. The review also concluded that the secondary containment components including the liner materials are adequately designed to withstand seismic forces and displacements.

Information Assessed		Source of Information	Assessment
Compatibility	The stored waste is compatible with its Secondary Containment and leak detection hardware based on a detailed chemical and physical analysis of the wastes used and other information sources.	24590-WTP-DB-ENG-01-001, Rev. 1P, Basis of Design; 24590-WTP-PER-M-02-001, Rev. 3, Material Selections for Building Secondary Containment/Leak Detection; 24590-WTP-PER-CSA-02-001, Rev. 9, Secondary Containment Design; 24590-WTP-3PS-AFPS-T0006, Rev. 2, Engineering Specification for Field Applied Special Protective Coatings for Secondary Containment Areas; 24590-HLW-PER-M-02-001, Rev. 3, HLW Facility Sump Data; 24590-HLW-PER-M-02-003, Rev. 3, Flooding Volume for HLW Facility; 24590-WTP-3PS-NLLR-T0002, Rev. 1, Engineering Specification for Furnishing, Detailing, Fabrication, Delivery and Installation of Stainless Steel Liner Plates.	The Basis of Design document states that cells and sumps are appropriately lined and any spills are removed and flushed within 24-hrs or as timely as possible. The Secondary Containment Design document requires the use of stainless steel liner or special protective coatings (SPC) liner for various process cells and rooms at different elevations of HLW building. Flood Volume documents provide required specific liner height in various rooms. Based on detailed analysis of the corrosive properties of expected waste process operations and evaluation of potential leak scenarios, the Material Selection report identifies appropriate and adequate corrosion resistant materials requirements for Secondary Containment liners, sumps and leak detection equipment. The Engineering Specification for Field Applied Special Protective Coatings (SPCs) provides the selection test criteria used to determine acceptable approved coating systems. These test criteria include chemical resistance endurance requirements and wear abrasion resistance criteria which provides liners compatibility with the wastes considered. The Secondary Containment Design document provides adequate typical construction details for liners including tank anchorage details, stainless steel liner installation details and SPC installation details to be used for Secondary Containment. Rooms at various elevations are provided with floor drains as itemized in the Sump Data document for the HLW. All sumps are equipped with leak detection; however, individual floor drains are not equipped with leak detection.

Information Assessed		Source of Information	Assessment
Strength	The design shows that the Secondary Containment has sufficient strength and thickness to prevent failure owing to pressure gradients, static head during a release, physical contact with the waste, climatic conditions, and the stress of daily operations (e.g., vehicular traffic).	Drawings listed above under References; 24590-WTP-DC-ST-01-001, Rev. 12D, Structural Design Criteria; 24590-WTP-PER-CSA-02-001, Rev. 9, Secondary Containment Design; 24590-WTP-3PS-NLLR-T0002, Rev. 1, Engineering Specification for Furnishing, Detailing, Fabrication, Delivery and Installation of Stainless Steel Liner Plates; 24590-WTP-PER-M-02-001, Rev. 3, Material Selections for Building Secondary Containment/Leak Detection; 24590-HLW-DGC-S13T-00001, Rev. 0, Verification of HLW Basemat Thickness in Support of LCAR; 24590-HLW-DGC-S13T-00002, Rev. 3, Foundation Slab Rebar Below Grade. 24590-HLW-DGC-S13T-00044, Rev. A, El. +0 ft Slab Rebar Design Area 2; 24590-HLW-DGC-S13T-00046, Rev. B, El. +0 ft Slab Rebar Design Area 4; 24590-HLW-DGC-S13T-00100, Rev. 0, Construction Equip. on Elev. 0'-0"; 24590-HLW-DGC-S13T-00073, Rev. A, El. +0 ft Slab-Wall Dowell Design; 24590-HLW-DGC-S13T-00115, Rev. A, HLW-Validation of Conc. for Slab at EL.(-) 21' and Walls from EL.(-) 21' to 0' for RGM; 24590-HLW-DGC-S13T-00130, Rev. A, HLW Slab Reinforcing @ Floor Elevation +37'-0" Bounded by Col. Lines 1-11 and B-M; 24590-HLW-DGC-S13T-00131, Rev. A, HLW Slab Reinforcing @ Floor Elevation +37'-0" Bounded by Col. Lines 11-20 and B-M.	Because the Secondary Containment structures being considered are installed inside the HLW Vitrification Building as shown on the general arrangement drawings, climatic conditions and vehicular traffic are not applicable load cases. The Secondary Containment Design requirements document identifies adequate and appropriate design codes and standards and all applicable load cases (operational stresses) from site specific conditions that must be considered in the design. The Engineering Specification for Furnishing Stainless Steel Liner Plates includes specific provisions for protection of and repair of completed liners during the construction process. Review of the sample calculations shows that the secondary containment structures are designed appropriately with sufficient strength to sustain the applicable loads. Factors that were considered during stainless steel liner material selection and special protective coating (SPC) material selection are adequately discussed in the Material Selections for Building Secondary Containment/Leak Detection document.

Information Assessed		Source of Information	Assessment
Strength (cont'd)	The Secondary Containment system has sufficient strength in the presence of operational stresses from site-specific conditions (i.e., traffic, heavy equipment, precipitation, frost).	Drawings listed above under References; 24590-WTP-DC-ST-01-001, Rev. 12D, Structural Design Criteria; 24590-WTP-PER-CSA-02-001, Rev. 9, Secondary Containment Design; 24590-WTP-3PS-NLLR-T0002, Rev. 1, Engineering Specification for Furnishing, Detailing, Fabrication, Delivery and Installation of Stainless Steel Liner Plates; 24590-WTP-PER-M-02-001, Rev. 3, Material Selections for Building Secondary Containment/Leak Detection; 24590-HLW-DGC-S13T-00002, Rev. 3, Foundation Slab Rebar Below Grade. 24590-HLW-DGC-S13T-00044, Rev. A, El. +0 ft Slab Rebar Design Area 2; 24590-HLW-DGC-S13T-00046, Rev. B, El. +0 ft Slab Rebar Design Area 4; 24590-HLW-DGC-S13T-00100, Rev. 0, Construction Equip. on Elev. 0'-0"; 24590-HLW-DGC-S13T-00073, Rev. A, El. +0 ft Slab-Wall Dowell Design; 24590-HLW-DGC-S13T-00115, Rev. A, HLW-Validation of Conc. for Slab at EL.(-) 21' and Walls from EL.(-) 21' to 0' for RGM; 24590-HLW-DGC-S13T-00130, Rev. A, HLW Slab Reinforcing @ Floor Elevation +37'-0" Bounded by Col. Lines 1-11 and B-M; 24590-HLW-DGC-S13T-00131, Rev. A, HLW Slab Reinforcing @ Floor Elevation +37'-0" Bounded by Col. Lines 11-20 and B-M.	The Secondary Containment Design requirements document identifies adequate and appropriate design codes and standards and all applicable load cases (operational stresses) from site specific conditions that must be considered in the design. Because the Secondary Containment structures being considered are installed inside the HLW Vitrification Building as shown on the drawings, therefore, traffic, heavy equipment, precipitation, and frost are not applicable load cases. The Engineering Specification for Furnishing Stainless Steel Liner Plates includes specific provisions for protection of and repair of completed liners during the construction process. Review of the sample calculations shows that the secondary containment structures are designed appropriately with sufficient strength to sustain the applicable loads from the specific conditions. Factors that were considered during stainless steel liner material selection and SPC material selection are adequately discussed in the Material Selections for Building Secondary Containment/Leak Detection document.

Information Assessed		Source of Information	Assessment
Foundation Integrity	The Secondary Containment is properly supported by a foundation or base in order to prevent failure from settlement, compression, or uplift, including the residual effects of installation.	Drawings listed above under References; 24590-WTP-DC-ST-01-001, Rev. 12D, Structural Design Criteria; 24590-BOF-3PS-CE00-T0001, Rev. 0, Technical Specification for Site Work. 24590-WTP-3PS-D000-T0001, Rev. 7, Engineering Specification for Concrete Work; 24590-BOF-3PS-CE01-T0001, Rev. 6, Engineering Specification for Excavation and Backfill; 24590-BOF-3PS-C000-T0001, Rev. 6, Engineering Specification for Material Testing Services; 24590-WTP-PER-CSA-02-001, Rev. 9, Secondary Containment Design. 24590-HLW-DGC-S13T-00001, Rev. 0, Verification of HLW Basemat Thickness in Support of LCAR; 24590-HLW-DGC-S13T-00002, Rev. 3, Foundation Slab Rebar Below Grade. 24590-HLW-S0C-S15T-00006, Rev. E, HLW Vitrification Building Seismic Analysis- Structural Model; 24590-HLW-DGC-S13T-00044, Rev. A, El. +0 ft Slab Rebar Design Area 2; 24590-HLW-DGC-S13T-00046, Rev. B, El. +0 ft Slab Rebar Design Area 4; 24590-HLW-DGC-S13T-00100, Rev. 0, Construction Equip. on Elev. 0'-0". 24590-HLW-DGC-S13T-00073, Rev. A, El. +0 ft Slab-Wall Dowell Design; 24590-HLW-DGC-S13T-00115, Rev. A, HLW-Validation of Conc. for Slab at EL.(-) 21' and Walls from EL.(-) 21' to 0' for RGM; 24590-HLW-DGC-S13T-00130, Rev. A, HLW Slab Reinforcing @ Floor Elevation +37'-0" Bounded by Col. Lines 1-11 and B-M; 24590-HLW-DGC-S13T-00131, Rev. A, HLW Slab Reinforcing @ Floor Elevation +37'-0" Bounded by Col. Lines 11-20 and B-M.	These conditions are fully addressed in the Structural Design Criteria and the Secondary Containment Design requirements documents. The design requirements and codes and standards specified are adequate to satisfy the performance goals. The procurement and construction specifications adequately provide for proper foundation construction and installation of the Secondary Containment. The general arrangement plans and the associated design drawings show the secondary containment boundaries. The sample calculations reviewed show that the foundation slabs are appropriately designed and will not fail when subjected loads such as uplift, installation, settlement or residual effects.

Information Assessed		Source of Information	Assessment
Foundation Integrity (cont'd)	The placement, structural support, and type of material used for backfill around and below the Secondary Containment are appropriate.	Drawings listed above under References; 24590-BOF-3PS-CE01-T0001, Rev. 6, Engineering Specification for Excavation and Backfill; 24590-BOF-3PS-C000-T0001, Rev. 6, Engineering Specification for Material Testing Services. 24590-HLW-DGC-S13T-00001, Rev. 0, Verification of HLW Basemat Thickness in Support of LCAR; 24590-HLW-DGC-S13T-00002, Rev. 3, Foundation Slab Rebar Below Grade.	The Excavation and Backfill and Material Testing specifications contain current adequate industry standards for selecting and testing fill materials, placing and compacting backfills, and testing not less than once each lift to assure adequate compaction. Requirements for testing and record keeping are current and adequate for both "safety grade" fills and "commercial grade" fills. Drawings show that backfill requirements are properly applied, tested, documented, and accepted and approved by BNI. Review of sample calculations shows that appropriate parameters for backfill are used in design.
Infiltration	The design or operation (e.g., diking & curbing) prevents run-on or infiltration of precipitation into the Secondary Containment system unless the collection system has sufficient excess capacity (25 yr rainfall) to contain the run-on precipitation.	Drawings listed above under References; 24590-WTP-DB-ENG-01-001, Rev. 1P, Basis of Design.	This requirement is specified in the Basis of Design document. All secondary containment structure rooms being reviewed in this integrity assessment are located at various levels inside the HLW Vitrification Building where they are protected from precipitation as shown in the general arrangement plans and other associated drawings. Therefore, this requirement is not applicable to these rooms. The Basis of Design document also describes that the ground water table under the WTP site is more than 250 ft below the ground surface which makes it unlikely event for water infiltration or intrusion into the building.

Information Assessed		Source of Information	Assessment
Infiltration (cont'd)	The design includes an external moisture barrier or other means to prevent moisture from entering the cell.	Drawings listed above under References; 24590-WTP-DB-ENG-01-001, Rev. 1P, Basis of Design. 24590-WTP-3PS-NLLR-T0002, Rev. 1, Engineering Specification for Furnishing, Detailing, Fabrication, Delivery and Installation of Stainless Steel Liner Plates; 24590-WTP-3PS-AFPS-T0006, Rev. 2, Engineering Specification for Field Applied Special Protective Coatings for Secondary Containment Areas; 24590-WTP-PER-J-02-002, Rev. 4, Leak Detection in Secondary Containment Systems.	The secondary containment rooms listed in the Scope section above are shown on the general arrangement plan drawings at floor elevations from (-) 21'-0" up to 37'-0" are located inside the HLW Vitrification Building which protects them from the precipitation and surface water percolation. The Basis of Design document states that the ground water table at WTP site is located more than 250 feet below the ground surface; therefore, infiltration of external moisture into the interior of the building is not a credible event. And furthermore, the subject Secondary Containment rooms as shown on the drawings are lined with stainless steel plates or special protective coating (SPC) material. The sumps in these rooms are equipped with leak detection monitoring instrumentation as an added insurance against moisture infiltration and/or presence.

Information Assessed		Source of Information	Assessment
Liner System	The containment area is free of cracks or gaps and the design discusses methods of their minimization.	24590-WTP-PER-CSA-02-001, Rev. 9, Secondary Containment Design; 24590-WTP-3PS-NLLR-T0002, Rev. 1, Engineering Specification for Furnishing, Detailing, Fabrication, Delivery and Installation of Stainless Steel Liner Plates; 24590-WTP-3PS-AFPS-T0006, Rev. 2, Engineering Specification for Field Applied Special Protective Coatings for Secondary Containment Areas.	The Secondary Containment Design requirements document provides adequate and appropriate codes and standards for design of leak-tight liners. This report includes appropriate details for design and installation of stainless steel and special protective coating liners and sumps free of cracks and gaps. The Engineering Specification for Furnishing, Detailing, Fabrication, Delivery and Installation of Stainless Steel Liner Plates provides detailed information on design, fabrication, installation, and inspection of stainless steel liners and sumps. The Engineering Specification for Field Applied Special Protective Coatings provides detailed information on the tested and approved coating systems. This information includes directions for surface preparation, patching materials and application methods, and specific directions for application of multi-layer coatings. From the review of the documents listed in the Sources of Information column, it is concluded that the liner materials applied are adequate.

Information Assessed		Source of Information	Assessment
Liner System (cont'd)	The design has considered the compatibility of the concrete liner or coatings and waste and presents information on coatings planning to be used from the manufacturer addressing compatibility with the stored waste. The lining or coating must prevent the waste from migrating into the concrete.	24590-WTP-PER-M-02-001, Rev. 3, Material Selections for Building Secondary Containment/Leak Detection; 24590-WTP-PER-CSA-02-001, Rev. 9, Secondary Containment Design; 24590-WTP-3PS-NLLR-T0002, Rev. 1, Engineering Specification for Furnishing, Detailing, Fabrication, Delivery and Installation of Stainless Steel Liner Plates; 24590-WTP-3PS-AFPS-T0006, Rev. 2, Engineering Specification for Field Applied Special Protective Coatings for Secondary Containment Areas.	The Material Selections document contains adequate and appropriate general information on the compatibility of planned Secondary Containment stainless steel and special protective coating liners with the waste. The Secondary Containment Design document provides adequate and appropriate standard details for design and installation of stainless steel and special protective coating liners that will prevent migration of the waste into the concrete. The Engineering Specification for Furnishing, Detailing, Fabrication, Delivery and Installation of Stainless Steel Liner Plates provides detailed information on design, fabrication, installation, and inspection of stainless steel liners and sumps. The Engineering Specification for Field Applied Special Protective Coatings (SPC) provides detailed information on the tested and approved coating systems. This information includes directions for surface preparation, patching materials and application methods, and specific directions for application of multi-layer coatings.