ISSUED BY
RPP-WTP PDC

R11549963

24590-CM-HC4-HXYG-00240-02-00006

REV 00A

SUBCONTRACT SUBMITTAL
REVIEW NOT REQUIRED

AREVA

AFS-12-0274

November 28, 2012

Mr. Gary Ellers
Subcontracts Administrator
Bechtel National RPP-WTP Project
2435 Stevens Center Place
Richland, Washington 99354

Dear Mr. Ellers:

BECHTEL NATIONAL, INC. CONTRACT NO. 24590-CM-HC4-HXYG-00240 IQRPE STRUCTURAL INTEGRITY ASSESSMENT REPORT FOR LAW SECONDARY CONTAINMENT BULGE ENCLOSURES (LCP/LFP/LOP/RLD) IA-3008143-000

The structural integrity assessment of the subject secondary containment bulge enclosures have been completed per the contract requirements and is enclosed for your use. The assessment found that the design is sufficient to ensure the secondary containment bulge enclosures 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,

Elizabeth W. Smith, C.P.M.
Subcontract Administrator
AREVA Federal Services LLC
Richland Office

llm

Enclosure (1)

cc: D. C. Pfluger, MS5-I w/enclosures (2)

IA-3008143-000

IQRPE STRUCTURAL INTEGRITY ASSESSMENT REPORT FOR LAW SECONDARY CONTAINMENT BULGE ENCLOSURES (LCP/LFP/LOP/RLD)

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 LAW SECONDARY CONTAINMENT BULGE ENCLOSURES (LCP/LFP/LOP/RLD)

"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 LAW Secondary Containment Bulge Enclosures (LCP/LFP/LOP/RLD), 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 fifty (50) pages numbered one (1) through fifty (50).

TARLOK SINGH HUNDAL
STATE OF WASHINGTON
20213
REGISTERED
PROFESSIONAL ENGINEER

Signature

11/28/12
Date

Scope	Scope of this Integrity Assessment	The scope of this integrity assessment includes nine LAW bulge enclosures (LCP-BULGE-00001/2/3, LFP-BULGE-00001/2, LOP-BULGE-00001/2, and RLD-BULGE-00001/4), also listed herein as bulges, bulge units, or plant items associated with the subject system as shown on General Arrangement Drawings 24590-LAW-P1-P01T-00001 and - 00004. These bulge enclosures house and act as secondary containment to numerous waste lines components such piping, valves, actuators, instruments, and associated equipment as shown on various listed Reference drawings. The bulges serve the purpose to provide quick, convenient, and safe containment enclosures for the maintenance of various serviceable components of different systems as shown on the drawings. The bulge enclosures (LCP-BULGE-00001/2/3, LFP-BULGE-00001/2, LOP-BULGE-00001/2, and RLD-BULGE-00004) are mounted on the concrete floor slab in Room L-0202 @ Elevation 28'-0" and bulge enclosure (RLD-BULGE-00001) is mounted on the concrete floor slab in Room L-B001A @ Elevation (-) 21'-0" of the LAW facility. Page contents description: Pages 1 and 2: Applicable to all below listed nine LAW bulge enclosures Pages 3-14: Applicable to LCP-BULGE-00001/2/3 Pages 15-26: Applicable to LFP-BULGE-00001/2 Pages 27-38: Applicable to LOP-BULGE-00001/2 Pages 39-50: Applicable to RLD-BULGE-00001/4.
Summary of Assessment		For each item of "Information Assessed" (i.e., Criteria) on the following pages, the documents 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,* Section WAC-173-303-640 (3) (a) through (g) applicable elements of the *Tank Systems.*

References	Material Requisition, Task Order T -008, Specifications, and Plant Drawings generally common to all LAW Bulges.	Material Requisition (MR): 24590-CM-MRD-PY33-00001, Rev. 5, Bulges (Process). Task Order T-008 (Technical Services Subcontract): 24590-QL-HC4-W000-00085, Rev. 2, Finite Element Analysis of LAW and PTF Bulges including Attachments 2 & 3 of Task Order T-008. Specifications: The following Specifications with their respective revision and Specification Change Notices (SCNs) are listed in the above listed MR and Task Order T-008: 24590-WTP-3PS-MX00-T0001, Engineering Specification for Process Bulge Design and Fabrication ; 24590-WTP-3PS-G000-T0001, Engineering Specification for Supplier Quality Assurance Program Requirements; 24590-WTP-3PS-G000-T0002, Engineering Specification for Positive Material Identification (PMI) for Shop Fabrication; 24590-WTP-3PS-G000-T0003, Engineering Specification for Packaging, Handling, and Storage Requirements; 24590-WTP-3PS-FB01-T0001, Engineering Specification for Structural Design Loads for Seismic Category III & IV Equipment and Tanks; 24590-WTP-3PS-SS00-T0002, Engineering Specification for Welding of Structural Stainless Steel and Welding of Structural Carbon Steel to Structural Stainless Steel; 24590-WTP-3PS-AFPS-T0001, Engineering Specification for Shop Applied Special Protective Coatings for Steel Items and Equipment. 24590-WTP-3PS-MV00-T0001, Engineering Specification for Pressure Vessel Design and Fabrication; 24590-WTP-3PS-MV00-T0003, Engineering Specification for Pressure Vessel Fatigue Analysis; 24590-WTP-3PS-G000-T0014, Engineering Specification for Supplier Design Analysis. Plant Drawings: 24590-LAW-P1-P01T-00001, Rev. 3, LAW Vitrification Building General Arrangement Plan at El. (-) 21'-0"; 24590-LAW-P1-P01T-00002, Rev. 6, LAW Vitrification Building General Arrangement Plan at El. 3'-0"; 24590-LAW-P1-P01T-00004, Rev. 4, LAW Vitrification Building General Arrangement Plan at El. 28'-0"; 24590-LAW-P1-P01T-00007, Rev. 8, LAW Vitrification Building General Arrangement Section A-A, B-B, and S-S; 24590-LAW-DB-S13T-00007, Rev. 3, LAW Vitrification Building Main Building Conc. Forming Plan Zone 1 @ El. (-) 21'-0"; 24590-LAW-DB-S13T-00014, Rev. 5, LAW Vitrification Building Main Building Partial Conc. Forming Plan Zone 1 @ El. 3'-0"; 24590-LAW-DB-S13T-00020, Rev. 1, LAW Vitrification Building Main Building Partial Conc. Forming Plan Zone 7 @ El. 2'-0" (Process Cells); 24590-LAW-DB-S13T-00021, Rev. 2, LAW Vitrification Building Main Building Partial Conc. Forming Plan Zone 8 @ El. 2'-0 (Process and Effluent Cells); 24590-LAW-DB-S13T-00024, Rev. 5, LAW Vitrification Building Main Building Partial Conc. Forming Plan Zone 1 @ El. 28'-0"; 24590-LAW-DB-S13T-00031, Rev. 6, LAW Vitrification Building Main Building Partial Conc. Forming Plan Zone 8 @ El. 28'-0"; 24590-LAW-DB-S13T-00032, Rev. 5, LAW Vitrification Building General Partial Conc. Forming Plan Zone 7 West @ El. 28'-0"; 24590-LAW-DB-S13T-00033, Rev. 5, LAW Vitrification Building General Partial Conc. Forming Plan Zone 7 East @ El. 28'-0"; 24590-LAW-S1-S15T-00375, Rev. 0, LAW Vitrification Building Main Building (+) 28' Elevation Bulge Anchorage Details, (including FCNs: 24590-WTP-FC-M-08-0164, -0173, -0181, -0194, & -0201, and 24590-WTP-FC-M-09-0006 & -0034); 24590-LAW-DD-S13T-00019, Rev. 3, LAW Vitrification Building Main Building Special Embed Plates; 24590-WTP-DD-S13T-00002, Rev. 7, Civil/Structural Standards-Standard Embed Plates.

References (cont'd)	Vendor Drawings for LCP Bulges	Vendor Fabrication Drawings (*Bechtel Status Code 1 Drawings): 24590-CM-POA-PY33-00002-06-00001, Rev. 00G, Concentrate Receipt Bulge (LCP-BULGE-00001) Outline, Dimensions & Det., Sh. 1 of 2; 24590-CM-POA-PY33-00002-06-00002, Rev. 00G, Concentrate Receipt Bulge (LCP-BULGE-00001) Outline, Dimensions & Details, Sh. 2; 24590-CM-POA-PY33-00002-06-00031, Rev. 00G, Concentrate Receipt Bulge (LCP-BULGE-00001) Assembly, Sheet 1 of 3; 24590-CM-POA-PY33-00002-06-00032, Rev. 00G, Concentrate Receipt Bulge (LCP-BULGE-00001) Assembly, Sheet 2; 24590-CM-POA-PY33-00002-06-00033, Rev. 00G, Concentrate Receipt Bulge (LCP-BULGE-00001) Assembly, Sheet 3; 24590-CM-POA-PY33-00002-06-00034, Rev. 00E, Enclosure & Cover (LCP-BULGE-00001) Subassembly, Sheet 1of 5; 24590-CM-POA-PY33-00002-06-00035, Rev. 00E, Enclosure & Cover (LCP-BULGE-00001) Details, Sheet 2; 24590-CM-POA-PY33-00002-06-00036, Rev. 00E, Enclosure & Cover (LCP-BULGE-00001) Details, Sheet 3; 24590-CM-POA-PY33-00002-06-00037, Rev. 00E, Enclosure & Cover (LCP-BULGE-00001) Details, Sheet 4; 24590-CM-POA-PY33-00002-06-00038, Rev. 00E, Enclosure & Cover (LCP-BULGE-00001) Details, Sheet 5; 24590-CM-POA-PY33-00002-06-00039, Rev. 00E, Enclosure Support Frame (LCP-BULGE-00001) Subassembly, Sheet 1of 3; 24590-CM-POA-PY33-00002-06-00040, Rev. 00E, Enclosure Support Frame (LCP-BULGE-00001) Details, Sheet 2; 24590-CM-POA-PY33-00002-06-00041, Rev. 00E, Enclosure Support Frame (LCP-BULGE-00001) Details, Sheet 3; 24590-CM-POA-PY33-00002-06-00151, Rev. 00F, Column Davit Assembly, Sheet 1 of 3; 24590-CM-POA-PY33-00002-06-00152, Rev. 00F, Column Davit Assembly, Sheet 2; 24590-CM-POA-PY33-00002-06-00153, Rev. 00F, Column Davit Assembly, Sheet 3; 24590-CM-POA-PY33-00002-06-00003, Rev. 00I, Concentrate Receipt Bulge (LCP-BULGE-00002) Outline, Dimensions & Det., Sh. 1 of 2; 24590-CM-POA-PY33-00002-06-00004, Rev. 00H, Concentrate Receipt Bulge (LCP-BULGE-00002) Outline, Dimensions & Details, Sh. 2; 24590-CM-POA-PY33-00002-06-00044, Rev. 00H, Concentrate Receipt Bulge (LCP-BULGE-00002) Assembly, Sheet 1 of 3; 24590-CM-POA-PY33-00002-06-00045, Rev. 00H, Concentrate Receipt Bulge (LCP-BULGE-00002) Assembly, Sheet 2; 24590-CM-POA-PY33-00002-06-00046, Rev. 00H, Concentrate Receipt Bulge (LCP-BULGE-00002) Assembly, Sheet 3; 24590-CM-POA-PY33-00002-06-00047, Rev. 00F, Enclosure & Cover (LCP-BULGE-00002) Subassembly, Sheet 1of 5; 24590-CM-POA-PY33-00002-06-00048, Rev. 00F, Enclosure & Cover (LCP-BULGE-00002) Details, Sheet 2; 24590-CM-POA-PY33-00002-06-00049, Rev. 00F, Enclosure & Cover (LCP-BULGE-00002) Details, Sheet 3; 24590-CM-POA-PY33-00002-06-00050, Rev. 00F, Enclosure & Cover (LCP-BULGE-00002) Details, Sheet 4; 24590-CM-POA-PY33-00002-06-00051, Rev. 00F, Enclosure & Cover (LCP-BULGE-00002) Details, Sheet 5; 24590-CM-POA-PY33-00002-06-00052, Rev. 00E, Enclosure Support Frame (LCP-BULGE-00002) Subassembly, Sheet 1of 3; 24590-CM-POA-PY33-00002-06-00053, Rev. 00E, Enclosure Support Frame (LCP-BULGE-00002) Details, Sheet 2; 24590-CM-POA-PY33-00002-06-00054, Rev. 00E, Enclosure Support Frame (LCP-BULGE-00002) Details, Sheet 3;

Reference (cont'd)	Vendor Drawings, Plant Drawings, Mechanical Data Sheets, and System Description for LCP Bulges	Vendor Fabrication Drawings (cont'd): 24590-CM-POA-PY33-00002-06-00005, Rev. 00I, Concentrate Receipt Bulge (LCP-BULGE-00003) Outline, Dimensions & Det., Sh. 1 of 2; 24590-CM-POA-PY33-00002-06-00006, Rev. 00I, Concentrate Receipt Bulge (LCP-BULGE-00003) Outline, Dimensions & Details, Sh. 2; 24590-CM-POA-PY33-00002-06-00057, Rev. 00H, Concentrate Receipt Bulge (LCP-BULGE-00003) Assembly, Sheet 1 of 3; 24590-CM-POA-PY33-00002-06-00058, Rev. 00H, Concentrate Receipt Bulge (LCP-BULGE-00003) Assembly, Sheet 2; 24590-CM-POA-PY33-00002-06-00059, Rev. 00H, Concentrate Receipt Bulge (LCP-BULGE-00003) Assembly, Sheet 3; 24590-CM-POA-PY33-00002-06-00060, Rev. 00F, Enclosure & Cover (LCP-BULGE-00003) Subassembly, Sheet 1of 5; 24590-CM-POA-PY33-00002-06-00061, Rev. 00F, Enclosure & Cover (LCP-BULGE-00003) Details, Sheet 2; 24590-CM-POA-PY33-00002-06-00062, Rev. 00F, Enclosure & Cover (LCP-BULGE-00003) Details, Sheet 3; 24590-CM-POA-PY33-00002-06-00063, Rev. 00F, Enclosure & Cover (LCP-BULGE-00003) Details, Sheet 4; 24590-CM-POA-PY33-00002-06-00064, Rev. 00F, Enclosure & Cover (LCP-BULGE-00003) Details, Sheet 5; 24590-CM-POA-PY33-00002-06-00065, Rev. 00E, Enclosure Support Frame (LCP-BULGE-00003) Subassembly, Sheet 1of 3; 24590-CM-POA-PY33-00002-06-00066, Rev. 00E, Enclosure Support Frame (LCP-BULGE-00003) Details, Sheet 2; 24590-CM-POA-PY33-00002-06-00067, Rev. 00E, Enclosure Support Frame (LCP-BULGE-00003) Details, Sheet 3; * Bechtel Status Code 1 Drawing is an "as fabricated vendor drawing" approved/accepted by Bechtel. Plant Drawings: 24590-LAW-M6-LCP-00001001, Rev. 0, P&ID- LAW, LAW Concentrate Receipt Process System LCP-BULGE-00001; 24590-LAW-M6-LCP-00001004, Rev. 0, P&ID- LAW, LAW Concentrate Receipt Process System LCP-BULGE-00002 (Sheet 1 of 2); 24590-LAW-M6-LCP-00001005, Rev. 0, P&ID- LAW, LAW Concentrate Receipt Process System LCP-BULGE-00002 (Sheet 2 of 2); 24590-LAW-M6-LCP-00002001, Rev. 0, P&ID- LAW, LAW Concentrate Receipt Process System LCP-BULGE-00003 (Sheet 1 of 2); 24590-LAW-M6-LCP-00002002, Rev. 0, P&ID- LAW, LAW Concentrate Receipt Process System LCP-BULGE-00003 (Sheet 2 of 2). Mechanical Data Sheets (MDS): 24590-LAW-MXD-LCP-00001, Rev. 4, Mechanical Systems Data Sheet: Process Bulge (LCP-BULGE-00001); 24590-LAW-MXD-LCP-00002, Rev. 3, Mechanical Systems Data Sheet: Process Bulge (LCP-BULGE-00002); 24590-LAW-MXD-LCP-00003, Rev. 3, Mechanical Systems Data Sheet: Process Bulge (LCP-BULGE-00003). System Description: 24590-LAW-3YD-LCP-00001, Rev. 3, System Description for the LAW Concentrate Receipt Process (LCP), (including SDCN # 24590-LAW-3YN-LCP-00005).

	Information Assessed	Source of Information	Assessment
Design	The bulge enclosures secondary containment design standards and codes used are appropriate and adequate for their intended use.	Specifications, Drawings, and Mechanical Data Sheets listed above under References; ASME Boiler and Pressure Vessel (B&PV) Code, Section III, Division 1, Rules for Construction of Pressure Vessels, American Society of Mechanical Engineers; ASME Boiler and Pressure Vessel (B&PV) Code, Section III, Division 2, Alternate Rules for Construction of Pressure Vessels, American Society of Mechanical Engineers; AISC M016, Manual of Steel Construction, Allowable Stress Design, 9th Edition (as tailored for the Project), American Institute of Steel Construction; UBC 1997, Uniform Building Code, International Conference of Building Officials.	The Engineering Specification for Process Bulge Design and Fabrication requires that various components of the LCP bulge enclosures be designed, fabricated, tested, and delivered in accordance with the requirements specified in the codes and standards listed in the Source of Information column in this section. Supplemental detailed requirements for the LCP bulge enclosures fabrication are specified in various engineering specifications listed in the References section herein. These requirements include items such as, positive material identification, fabrication tolerances, welding procedures, welder qualifications, and testing records, NDE inspections and records, packaging, handling, and storage requirements. The Mechanical Data Sheets (MDS) for the LCP bulges list their Quality Level as (CM) and Seismic Category as (SC-IV). The Vendor Fabrication drawings show that approximate dimensions of LCP-BULGE-00001 are 105" L x 32" W x 31" H with a davit crane used for maintenance and the approximate dimensions of LCP-BULGE-00002/3 are 93" L x 47" W x 32" H. Each enclosure has removable top cover and its various components and support frame are built with various stainless steel grade materials as shown on the drawings. The MDS for each unit requires that it be designed for temperature range of 59° F to 113° F and pressure range of (-) 2" WC to full hydrostatic test pressure WC. MDS also provide applicable nozzle and fatigue loads. The design codes and standards listed in the Source of Information column are appropriate and adequate to provide secondary containment design for the intended use of the bulges.

	Information Assessed	Source of Information	Assessment
Design (cont'd)	The bulge enclosure components, supports, and foundation design include full weight of bulge enclosure.	Mechanical Data Sheets, Drawings, and Specifications listed above under References; 24590-WTP-DB-ENG-01-001, Rev. 1Q, Basis of Design; 24590-WTP-DC-ST-01-001, Rev. 13, Structural Design Criteria; 24590-CM-POA-PY33-00002-09-00006, Rev. 00E, Concentrate Receipt Bulge Structural and Shell Design Analysis (LCP-BULGE-00001) (Design Calculation); 24590-CM-POA-PY33-00002-02-00069, Rev. 00E, Concentrate Receipt Bulge Structural and Shell Design Analysis (LCP-BULGE-00002) (Design Calculation); 24590-CM-POA-PY33-00002-09-00007, Rev. 00C, Concentrate Receipt Bulge Structural and Shell Design Analysis (LCP-BULGE-00003) (Design Calculation).	The Engineering Specification for Process Bulge Design and Fabrication identifies the system to be of commercial grade (CM) quality and the seismic category to be SC-IV. The drawings show that the secondary containment enclosure components are fully welded to confine any waste spillage within them. Any spill within the LCP bulge enclosures is drained into RLD-SUMP-00029/31 located at lower floor Elevation 3'-0" which have the radar leak detection devices to alarm any spillage incidents. Each enclosure structure is attached to and supported by structural steel framing members. The Structural Design Criteria uses appropriate applicable standards to define design loads and load combinations. The Basis of Design and the MDS documents require that along with dead weights of the components, the weight of the bulge filled with water, and the specified temperature and pressure environmental conditions should be appropriately included in the loads and load combinations. Review of the LCP bulge design calculation and drawing documents shows that the support system for each unit has adequate strength to sustain the aforementioned loads and is in turn anchored (welded) to the steel embed plates in the concrete floor slab. Furthermore, Chapter 14 of the Basis of Design document requires that the foundation underlying the bulge supports must be adequate to sustain the full load of the units, which is out of scope of this assessment. The assessment of the adequacy of the underlying foundation slab is part of the final Structural Integrity Assessment Report for LAW Secondary Containment for the plant items on this floor (Elev. 28'-0").

	Information Assessed	Source of Information	Assessment
Design (cont'd)	Design calculation approach and design basis of support and foundation with design standard and codes references such as AISC codes are adequate.	Drawings listed above under References; 24590-WTP-DB-ENG-01-001, Rev. 1Q, Basis of Design; 24590-WTP-DC-ST-01-001, Rev. 13, Structural Design Criteria; 24590-WTP-DC-ENG-06-001, Rev. 1, Design Criteria for Equipment Seismic and Environmental Qualification; AISC M016, Manual of Steel Construction, Allowable Stress Design, 9th Edition (as tailored for the Project), American Institute of Steel Construction; UBC 1997, Uniform Building Code, International Conference of Building Officials; 24590-CM-POA-PY33-00002-09-00006, Rev. 00E, Concentrate Receipt Bulge Structural and Shell Design Analysis (LCP-BULGE-00001) (Design Calculation); 24590-CM-POA-PY33-00002-02-00069, Rev. 00E, Concentrate Receipt Bulge Structural and Shell Design Analysis (LCP-BULGE-00002) (Design Calculation); 24590-CM-POA-PY33-00002-09-00007, Rev. 00C, Concentrate Receipt Bulge Structural and Shell Design Analysis (LCP-BULGE-00003) (Design Calculation).	The Basis of Design document provides many fundamental general requirements for support and foundation design. The Structural Design Criteria and Design Criteria for Equipment Seismic and Environmental Qualification documents provide adequate detailed design criteria for the design of support steel framing and concrete foundations and footings. AISC M016 and UBC 1997 codes are referenced for support design of SC-IV structural steel components. The design calculation documents and drawings reviewed show that each LCP bulge secondary containment enclosure and support system is adequately designed to meet the applicable code requirements.

	Information Assessed	Source of Information	Assessment
Foundation	Foundation material is compatible with the support structure.	Specifications, Mechanical Data Sheets, and Drawings listed above under References.	The Engineering Specification for Process Bulge Design and Fabrication and MDS require that stainless steel material be used for all bulge enclosure components. The drawings show that the LAW LCP bulges (LCP-BULGE-00001/2/3) are located in Room L-0202 at floor Elevation 28'-0" of the LAW building. The stainless steel support structure frame is welded to the carbon steel base plates which in turn are welded (anchored) to the carbon steel plates embedded in concrete floor slab. All components are weld compatible with each other as per Engineering Specification for Welding of Structural Stainless Steel and Welding of Structural Carbon Steel to Structural Stainless Steel.
	If in an area subject to flooding, the Bulge is anchored.	Drawings and Mechanical Data Sheets listed above under References; 24590-LAW-PER-M-02-002, Rev. 7, Dangerous Waste Permit (DWP) Liner Heights in the LAW Facility; 24590-LAW-DDC-S13T-00028, Rev. 2, Misc. Equipment Anchorage (Design Calculation).	As shown on the referenced drawings, the LCP bulge enclosures included in this assessment are located in Room L-0202 @ Floor Elev. 28'-0" of the LAW facility. The DWP Liner Heights document does not identify any flooding condition in Room L-0202, nor do the Mechanical Data Sheets identify any submergence conditions of the bulge enclosures, therefore, they need not be evaluated for anchoring due to any buoyant forces. However, in order to sustain any other applicable forces such as seismic, nozzle, and internal hydrostatic loads, these units are adequately anchored by welding to the embedded steel plates in the concrete floor slab as shown on the drawings and in the Misc. Equipment Anchorage calculation documents.
	Foundation will withstand the effects of frost heave.	Drawings listed above under References; 24590-WTP-DC-ST-01-001, Rev. 13, Structural Design Criteria.	The Structural Design Criteria document requires that all structural foundations extend into the surrounding soil below the 30 inch frost line in order to preclude frost heave. As shown on the referenced general arrangement drawings, the LCP bugles considered in this assessment are installed in the LAW facility at Floor Elev. 28'-0" which is not subject to frost heave. Therefore, the foundation beneath these units is not subject to the frost heave effects.

Information Assessed		Source of Information	Assessment
Seismic	Seismic considerations have been adequately addressed.	Specifications, Mechanical Data Sheets, and Drawings listed above under References; 24590-WTP-PER-CSA-02-001, Rev. 10 Secondary Containment Design; 24590-WTP-DC-ST-01-001, Rev. 13, Structural Design Criteria; 24590-WTP-DC-ENG-06-001, Rev. 1, Design Criteria for Equipment Seismic and Environmental Qualification; AISC M016, Manual of Steel Construction, Allowable Stress Design, 9th Edition (as tailored for the Project), American Institute of Steel Construction; UBC 1997, Uniform Building Code, International Conference of Building Officials; 24590-CM-POA-PY33-00002-09-00006, Rev. 00E, Concentrate Receipt Bulge Structural and Shell Design Analysis (LCP-BULGE-00001) (Design Calculation); 24590-CM-POA-PY33-00002-02-00069, Rev. 00E, Concentrate Receipt Bulge Structural and Shell Design Analysis (LCP-BULGE-00002) (Design Calculation); 24590-CM-POA-PY33-00002-09-00007, Rev. 00C, Concentrate Receipt Bulge Structural and Shell Design Analysis (LCP-BULGE-00003) (Design Calculation); 24590-CM-POA-PY33-00002-07-00001, Rev. 00G, Process Bulges Seismic Data Report (Design Calculation).	The Secondary Containment Design, Structural Design Criteria, and Design Criteria for Seismic and Environmental Qualification documents provide detailed information of design methodology, materials, loads, and load combinations applicable for the LCP bulge enclosures. The Engineering Specification for Process Bulge Design and Fabrication and MDS documents identify the Quality Level of the bulges to be CM and the Seismic Classification as SC-IV. The bulge enclosure system design loads combinations are taken from UBC 1997 code and analysis for SC-IV secondary containment enclosure is performed in accordance with the Specification for Structural Design Loads for Seismic Category III/IV Equipment and Tanks document. The AISC M016 code is used for the design of SC-IV secondary containment enclosure and support frame, as applicable. The frame structure is designed to sustain all applicable loads including seismic and its bases are adequately welded to the embedded steel plates in concrete floor slab supporting the bulge units. The design calculation documents and drawings reviewed show that sound engineering techniques are used for adequate consideration of forces due to applicable seismic event.

	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.	Drawings listed above under References; 24590-WTP-DB-ENG-01-001, Rev. 1Q, 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. 10, Secondary Containment Design; 24590-WTP-PER-J-02-002, Rev. 4, Leak Detection in Secondary Containment Systems; 24590-CM-POA-PY33-00002-09-00006, Rev. 00E, Concentrate Receipt Bulge Structural and Shell Design Analysis (LCP-BULGE-00001) (Design Calculation); 24590-CM-POA-PY33-00002-02-00069, Rev. 00E, Concentrate Receipt Bulge Structural and Shell Design Analysis (LCP-BULGE-00002) (Design Calculation); 24590-CM-POA-PY33-00002-09-00007, Rev. 00C, Concentrate Receipt Bulge Structural and Shell Design Analysis (LCP-BULGE-00003) (Design Calculation).	The Basis of Design document states that the secondary containment components are to be appropriately lined and any leaks or spills will be removed within 24 hours of a leak detection or in as timely a manner as possible. Based on a detailed chemical and physical analysis of the wastes and other process information sources, the Material Selections document identifies appropriate compatible corrosion resistant materials (stainless steel) for the bulge units' secondary containment components and leak detection hardware. Leak detection technology and methods are described in Leak Detection in Secondary Containment Systems document. The drawings and design calculations reviewed show that the stainless steel as recommended in Material Selections document is used for the fabrication of the LCP bulges. The Secondary Containment Design document provides adequate typical construction details including attachment details for the leak detection equipment to be used for secondary containment where required.

	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, seismic event, and the stress of daily operations (e.g., vehicular traffic).	Drawings listed above under References; 24590-WTP-DB-ENG-01-001, Rev. 1Q, Basis of Design; 24590-WTP-PER-CSA-02-001, Rev. 10, Secondary Containment Design; 24590-CM-POA-PY33-00002-09-00006, Rev. 00E, Concentrate Receipt Bulge Structural and Shell Design Analysis (LCP-BULGE-00001) (Design Calculation); 24590-CM-POA-PY33-00002-02-00069, Rev. 00E, Concentrate Receipt Bulge Structural and Shell Design Analysis (LCP-BULGE-00002) (Design Calculation); 24590-CM-POA-PY33-00002-09-00007, Rev. 00C, Concentrate Receipt Bulge Structural and Shell Design Analysis (LCP-BULGE-00003) (Design Calculation); 24590-CM-POA-PY33-00002-07-00001, Rev. 00G, Process Bulges Seismic Data Report (Design Calculation).	The LAW general arrangement drawings show the LCP bulges are located inside the building. Pressure gradients, static head during a release, physical contact with the waste, climatic conditions, and the stresses of daily operations are adequately stated as design goals in the Basis of Design document. The Secondary Containment Design document describes and provides references to the design methodology, materials of construction, loads, and load combinations (including seismic loads) for the LAW facility secondary containment components. The LCP secondary containment bulge enclosures being considered are located in the room inside the LAW Vitrification Building rather than being directly buried in ground, therefore, pressure gradients and vehicular traffic are not considered applicable load cases. The design calculations, drawings, and related design change documents such as DCNs, FCNs, BODCNs, NCRs, CDRs, and SDDRs were reviewed. The review of these aforementioned design media documents show that the secondary containment enclosures of the said bulges have been adequately designed to provide sufficient strength required to sustain the forces due to applicable load cases including full hydrostatic load and design basis seismic event. Furthermore, the review, acceptance, and approval of design media by BNI, provides added assurance of the sound design of the secondary containment having sufficient strength required for the intended use of these bulges.

	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., frost, precipitation etc.).	Drawings listed above under References; 24590-WTP-PER-CSA-02-001, Rev. 10, 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-CM-POA-PY33-00002-09-00006, Rev. 00E, Concentrate Receipt Bulge Structural and Shell Design Analysis (LCP-BULGE-00001) (Design Calculation); 24590-CM-POA-PY33-00002-02-00069, Rev. 00E, Concentrate Receipt Bulge Structural and Shell Design Analysis (LCP-BULGE-00002) (Design Calculation); 24590-CM-POA-PY33-00002-09-00007, Rev. 00C, Concentrate Receipt Bulge Structural and Shell Design Analysis (LCP-BULGE-00003) (Design Calculation).	The LAW facility drawings show that the secondary containment units being considered are installed inside the building. Because they are located inside the building, precipitation and frost are not applicable load cases. The Secondary Containment Design document identifies the 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 and repair of completed liners during the construction process. The Material Selections for Building Secondary Containment document addresses the potential effects of operations conditions on metal liner and the associated maintenance requirements. The design calculation documents reviewed show that the LCP bulge secondary containment components are adequately designed and have sufficient strength to sustain the applicable design loads.

	Information Assessed	Source of Information	Assessment
Foundation Integrity	The secondary containment is adequately supported by the enclosure structure frame and foundation below has adequate strength	Drawings listed above under References; 24590-CM-POA-PY33-00002-09-00006, Rev. 00E, Concentrate Receipt Bulge Structural and Shell Design Analysis (LCP-BULGE-00001) (Design Calculation); 24590-CM-POA-PY33-00002-02-00069, Rev. 00E, Concentrate Receipt Bulge Structural and Shell Design Analysis (LCP-BULGE-00002) (Design Calculation); 24590-CM-POA-PY33-00002-09-00007, Rev. 00C, Concentrate Receipt Bulge Structural and Shell Design Analysis (LCP-BULGE-00003) (Design Calculation); 24590-WTP-DB-ENG-01-001, Rev. 1Q, Basis of Design.	Review of the design calculation and drawings documents shows that the support system for each LCP bulge unit has adequate strength to sustain the applicable design loads and is in turn anchored (welded) to the steel embed plates in the concrete floor slab. Chapter 14 of the Basis of Design document requires that the foundation underlying each bulge enclosure support system must be adequate to sustain the loads from the weight of the bulge unit filled with water, which is out of scope of this assessment. The assessment of the adequacy of the underlying foundation slab is part of the final Structural Integrity Assessment Report for LAW Secondary Containment for the plant items on this floor.
Infiltration	The design or operation prevents run-on or infiltration of precipitation into the secondary containment.	Drawings listed above under References; 24590-WTP-DB-ENG-01-001, Rev. 1Q, Basis of Design.	The Basis of Design document requires the design to provide adequate measures to prevent run-on or infiltration of precipitation. The LCP bulges are located inside the LAW Vitrification Building where they are protected from direct run-on or infiltration of precipitation by the building structure as shown in the general arrangement drawings. Therefore, this section is not applicable to the secondary containment of the LCP bulges being assessed.
	The design includes an external moisture barrier or other means to prevent moisture from entering the room.	Drawings listed above under References; 24590-WTP-DB-ENG-01-001, Rev. 1Q, Basis of Design.	The Basis of Design document requires the design include provisions to prevent external moisture intrusion. The LCP bulges shown on the general arrangement drawings are inside the LAW Vitrification Building which protects them from precipitation and surface water percolation, therefore, this section is not applicable to them.

	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-DB-ENG-01-001, Rev. 1Q, Basis of Design; 24590-WTP-PER-CSA-02-001, Rev. 10, Secondary Containment Design; 24590-WTP-PER-M-02-001, Rev. 3, Material Selections for Building Secondary Containment/Leak Detection.	The Basis of Design document requires the liner system to be free of cracks and gaps. The Secondary Containment Design document provides current adequate design requirements, and codes and standards to design leak tight liners. This document includes appropriate details for installation of stainless steel components free of cracks and gaps. The Material Selections document provides adequate requirements for the secondary containment components materials.
	The design has considered the compatibility of the secondary containment elements with the waste and for preventing it from migrating into the concrete slab below.	24590-WTP-PER-M-02-001, Rev. 3, Material Selections for Building Secondary Containment/Leak Detection; 24590-WTP-PER-CSA-02-001, Rev. 10, Secondary Containment Design.	The Material Selections document contains information on the compatibility of secondary containment stainless steel material usage for containing the waste. The Secondary Containment Design document provides standard installation details for the secondary containment components of the LCP bulges which ensure leak-tight connections that will prevent the migration of the waste onto the concrete slab below.

References (cont'd)	Vendor Drawings for LFP Bulges	Vendor Fabrication Drawings (*Bechtel Status Code 1 Drawings): 24590-CM-POA-PY33-00002-06-00011, Rev. 00F, Melter 1-Feed/Prep Bulge (LFP-BULGE-00001) Outline, Dim. & Det., Sh. 1 of 2; 24590-CM-POA-PY33-00002-06-00012, Rev. 00F, Melter 1-Feed/Feed Bulge (LFP-BULGE-00001) Outline, Dimensions & Details, Sh. 2; 24590-CM-POA-PY33-00002-06-00104, Rev. 00G, Melter 1-Feed/Prep Bulge (LFP-BULGE-00001) Assembly, Sheet 1 of 3; 24590-CM-POA-PY33-00002-06-00105, Rev. 00G, Melter 1-Feed/Prep Bulge (LFP-BULGE-00001) Assembly, Sheet 2; 24590-CM-POA-PY33-00002-06-00106, Rev. 00G, Melter 1-Feed/Prep Bulge (LFP-BULGE-00001) Assembly, Sheet 3; 24590-CM-POA-PY33-00002-06-00107, Rev. 00F, Enclosure & Cover (LFP-BULGE-00001) Subassembly, Sheet 1of 6; 24590-CM-POA-PY33-00002-06-00108, Rev. 00F, Enclosure & Cover (LFP-BULGE-00001) Details, Sheet 2; 24590-CM-POA-PY33-00002-06-00109, Rev. 00F, Enclosure & Cover (LFP-BULGE-00001) Details, Sheet 3; 24590-CM-POA-PY33-00002-06-00110, Rev. 00F, Enclosure & Cover (LFP-BULGE-00001) Details, Sheet 4; 24590-CM-POA-PY33-00002-06-00111, Rev. 00F, Enclosure & Cover (LFP-BULGE-00001) Details, Sheet 5; 24590-CM-POA-PY33-00002-06-00112, Rev. 00F, Enclosure & Cover (LFP-BULGE-00001) Details, Sheet 6; 24590-CM-POA-PY33-00002-06-00113, Rev. 00E, Enclosure Support Frame (LFP-BULGE-00001) Subassembly, Sheet 1of 3; 24590-CM-POA-PY33-00002-06-00114, Rev. 00E, Enclosure Support Frame (LFP-BULGE-00001) Details, Sheet 2; 24590-CM-POA-PY33-00002-06-00115, Rev. 00E, Enclosure Support Frame (LFP-BULGE-00001) Details, Sheet 3; 24590-CM-POA-PY33-00002-06-00013, Rev. 00F, Melter 2-Feed/Prep Bulge (LFP-BULGE-00002) Outline, Dim. & Det., Sh. 1 of 2; 24590-CM-POA-PY33-00002-06-00014, Rev. 00F, Melter 2-Feed/Feed Bulge (LFP-BULGE-00002) Outline, Dimensions & Details, Sh. 2; 24590-CM-POA-PY33-00002-06-00120, Rev. 00G, Melter 2-Feed/Prep Bulge (LFP-BULGE-00002) Assembly, Sheet 1 of 3; 24590-CM-POA-PY33-00002-06-00121, Rev. 00G, Melter 2-Feed/Prep Bulge (LFP-BULGE-00002) Assembly, Sheet 2; 24590-CM-POA-PY33-00002-06-00122, Rev. 00G, Melter 2-Feed/Prep Bulge (LFP-BULGE-00002) Assembly, Sheet 3; 24590-CM-POA-PY33-00002-06-00123, Rev. 00F, Enclosure & Cover (LFP-BULGE-00002) Subassembly, Sheet 1of 6; 24590-CM-POA-PY33-00002-06-00124, Rev. 00F, Enclosure & Cover (LFP-BULGE-00002) Details, Sheet 2; 24590-CM-POA-PY33-00002-06-00125, Rev. 00F, Enclosure & Cover (LFP-BULGE-00002) Details, Sheet 3; 24590-CM-POA-PY33-00002-06-00126, Rev. 00F, Enclosure & Cover (LFP-BULGE-00002) Details, Sheet 4; 24590-CM-POA-PY33-00002-06-00127, Rev. 00F, Enclosure & Cover (LFP-BULGE-00002) Details, Sheet 5; 24590-CM-POA-PY33-00002-06-00128, Rev. 00F, Enclosure & Cover (LFP-BULGE-00002) Details, Sheet 6; 24590-CM-POA-PY33-00002-06-00129, Rev. 00E, Enclosure Support Frame (LFP-BULGE-00002) Subassembly, Sheet 1of 3; 24590-CM-POA-PY33-00002-06-00130, Rev. 00E, Enclosure Support Frame (LFP-BULGE-00002) Details, Sheet 2; 24590-CM-POA-PY33-00002-06-00131, Rev. 00E, Enclosure Support Frame (LFP-BULGE-00002) Details, Sheet 3. * Bechtel Status Code 1 Drawing is an "as fabricated vendor drawing" approved/accepted by Bechtel.

Reference (cont')	Plant Drawings, Mechanical Data Sheets, and System Description for LFP Bulges	Plant Drawings: 24590-LAW-M6-LFP-00001005, Rev. 0, P&ID- LAW Melter Feed Process System Melter 1, Feed Preparation and Feed LFP-BULGE-00001; 24590-LAW-M6-LFP-00001006, Rev. 0, P&ID- LAW Melter Feed Process System Melter 1, Feed Preparation and Feed LFP-BULGE-00001; 24590-LAW-M6-LFP-00003005, Rev. 0, P&ID- LAW Melter Feed Process System Melter 2, Feed Preparation and Feed LFP-BULGE-00002; 24590-LAW-M6-LFP-00003006, Rev. 0, P&ID- LAW Melter Feed Process System Melter 2, Feed Preparation and Feed LFP-BULGE-00002. Mechanical Data Sheets (MDS): 24590-LAW-MXD-LFP-00001, Rev. 4, Mechanical Systems Data Sheet: Process Bulge (LFP-BULGE-00001); 24590-LAW-MXD-LFP-00002, Rev. 4, Mechanical Systems Data Sheet: Process Bulge (LFP-BULGE-00002). System Description: 24590-LAW-3YD-LFP-00001, Rev. 3, System Description for the Low Activity Waste Melter Feed Process System (LFP), (including SDCN # 24590-LAW-3YN-LFP-00006 and -00008).

	Information Assessed	Source of Information	Assessment
Design	The bulge enclosures secondary containment design standards and codes used are appropriate and adequate for their intended use.	Specifications, Drawings, and Mechanical Data Sheets listed above under References; ASME Boiler and Pressure Vessel (B&PV) Code, Section III, Division 1, Rules for Construction of Pressure Vessels, American Society of Mechanical Engineers; ASME Boiler and Pressure Vessel (B&PV) Code, Section III, Division 2, Alternate Rules for Construction of Pressure Vessels, American Society of Mechanical Engineers; AISC M016, Manual of Steel Construction, Allowable Stress Design, 9th Edition (as tailored for the Project), American Institute of Steel Construction; UBC 1997, Uniform Building Code, International Conference of Building Officials.	The Engineering Specification for Process Bulge Design and Fabrication requires that various components of the bulge enclosures be designed, fabricated, tested, and delivered in accordance with the requirements specified in the codes and standards listed in the Source of Information column in this section. Supplemental detailed requirements for the Bulge Enclosures fabrication are specified in various engineering specifications listed in the References section herein. These requirements include items such as, positive material identification, fabrication tolerances, welding procedures, welder qualifications, and testing records, NDE inspections and records, packaging, handling, and storage requirements. The Mechanical Data Sheets (MDS) for the LFP bulges list their Quality Level as (CM) and Seismic Category as (SC-IV). The Vendor Fabrication drawings show that dimensions of each of the LFP bulge enclosures are 109" L x 49" W x 31" H. Each enclosure and its various components and support frame are built with various stainless steel grade materials as shown on the drawings. The MDS for each unit requires that it be designed for temperature range of 59° F to 113° F and pressure range of (-) 2" WC to full hydrostatic test pressure WC. MDS also provide applicable nozzle and fatigue loads. The design codes and standards listed in the Source of Information column are appropriate and adequate to provide secondary containment design for the intended use of the LFP bulges.

	Information Assessed	Source of Information	Assessment
Design (cont'd)	The bulge enclosure components, supports, and foundation design include full weight of bulge enclosure.	Mechanical Data Sheets, Drawings, and Specifications listed above under References; 24590-WTP-DB-ENG-01-001, Rev. 1Q, Basis of Design; 24590-WTP-DC-ST-01-001, Rev. 13, Structural Design Criteria; 24590-QL-HC4-W000-00085-T08-01-00001, Rev. 00C, FEA of LAW and PTF Bulges Analysis Methodology (Design Calculations); 24590-QL-HC4-W000-00085-T08-02-00001, Rev. 00D, Structural Analysis of LAW & PTF Bulges, Melter 1 Valve Bulge (24590-LAW-PY-LFP-BULGE-00001) (Design Calculation); 24590-QL-HC4-W000-00085-T08-02-00002, Rev. 00D, Structural Analysis of LAW & PTF Bulges, Melter 2 Feed/Prep Valve Bulge (24590-LAW-PY-LFP-BULGE-00002) (Design Calculation).	The Engineering Specification for Process Bulge Design and Fabrication identifies the system to be of commercial grade (CM) quality and the seismic category to be SC-IV. The drawings show that the secondary containment enclosure components are fully welded to confine any waste spillage within them. Any spill within the enclosures is drained into RLD-SUMP-00030/32 located at lower floor Elevation 3'-0" which have radar leak detection devices to alarm any spillage incidents. Each enclosure structure is attached to and supported by structural steel framing members. The Structural Design Criteria uses appropriate applicable standards to define design loads and load combinations. The Basis of Design and the MDS documents require that along with dead weights of the components, the weight of the bulge filled with water, and the specified temperature and pressure environmental conditions should be appropriately included in the loads and load combinations. Review of the LFP bulge design calculation and drawing documents shows that the support system for each unit has adequate strength to sustain the aforementioned loads and is in turn anchored (welded) to the steel embed plates in the concrete floor slab. Furthermore, Chapter 14 of the Basis of Design document requires that the foundation underlying the bulge supports must be adequate to sustain the full load of the units, which is out of scope of this assessment. The assessment of the adequacy of the underlying foundation slab is part of the final Structural Integrity Assessment Report for LAW Secondary Containment for the plant items on this floor (Elev. 28'-0").

	Information Assessed	Source of Information	Assessment
Design (cont'd)	Design calculation approach and design basis of support and foundation with design standard and codes references such as AISC codes are adequate.	Drawings listed above under References; 24590-WTP-DB-ENG-01-001, Rev. 1Q, Basis of Design; 24590-WTP-DC-ST-01-001, Rev. 13, Structural Design Criteria; 24590-WTP-DC-ENG-06-001, Rev. 1, Design Criteria for Equipment Seismic and Environmental Qualification; AISC M016, Manual of Steel Construction, Allowable Stress Design, 9th Edition (as tailored for the Project), American Institute of Steel Construction; UBC 1997, Uniform Building Code, International Conference of Building Officials; 24590-QL-HC4-W000-00085-T08-01-00001, Rev. 00C, FEA of LAW and PTF Bulges Analysis Methodology (Design Calculations); 24590-QL-HC4-W000-00085-T08-02-00001, Rev. 00D, Structural Analysis of LAW & PTF Bulges, Melter 1 Valve Bulge (24590-LAW-PY-LFP-BULGE-00001) (Design Calculation); 24590-QL-HC4-W000-00085-T08-02-00002, Rev. 00D, Structural Analysis of LAW & PTF Bulges, Melter 2 Feed/Prep Valve Bulge (24590-LAW-PY-LFP-BULGE-00002) (Design Calculation).	The Basis of Design document provides many fundamental general requirements for support and foundation design. The Structural Design Criteria and Design Criteria for Equipment Seismic and Environmental Qualification documents provide adequate detailed design criteria for the design of support steel framing and concrete foundations and footings. AISC M016 and UBC 1997 codes are referenced for support design of SC-IV structural steel components. The design calculation documents and drawings reviewed show that each of the LFP bulge secondary containment enclosures and support systems are adequately designed to meet the applicable code requirements.

	Information Assessed	Source of Information	Assessment
Foundation	Foundation material is compatible with the support structure.	Specifications, Mechanical Data Sheets, and Drawings listed above under References.	The Engineering Specification for Process Bulge Design and Fabrication and MDS require that stainless steel material be used for all LFP bulge enclosure components. The drawings show that the LAW bulges (LFP-BULGE-00001/2) are located in Room L-0202 at floor Elevation 28'-0" of the LAW building. The stainless steel support structure frame is welded to the carbon steel base plates which in turn are welded (anchored) to the carbon steel plates embedded in concrete floor slab. All components are weld compatible with each other as per Engineering Specification for Welding of Structural Stainless Steel and Welding of Structural Carbon Steel to Structural Stainless Steel.
	If in an area subject to flooding, the bulge is anchored.	Drawings, Specifications, and Mechanical Data Sheets listed above under References; 24590-LAW-PER-M-02-002, Rev. 7, Dangerous Waste Permit (DWP) Liner Heights in the LAW Facility; 24590-LAW-DDC-S13T-00028, Rev. 2, Misc. Equipment Anchorage (Design Calculation).	As shown on the referenced drawings, the bulge enclosures included in this assessment are located in Room L-0202 @ Floor Elev. 28'-0" of the LAW facility. The DWP Liner Heights document does not identify any flooding condition in Room L-0202, nor do the Mechanical Data Sheets identify any submergence conditions of the LFP bulge enclosures, therefore, they need not be evaluated for anchoring due to any buoyant forces. However, in order to sustain any other applicable forces such as seismic, nozzle, and internal hydrostatic loads, these units are adequately anchored by welding to the embedded steel plates in the concrete floor slab as shown on the drawings and in the Misc. Equipment Anchorage calculation documents.
	Foundation will withstand the effects of frost heave.	Drawings listed above under References; 24590-WTP-DC-ST-01-001, Rev. 13, Structural Design Criteria.	The Structural Design Criteria document requires that all structural foundations extend into the surrounding soil below the 30 inch frost line in order to preclude frost heave. As shown on the referenced general arrangement drawings, the LFP bugles considered in this assessment are installed in the LAW facility at Floor Elev. 28'-0" which is not subject to frost heave. Therefore, the foundation beneath these units is not subject to the frost heave effects.

	Information Assessed	Source of Information	Assessment
Seismic	Seismic considerations have been adequately addressed.	Specifications, Mechanical Design Sheets, and Drawings listed above under References; 24590-WTP-PER-CSA-02-001, Rev. 10 Secondary Containment Design; 24590-WTP-DC-ST-01-001, Rev. 13, Structural Design Criteria; 24590-WTP-DC-ENG-06-001, Rev. 1, Design Criteria for Equipment Seismic and Environmental Qualification; AISC M016, Manual of Steel Construction, Allowable Stress Design, 9th Edition (as tailored for the Project), American Institute of Steel Construction; UBC 1997, Uniform Building Code, International Conference of Building Officials; 24590-QL-HC4-W000-00085-T08-01-00001, Rev. 00C, FEA of LAW and PTF Bulges Analysis Methodology (Design Calculations); 24590-QL-HC4-W000-00085-T08-02-00001, Rev. 00D, Structural Analysis of LAW & PTF Bulges, Melter 1 Valve Bulge (24590-LAW-PY-LFP-BULGE-00001) (Design Calculation); 24590-QL-HC4-W000-00085-T08-02-00002, Rev. 00D, Structural Analysis of LAW & PTF Bulges, Melter 2 Feed/Prep Valve Bulge (24590-LAW-PY-LFP-BULGE-00002) (Design Calculation); 24590-CM-POA-PY33-00002-07-00001, Rev. 00G, Process Bulges Seismic Data Report (Anchorage Calculation).	The Secondary Containment Design, Structural Design Criteria, and Design Criteria for Seismic and Environmental Qualification documents provide detailed information of design methodology, materials, loads, and load combinations applicable for the LFP bulge enclosures. The Engineering Specification for Process Bulge Design and Fabrication and MDS documents identify the Quality Level of the Bulges to be CM and the Seismic Classification as SC-IV. The LFP bulge enclosure system design loads combinations are taken from UBC 1997 code and analysis for SC-IV secondary containment enclosure is performed in accordance with the Specification for Structural Design Loads for Seismic Category III/IV Equipment and Tanks document. The AISC M016 code is used for the design of SC-IV secondary containment enclosure and support frame, as applicable. The frame structure is designed to sustain all applicable loads including seismic and its bases are adequately welded to the embedded steel plates in concrete floor slab supporting the bulge units. The design calculation documents and drawings reviewed show that sound engineering techniques are used for adequate consideration of forces due to applicable seismic event.

	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.	Drawings listed above under References; 24590-WTP-DB-ENG-01-001, Rev. 1Q, 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. 10, Secondary Containment Design; 24590-WTP-PER-J-02-002, Rev. 4, Leak Detection in Secondary Containment Systems; 24590-QL-HC4-W000-00085-T08-02-00001, Rev. 00D, Structural Analysis of LAW & PTF Bulges, Melter 1 Valve Bulge (24590-LAW-PY-LFP-BULGE-00001) (Design Calculation); 24590-QL-HC4-W000-00085-T08-02-00002, Rev. 00D, Structural Analysis of LAW & PTF Bulges, Melter 2 Feed/Prep Valve Bulge (24590-LAW-PY-LFP-BULGE-00002) (Design Calculation).	The Basis of Design document states that the secondary containment components are to be appropriately lined and any leaks or spills will be removed within 24 hours of a leak detection or in as timely a manner as possible. Based on a detailed chemical and physical analysis of the wastes and other process information sources, the Material Selections document identifies appropriate compatible corrosion resistant materials (stainless steel) for the bulge units' secondary containment components and leak detection hardware. Leak detection technology and methods are described in Leak Detection in Secondary Containment Systems document. The drawings and design calculations reviewed show that the stainless steel as recommended in Material Selections document is used for the fabrication of the LFP bulges. The Secondary Containment Design document provides adequate typical construction details including attachment details for the leak detection equipment to be used for secondary containment where required.

	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, seismic event, and the stress of daily operations (e.g., vehicular traffic).	Drawings listed above under References; 24590-WTP-DB-ENG-01-001, Rev. 1Q, Basis of Design; 24590-WTP-PER-CSA-02-001, Rev. 10, Secondary Containment Design; 24590-QL-HC4-W000-00085-T08-02-00001, Rev. 00D, Structural Analysis of LAW & PTF Bulges, Melter 1 Valve Bulge (24590-LAW-PY-LFP-BULGE-00001) (Design Calculation); 24590-QL-HC4-W000-00085-T08-02-00002, Rev. 00D, Structural Analysis of LAW & PTF Bulges, Melter 2 Feed/Prep Valve Bulge (24590-LAW-PY-LFP-BULGE-00002) (Design Calculation); 24590-CM-POA-PY33-00002-07-00001, Rev. 00G, Process Bulges Seismic Data Report (Design Calculation).	The LAW general arrangement drawings show LFP bulges are located inside the building. Pressure gradients, static head during a release, physical contact with the waste, climatic conditions, and the stresses of daily operations are adequately stated as design goals in the Basis of Design document. The Secondary Containment Design document describes and provides references to the design methodology, materials of construction, loads, and load combinations (including seismic loads) for the LAW facility secondary containment components. The LFP secondary containment bulge enclosures being considered are located in the room inside the LAW Vitrification Building rather than being directly buried in ground, therefore, pressure gradients and vehicular traffic are not considered applicable load cases. The design calculations, drawings, and related design change documents such as DCNs, FCNs, BODCNs, NCRs, CDRs, and SDDRs were reviewed. The review of these aforementioned design media documents show that the secondary containment enclosures of the said bulges have been adequately designed to provide sufficient strength required to sustain the forces due to applicable load cases including full hydrostatic load and design basis seismic event. Furthermore, the review, acceptance, and approval of design media by BNI, provides added assurance of the sound design of the secondary containment having sufficient strength required for the intended use of these bulges.

	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., frost, precipitation etc.).	Drawings listed above under References; 24590-WTP-PER-CSA-02-001, Rev. 10, 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-QL-HC4-W000-00085-T08-02-00001, Rev. 00D, Structural Analysis of LAW & PTF Bulges, Melter 1 Valve Bulge (24590-LAW-PY-LFP-BULGE-00001) (Design Calculation); 24590-QL-HC4-W000-00085-T08-02-00002, Rev. 00D, Structural Analysis of LAW & PTF Bulges, Melter 2 Feed/Prep Valve Bulge (24590-LAW-PY-LFP-BULGE-00002) (Design Calculation).	The LAW facility drawings show that the secondary containment units being considered are installed inside the building. Because they are located inside the building, precipitation and frost are not applicable load cases. The Secondary Containment Design document identifies the 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 and repair of completed liners during the construction process. The Material Selections for Building Secondary Containment document addresses the potential effects of operations conditions on metal liner and the associated maintenance requirements. The design calculation documents reviewed show that the secondary containment components are adequately designed and have sufficient strength to sustain the applicable design loads.

	Information Assessed	Source of Information	Assessment
Foundation Integrity	The secondary containment is adequately supported by the enclosure structure frame and foundation below has adequate strength	Drawings listed above under References; 24590-QL-HC4-W000-00085-T08-02-00001, Rev. 00D, Structural Analysis of LAW & PTF Bulges, Melter 1 Valve Bulge (24590-LAW-PY-LFP-BULGE-00001) (Design Calculation); 24590-QL-HC4-W000-00085-T08-02-00002, Rev. 00D, Structural Analysis of LAW & PTF Bulges, Melter 2 Feed/Prep Valve Bulge (24590-LAW-PY-LFP-BULGE-00002) (Design Calculation); 24590-WTP-DB-ENG-01-001, Rev. 1Q, Basis of Design.	Review of the design calculation and drawings documents shows that the support system for each of the LFP bulge unit has adequate strength to sustain the applicable design loads and is in turn anchored (welded) to the steel embed plates in the concrete floor slab. Chapter 14 of the Basis of Design document requires that the foundation underlying each bulge enclosure support system must be adequate to sustain the loads from the weight of the bulge unit filled with water, which is out of scope of this assessment. The assessment of the adequacy of the underlying foundation slab is part of the final Structural Integrity Assessment Report for LAW Secondary Containment for the plant items on this floor.
Infiltration	The design or operation prevents run-on or infiltration of precipitation into the secondary containment.	Drawings listed above under References; 24590-WTP-DB-ENG-01-001, Rev. 1Q, Basis of Design.	The Basis of Design document requires the design to provide adequate measures to prevent run-on or infiltration of precipitation. The LFP bulges are located inside the LAW Vitrification Building where they are protected from direct run-on or infiltration of precipitation by the building structure as shown in the general arrangement drawings. Therefore, this section is not applicable to the secondary containment bulge units being assessed.
	The design includes an external moisture barrier or other means to prevent moisture from entering the room.	Drawings listed above under References; 24590-WTP-DB-ENG-01-001, Rev. 1Q, Basis of Design.	The Basis of Design document requires the design include provisions to prevent external moisture intrusion. The LFP bulges shown on the general arrangement drawings are inside the LAW Vitrification Building which protects them from precipitation and surface water percolation, therefore, this section is not applicable to them.

	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-DB-ENG-01-001, Rev. 1Q, Basis of Design; 24590-WTP-PER-CSA-02-001, Rev. 10, Secondary Containment Design; 24590-WTP-PER-M-02-001, Rev. 3, Material Selections for Building Secondary Containment/Leak Detection.	The Basis of Design document requires the liner system to be free of cracks and gaps. The Secondary Containment Design document provides current adequate design requirements, and codes and standards to design leak tight liners. This document includes appropriate details for installation of stainless steel components free of cracks and gaps. The Material Selections document provides adequate requirements for the secondary containment components materials.
	The design has considered the compatibility of the secondary containment elements with the waste and for preventing it from migrating into the concrete slab below.	24590-WTP-PER-M-02-001, Rev. 3, Material Selections for Building Secondary Containment/Leak Detection; 24590-WTP-PER-CSA-02-001, Rev. 10, Secondary Containment Design.	The Material Selections document contains information on the compatibility of secondary containment stainless steel material usage for containing the waste. The Secondary Containment Design document provides standard installation details for the secondary containment components of the LFP bulges which ensures leak-tight connections that will prevent the migration of the waste onto the concrete slab below.

References	Vendor Drawings for LOP Bulges	Vendor Fabrication Drawings (*Bechtel Status Code 1 Drawings): 24590-CM-POA-PY33-00002-06-00007, Rev. 00F, Melter 1-Valve Bulge (LOP-BULGE-00001) Outline, Dimensions & Det., Sh. 1 of 2; 24590-CM-POA-PY33-00002-06-00008, Rev. 00F, Melter 1-Valve Bulge (LOP-BULGE-00001) Outline, Dimensions & Details, Sh. 2; 24590-CM-POA-PY33-00002-06-00070, Rev. 00J, Melter 1-Valve Bulge (LOP-BULGE-00001) Assembly, Sheet 1 of 3; 24590-CM-POA-PY33-00002-06-00071, Rev. 00J, Melter 1-Valve Bulge (LOP-BULGE-00001) Assembly, Sheet 2; 24590-CM-POA-PY33-00002-06-00072, Rev. 00I, Melter 1-Valve Bulge (LOP-BULGE-00001) Assembly, Sheet 3; 24590-CM-POA-PY33-00002-06-00073, Rev. 00F, Enclosure & Cover (LOP-BULGE-00001) Subassembly, Sheet 1of 7; 24590-CM-POA-PY33-00002-06-00074, Rev. 00F, Enclosure & Cover (LOP-BULGE-00001) Details, Sheet 2; 24590-CM-POA-PY33-00002-06-00075, Rev. 00F, Enclosure & Cover (LOP-BULGE-00001) Details, Sheet 3; 24590-CM-POA-PY33-00002-06-00076, Rev. 00F, Enclosure & Cover (LOP-BULGE-00001) Details, Sheet 4; 24590-CM-POA-PY33-00002-06-00077, Rev. 00F, Enclosure & Cover (LOP-BULGE-00001) Details, Sheet 5; 24590-CM-POA-PY33-00002-06-00078, Rev. 00G, Enclosure & Cover (LOP-BULGE-00001) Details, Sheet 6; 24590-CM-POA-PY33-00002-06-00079, Rev. 00F, Enclosure & Cover (LOP-BULGE-00001) Details, Sheet 7; 24590-CM-POA-PY33-00002-06-00080, Rev. 00E, Enclosure Support Frame (LOP-BULGE-00001) Subassembly, Sheet 1of 4; 24590-CM-POA-PY33-00002-06-00081, Rev. 00E, Enclosure Support Frame (LOP-BULGE-00001) Details, Sheet 2; 24590-CM-POA-PY33-00002-06-00082, Rev. 00E, Enclosure Support Frame (LOP-BULGE-00001) Details, Sheet 3; 24590-CM-POA-PY33-00002-06-00083, Rev. 00E, Enclosure Support Frame (LOP-BULGE-00001) Details, Sheet 4; 24590-CM-POA-PY33-00002-06-00151, Rev. 00F, Column Davit Assembly, Sheet 1 of 3; 24590-CM-POA-PY33-00002-06-00152, Rev. 00F, Column Davit Assembly, Sheet 2; 24590-CM-POA-PY33-00002-06-00153, Rev. 00F, Column Davit Assembly, Sheet 3; 24590-CM-POA-PY33-00002-06-00009, Rev. 00F, Melter 2-Valve Bulge (LOP-BULGE-00002) Outline, Dimensions & Det., Sh. 1 of 2; 24590-CM-POA-PY33-00002-06-00010, Rev. 00F, Melter 2-Valve Bulge (LOP-BULGE-00002) Outline, Dimensions & Details, Sh. 2; 24590-CM-POA-PY33-00002-06-00087, Rev. 00J, Melter 2-Valve Bulge (LOP-BULGE-00002) Assembly, Sheet 1 of 3; 24590-CM-POA-PY33-00002-06-00088, Rev. 00J, Melter 2-Valve Bulge (LOP-BULGE-00002) Assembly, Sheet 2; 24590-CM-POA-PY33-00002-06-00089, Rev. 00I, Melter 2-Valve Bulge (LOP-BULGE-00002) Assembly, Sheet 3; 24590-CM-POA-PY33-00002-06-00090, Rev. 00F, Enclosure & Cover (LOP-BULGE-00002) Subassembly, Sheet 1of 7; 24590-CM-POA-PY33-00002-06-00091, Rev. 00F, Enclosure & Cover (LOP-BULGE-00002) Details, Sheet 2; 24590-CM-POA-PY33-00002-06-00092, Rev. 00F, Enclosure & Cover (LOP-BULGE-00002) Details, Sheet 3; 24590-CM-POA-PY33-00002-06-00093, Rev. 00F, Enclosure & Cover (LOP-BULGE-00002) Details, Sheet 4; 24590-CM-POA-PY33-00002-06-00094, Rev. 00F, Enclosure & Cover (LOP-BULGE-00002) Details, Sheet 5; 24590-CM-POA-PY33-00002-06-00095, Rev. 00H, Enclosure & Cover (LOP-BULGE-00002) Details, Sheet 6; 24590-CM-POA-PY33-00002-06-00096, Rev. 00F, Enclosure & Cover (LOP-BULGE-00002) Details, Sheet 7; 24590-CM-POA-PY33-00002-06-00097, Rev. 00E, Enclosure Support Frame (LOP-BULGE-00002) Subassembly, Sheet 1of 4; 24590-CM-POA-PY33-00002-06-00098, Rev. 00E, Enclosure Support Frame (LOP-BULGE-00002) Details, Sheet 2; 24590-CM-POA-PY33-00002-06-00099, Rev. 00E, Enclosure Support Frame (LOP-BULGE-00002) Details, Sheet 3; 24590-CM-POA-PY33-00002-06-00100, Rev. 00E, Enclosure Support Frame (LOP-BULGE-00002) Details, Sheet 4; * Bechtel Status Code 1 Drawing is an "as fabricated vendor drawing" approved/accepted by Bechtel.

Reference (cont')	Plant Drawings, Mechanical Data Sheets, and System Description for LOP Bulges	Plant Drawings: 24590-LAW-M6-LOP-00001003, Rev. 0, P&ID- LAW Primary Offgas Process System Melter 1, LOP-BULGE-00001; 24590-LAW-M6-LOP-00002003, Rev. 0, P&ID- LAW Primary Offgas Process System Melter 2, LOP-BULGE-00002 (w/DCNL # 00005); Mechanical Data Sheets (MDS): 24590-LAW-MXD-LOP-00001, Rev. 4, Mechanical Systems Data Sheet: Process Bulge (LOP-BULGE-00001); 24590-LAW-MXD-LOP-00002, Rev. 4, Mechanical Systems Data Sheet: Process Bulge (LOP-BULGE-00002). System Description: 24590-LAW-3YD-LOP-00001, Rev. 3, System Description for the LAW Primary Offgas (LOP) and Secondary Offgas/Vessel Vent (LVP) Systems, (including SDCN # 24590-LAW-3YN-LOP-00011, -00012, and -00013).

	Information Assessed	Source of Information	Assessment
Design	The bulge enclosures secondary containment design standards and codes used are appropriate and adequate for their intended use.	Specifications, Drawings, and Mechanical Data Sheets listed above under References; ASME Boiler and Pressure Vessel (B&PV) Code, Section III, Division 1, Rules for Construction of Pressure Vessels, American Society of Mechanical Engineers; ASME Boiler and Pressure Vessel (B&PV) Code, Section III, Division 2, Alternate Rules for Construction of Pressure Vessels, American Society of Mechanical Engineers; AISC M016, Manual of Steel Construction, Allowable Stress Design, 9th Edition (as tailored for the Project), American Institute of Steel Construction; UBC 1997, Uniform Building Code, International Conference of Building Officials.	The Engineering Specification for Process Bulge Design and Fabrication requires that various components of the bulge enclosures be designed, fabricated, tested, and delivered in accordance with the requirements specified in the codes and standards listed in the Source of Information column in this section. Supplemental detailed requirements for the bulge enclosures fabrication are specified in various engineering specifications listed in the References section herein. These requirements include items such as, positive material identification, fabrication tolerances, welding procedures, welder qualifications, and testing records, NDE inspections and records, packaging, handling, and storage requirements. The Mechanical Data Sheets (MDS) for the LOP bulges list their Quality Level as (CM) and Seismic Category as (SC-III). The Vendor Fabrication drawings show that dimensions of each LOP bulge enclosure are 142" L x 50" W x 35" H, with a davit crane used for maintenance. Each bulge enclosure has removable top cover and its various components and support frame are built with various stainless steel grade materials as shown on the drawings. The MDS for each bulge unit requires that it be designed for temperature range of 59° F to 113° F and pressure range of (-) 2" WC to full hydrostatic test pressure WC. MDS also provide applicable nozzle and fatigue loads. The design codes and standards listed in the Source of Information column are appropriate and adequate to provide secondary containment design for the intended use of the LOP bulges.

	Information Assessed	Source of Information	Assessment
Design (cont'd)	The bulge enclosure components, supports, and foundation design include full weight of bulge enclosure.	Mechanical Data Sheets, Drawings, and Specifications listed above under References; 24590-WTP-DB-ENG-01-001, Rev. 1Q, Basis of Design; 24590-WTP-DC-ST-01-001, Rev. 13, Structural Design Criteria; 24590-QL-HC4-W000-00085-T08-01-00001, Rev. 00C, FEA of LAW and PTF Bulges Analysis Methodology (Design Calculations); 24590-QL-HC4-W000-00085-T08-02-00003, Rev. 00D, Structural Analysis of LAW & PTF Bulges, Melter 1 Valve Bulge (24590-LAW-PY-LOP-BULGE-00001) (Design Calculation); 24590-QL-HC4-W000-00085-T08-02-00004, Rev. 00D, Structural Analysis of LAW & PTF Bulges, Melter 2 Valve Bulge (24590-LAW-PY-LOP-BULGE-00002) (Design Calculation).	The Engineering Specification for Process Bulge Design and Fabrication identifies the system to be of commercial grade (CM) quality and the seismic category to be SC-III. The drawings show that the secondary containment enclosure components are fully welded to confine any waste spillage within them. Any spill within the LOP bulge enclosures is drained into RLD-SUMP-00029/31 located at lower floor at Elevation 3'-0" which have radar leak detection devices to alarm any spillage incidents. Each enclosure structure is attached to and supported by structural steel framing members. The Structural Design Criteria uses appropriate applicable standards to define design loads and load combinations. The Basis of Design and the MDS documents require that along with dead weights of the components, the weight of the bulge filled with water, and the specified temperature and pressure environmental conditions should be appropriately included in the loads and load combinations. Review of the LOP bulge design calculation and drawing documents shows that the support system for each unit has adequate strength to sustain the aforementioned loads and is in turn anchored (welded) to the steel embed plates in the concrete floor slab. Furthermore, Chapter 14 of the Basis of Design document requires that the foundation underlying the bulge supports must be adequate to sustain the full load of the units, which is out of scope of this assessment. The assessment of the adequacy of the underlying foundation slab is part of the final Structural Integrity Assessment Report for LAW Secondary Containment for the plant items on this floor (Elev. 28'-0").

	Information Assessed	Source of Information	Assessment
Design (cont'd)	Design calculation approach and design basis of support and foundation with design standard and codes references such as AISC codes are adequate.	Drawings listed above under References; 24590-WTP-DB-ENG-01-001, Rev. 1Q, Basis of Design; 24590-WTP-DC-ST-01-001, Rev. 13, Structural Design Criteria; 24590-WTP-DC-ENG-06-001, Rev. 1, Design Criteria for Equipment Seismic and Environmental Qualification; AISC N690,Specification for the Design, Fabrication, and Erection of Steel Safety-Related Structures for Nuclear Facilities (as tailored for the Project); AISC M016, Manual of Steel Construction, Allowable Stress Design, 9th Edition (as tailored for the Project), American Institute of Steel Construction; UBC 1997, Uniform Building Code, International Conference of Building Officials; 24590-QL-HC4-W000-00085-T08-01-00001, Rev. 00C, FEA of LAW and PTF Bulges Analysis Methodology (Design Calculations); 24590-QL-HC4-W000-00085-T08-02-00003, Rev. 00D, Structural Analysis of LAW & PTF Bulges, Melter 1 Valve Bulge (24590-LAW-PY-LOP-BULGE-00001) (Design Calculation); 24590-QL-HC4-W000-00085-T08-02-00004, Rev. 00D, Structural Analysis of LAW & PTF Bulges, Melter 2 Valve Bulge (24590-LAW-PY-LOP-BULGE-00002) (Design Calculation).	The Basis of Design document provides many fundamental general requirements for support and foundation design. The Structural Design Criteria and Design Criteria for Equipment Seismic and Environmental Qualification documents provide adequate detailed design criteria for the design of support steel framing and concrete foundations and footings. AISC M016 and UBC 1997 codes are referenced for support design of SC-III structural steel components. Design Calculation documents and drawings reviewed show that each LOP bulge secondary containment enclosure and support system is adequately designed to meet the applicable code requirements.

	Information Assessed	Source of Information	Assessment
Foundation	Foundation material is compatible with the support structure.	Specifications, Mechanical Data Sheets and Drawings listed above under References.	The Engineering Specification for Process Bulge Design and Fabrication and MDS require that stainless steel material be used for all bulge enclosure components. The drawings show that the LAW bulges (LOP-BULGE-00001/2) are located in Room L-0202 at floor Elevation 28'-0" of the LAW building. The stainless steel support structure frame is welded to the carbon steel base plates which in turn are welded (anchored) to the carbon steel plates embedded in concrete floor slab. All components are weld compatible with each other as per Engineering Specification for Welding of Structural Stainless Steel and Welding of Structural Carbon Steel to Structural Stainless Steel.
	If in an area subject to flooding, the bulge is anchored.	Drawings and Mechanical Data Sheets listed above under References; 24590-LAW-PER-M-02-002, Rev. 7, Dangerous Waste Permit (DWP) Liner Heights in the LAW Facility; 24590-LAW-DDC-S13T-00028, Rev. 2, Misc. Equipment Anchorage (Design Calculation).	As shown on the referenced drawings, the bulge enclosures included in this assessment are located in Room L-0202 @ Floor Elev. 28'-0" of the LAW facility. The DWP Liner Heights document does not identify any flooding condition in Room L-0202, nor do the Mechanical Data Sheets identify any submergence conditions of the LOP bulge enclosures, therefore, they need not be evaluated for anchoring due to any buoyant forces. However, in order to sustain any other applicable forces such as seismic, nozzle, and internal hydrostatic loads, these units are adequately anchored by welding to the embedded steel plates in the concrete floor slab as shown on the drawings and in the Misc. Equipment Anchorage calculation documents.
	Foundation will withstand the effects of frost heave.	Drawings listed above under References; 24590-WTP-DC-ST-01-001, Rev. 13, Structural Design Criteria.	The Structural Design Criteria document requires that all structural foundations extend into the surrounding soil below the 30 inch frost line in order to preclude frost heave. As shown on the referenced general arrangement drawings, the LOP bugles considered in this assessment are installed in the LAW facility at Floor Elev. 28'-0" which is not subject to frost heave. Therefore, the foundation beneath these units is not subject to the frost heave effects.

	Information Assessed	Source of Information	Assessment
Seismic	Seismic considerations have been adequately addressed.	Specifications, Mechanical Data Sheets, and Drawings listed above under References; 24590-WTP-PER-CSA-02-001, Rev. 10 Secondary Containment Design; 24590-WTP-DC-ST-01-001, Rev. 13, Structural Design Criteria; 24590-WTP-DC-ENG-06-001, Rev. 1, Design Criteria for Equipment Seismic and Environmental Qualification; AISC M016, Manual of Steel Construction, Allowable Stress Design, 9th Edition (as tailored for the Project), American Institute of Steel Construction; UBC 1997, Uniform Building Code, International Conference of Building Officials; 24590-QL-HC4-W000-00085-T08-01-00001, Rev. 00C, FEA of LAW and PTF Bulges Analysis Methodology (Design Calculations); 24590-QL-HC4-W000-00085-T08-02-00003, Rev. 00D, Structural Analysis of LAW & PTF Bulges, Melter 1 Valve Bulge (24590-LAW-PY-LOP-BULGE-00001) (Design Calculation); 24590-QL-HC4-W000-00085-T08-02-00004, Rev. 00D, Structural Analysis of LAW & PTF Bulges, Melter 2 Valve Bulge (24590-LAW-PY-LOP-BULGE-00002) (Design Calculation); 24590-CM-POA-PY33-00002-07-00001, Rev. 00G, Process Bulges Seismic Data Report (Design Calculation).	The Secondary Containment Design, Structural Design Criteria, and Design Criteria for Seismic and Environmental Qualification documents provide detailed information of design methodology, materials, loads, and load combinations applicable for the LOP bulge enclosures. The Engineering Specification for Process Bulge Design and Fabrication and MDS documents identify the Quality Level of the LOP bulges to be CM and the Seismic Classification as SC-III. The bulge enclosure system design loads combinations are taken from UBC 1997 code and analysis for SC-III secondary containment enclosure is performed in accordance with the Specification for Structural Design Loads for Seismic Category III/IV Equipment and Tanks document. The AISC M016 code is used for the design of SC-III secondary containment enclosure and support frame, as applicable. The frame structure is designed to sustain all applicable loads including seismic and its bases are adequately welded to the embedded steel plates in concrete floor slab supporting the bulge units. The design calculation documents and drawings reviewed show that sound engineering techniques are used for adequate consideration of forces due to applicable seismic event.

	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.	Drawings listed above under References; 24590-WTP-DB-ENG-01-001, Rev. 1Q, 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. 10, Secondary Containment Design; 24590-WTP-PER-J-02-002, Rev. 4, Leak Detection in Secondary Containment Systems; 24590-QL-HC4-W000-00085-T08-02-00003, Rev. 00D, Structural Analysis of LAW & PTF Bulges, Melter 1 Valve Bulge (24590-LAW-PY-LOP-BULGE-00001) (Design Calculation); 24590-QL-HC4-W000-00085-T08-02-00004, Rev. 00D, Structural Analysis of LAW & PTF Bulges, Melter 2 Valve Bulge (24590-LAW-PY-LOP-BULGE-00002) (Design Calculation).	The Basis of Design document states that the secondary containment components are to be appropriately lined and any leaks or spills will be removed within 24 hours of a leak detection or in as timely a manner as possible. Based on a detailed chemical and physical analysis of the wastes and other process information sources, the Material Selections document identifies appropriate compatible corrosion resistant materials (stainless steel) for the bulge units' secondary containment components and leak detection hardware. Leak detection technology and methods are described in Leak Detection in Secondary Containment Systems document. The drawings and design calculations reviewed show that the stainless steel as recommended in Material Selections document is used for the fabrication of the LOP bulges . The Secondary Containment Design document provides adequate typical construction details including attachment details for the leak detection equipment to be used for secondary containment where required.

	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, seismic event, and the stress of daily operations (e.g., vehicular traffic).	Drawings listed above under References; 24590-WTP-DB-ENG-01-001, Rev. 1Q, Basis of Design; 24590-WTP-PER-CSA-02-001, Rev. 10, Secondary Containment Design; 24590-QL-HC4-W000-00085-T08-02-00003, Rev. 00D, Structural Analysis of LAW & PTF Bulges, Melter 1 Valve Bulge (24590-LAW-PY-LOP-BULGE-00001) (Design Calculation); 24590-QL-HC4-W000-00085-T08-02-00004, Rev. 00D, Structural Analysis of LAW & PTF Bulges, Melter 2 Valve Bulge (24590-LAW-PY-LOP-BULGE-00002) (Design Calculation); 24590-CM-POA-PY33-00002-07-00001, Rev. 00G, Process Bulges Seismic Data Report (Design Calculation).	The LAW general arrangement drawings show that the LOP bulges are located inside the building. Pressure gradients, static head during a release, physical contact with the waste, climatic conditions, and the stresses of daily operations are adequately stated as design goals in the Basis of Design document. The Secondary Containment Design document describes and provides references to the design methodology, materials of construction, loads, and load combinations (including seismic loads) for the LAW facility secondary containment components. The LOP secondary containment bulge enclosures being considered are located in the room inside the LAW Vitrification Building rather than being directly buried in ground, therefore, pressure gradients and vehicular traffic are not considered applicable load cases. The design calculations, drawings, and related design change documents such as DCNs, FCNs, BODCNs, NCRs, CDRs, and SDDRs were reviewed. The review of these aforementioned design media documents show that the secondary containment enclosures of the said bulges have been adequately designed to provide sufficient strength required to sustain the forces due to applicable load cases including full hydrostatic load and design basis seismic event. Furthermore, the review, acceptance, and approval of design media by BNI, provides added assurance of the sound design of the secondary containment having sufficient strength required for the intended use of these bulges.

	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., frost, precipitation etc.).	Drawings listed above under References; 24590-WTP-PER-CSA-02-001, Rev. 10, 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-QL-HC4-W000-00085-T08-02-00003, Rev. 00D, Structural Analysis of LAW & PTF Bulges, Melter 1 Valve Bulge (24590-LAW-PY-LOP-BULGE-00001) (Design Calculation); 24590-QL-HC4-W000-00085-T08-02-00004, Rev. 00D, Structural Analysis of LAW & PTF Bulges, Melter 2 Valve Bulge (24590-LAW-PY-LOP-BULGE-00002) (Design Calculation).	The LAW facility drawings show that the secondary containment units being considered are installed inside the building. Because they are located inside the building, precipitation and frost are not applicable load cases. The Secondary Containment Design document identifies the 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 and repair of completed liners during the construction process. The Material Selections for Building Secondary Containment document addresses the potential effects of operations conditions on metal liner and the associated maintenance requirements. The design calculation documents reviewed show that the LOP secondary containment components are adequately designed and have sufficient strength to sustain the applicable design loads.

	Information Assessed	Source of Information	Assessment
Foundation Integrity	The secondary containment is adequately supported by the enclosure structure frame and foundation below has adequate strength	Drawings listed above under References; 24590-QL-HC4-W000-00085-T08-02-00003, Rev. 00D, Structural Analysis of LAW & PTF Bulges, Melter 1 Valve Bulge (24590-LAW-PY-LOP-BULGE-00001) (Design Calculation); 24590-QL-HC4-W000-00085-T08-02-00004, Rev. 00D, Structural Analysis of LAW & PTF Bulges, Melter 2 Valve Bulge (24590-LAW-PY-LOP-BULGE-00002) (Design Calculation); 24590-WTP-DB-ENG-01-001, Rev. 1Q, Basis of Design.	Review of the Design Calculation and drawings documents shows that the support system for each Bulge unit has adequate strength to sustain the applicable design loads and is in turn anchored (welded) to the steel embed plates in the concrete floor slab. Chapter 14 of the Basis of Design document requires that the foundation underlying each Bulge Enclosure support system must be adequate to sustain the loads from the weight of the bulge unit filled with water, which is out of scope of this assessment. The assessment of the adequacy of the underlying foundation slab is part of the final Structural Integrity Assessment Report for LAW Secondary Containment for the plant items on this floor.
Infiltration	The design or operation prevents run-on or infiltration of precipitation into the secondary containment.	Drawings listed above under References; 24590-WTP-DB-ENG-01-001, Rev. 1Q, Basis of Design.	The Basis of Design document requires the design to provide adequate measures to prevent run-on or infiltration of precipitation. The LOP secondary containment bulges are located inside the LAW Vitrification Building where they are protected from direct run-on or infiltration of precipitation by the building structure as shown in the general arrangement drawings. Therefore, this section is not applicable to the secondary containment of the LOP bulges being assessed.
	The design includes an external moisture barrier or other means to prevent moisture from entering the room.	Drawings listed above under References; 24590-WTP-DB-ENG-01-001, Rev. 1Q, Basis of Design.	The Basis of Design document requires the design include provisions to prevent external moisture intrusion. The LOP bulges shown on the general arrangement drawings are inside the LAW Vitrification Building which protects them from precipitation and surface water percolation, therefore, this section is not applicable to them.

	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-DB-ENG-01-001, Rev. 1Q, Basis of Design; 24590-WTP-PER-CSA-02-001, Rev. 10, Secondary Containment Design; 24590-WTP-PER-M-02-001, Rev. 3, Material Selections for Building Secondary Containment/Leak Detection.	The Basis of Design document requires the liner system to be free of cracks and gaps. The Secondary Containment Design document provides current adequate design requirements, and codes and standards to design leak tight liners. This document includes appropriate details for installation of stainless steel components free of cracks and gaps. The Material Selections document provides adequate requirements for the secondary containment components materials.
	The design has considered the compatibility of the secondary containment elements with the waste and for preventing it from migrating into the concrete slab below.	24590-WTP-PER-M-02-001, Rev. 3, Material Selections for Building Secondary Containment/Leak Detection; 24590-WTP-PER-CSA-02-001, Rev. 10, Secondary Containment Design.	The Material Selections document contains information on the compatibility of secondary containment stainless steel material usage for containing the waste. The Secondary Containment Design document provides standard installation details for the secondary containment components of the LOP bulges which ensures leak-tight connections that will prevent the migration of the waste onto the concrete slab below.

References	Vendor Drawings for RLD Bulges	Vendor Fabrication Drawings (*Bechtel Status Code 1 Drawings): 24590-CM-POA-PY33-00001-01-01, Rev. 00D, General Layout Drawing (RLD-BULGE-00001); 24590-CM-POA-PY33-00001-10-03, Rev. 00C, General Layout-Details (RLD-BULGE-00001); 24590-CM-POA-PY33-00001-10-04, Rev. 00C, Main Piping Layout Drawing (RLD-BULGE-00001); 24590-CM-POA-PY33-00001-10-05, Rev. 00B, Main Frame Structural Drawing (RLD-BULGE-00001); 24590-CM-POA-PY33-00001-10-06, Rev. 00B, Containment Layout Drawing (RLD-BULGE-00001); 24590-CM-POA-PY33-00001-22-03, Rev. 00A, Main Piping Layout Drawing (RLD-BULGE-00001); 24590-CM-POA-PY33-00001-25-01, Rev. 00D, Wash Water Details (RLD-BULGE-00001); 24590-CM-POA-PY33-00002-06-00015, Rev. 00F, Plant Wash/SBS Condensate (RLD-BULGE-00004) Outline, Dim. & Det., Sh. 1 of 2; 24590-CM-POA-PY33-00002-06-00016, Rev. 00F, Plant Wash/SBS Condensate (RLD-BULGE-00004) Outline, Dim. & Det., Sh. 2; 24590-CM-POA-PY33-00002-06-00136, Rev. 00G, Plant Wash/SBS Condensate (RLD-BULGE-00004) Assembly, Sheet 1 of 3; 24590-CM-POA-PY33-00002-06-00137, Rev. 00G, Plant Wash/SBS Condensate (RLD-BULGE-00004) Assembly, Sheet 2; 24590-CM-POA-PY33-00002-06-00138, Rev. 00G, Plant Wash/SBS Condensate (RLD-BULGE-00004) Assembly, Sheet 3; 24590-CM-POA-PY33-00002-06-00139, Rev. 00F, Enclosure & Cover (RLD-BULGE-00004) Subassembly, Sheet 1of 5; 24590-CM-POA-PY33-00002-06-00140, Rev. 00F, Enclosure & Cover (RLD-BULGE-00004) Details, Sheet 2; 24590-CM-POA-PY33-00002-06-00141, Rev. 00F, Enclosure & Cover (RLD-BULGE-00004) Details, Sheet 3; 24590-CM-POA-PY33-00002-06-00142, Rev. 00F, Enclosure & Cover (RLD-BULGE-00004) Details, Sheet 4; 24590-CM-POA-PY33-00002-06-00143, Rev. 00F, Enclosure & Cover (RLD-BULGE-00004) Details, Sheet 5; 24590-CM-POA-PY33-00002-06-00144, Rev. 00E, Enclosure Support Frame (RLD-BULGE-00004) Subassembly, Sheet 1of 3; 24590-CM-POA-PY33-00002-06-00145, Rev. 00E, Enclosure Support Frame (RLD-BULGE-00004) Details, Sheet 2; 24590-CM-POA-PY33-00002-06-00146, Rev. 00E, Enclosure Support Frame (RLD-BULGE-00004) Details, Sheet 3; 24590-CM-POA-PY33-00002-06-00151, Rev. 00F, Column Davit Assembly, Sheet 1 of 3; 24590-CM-POA-PY33-00002-06-00152, Rev. 00F, Column Davit Assembly, Sheet 2; 24590-CM-POA-PY33-00002-06-00153, Rev. 00F, Column Davit Assembly, Sheet 3. * Bechtel Status Code 1 Drawing is an "as fabricated vendor drawing" approved/accepted by Bechtel.

Reference (cont')	Plant Drawings, Mechanical Data Sheets, and System Description for RLD Bulges	Plant Drawings: 24590-LAW-M6-RLD-00002003, Rev. 0, P&ID- LAW Radioactive Liquid Waste Disposal System C3/C5 Drain/Sump Collection RLD-BULGE-00001; 24590-LAW-M6-RLD-00002004, Rev. 0, P&ID- LAW Radioactive Liquid Waste Disposal System C3/C5 Drain/Sump Collection RLD-BULGE-00001; 24590-LAW-M6-RLD-00001005, Rev. 0, P&ID- LAW Radioactive Liquid Waste Disposal System Plant Wash & SBS Condensate Collection RLD-BULGE-00004; 24590-LAW-M6-RLD-00001006, Rev. 0, P&ID- LAW Radioactive Liquid Waste Disposal System Plant Wash & SBS Condensate Collection RLD-BULGE-00004. Mechanical Data Sheets (MDS): 24590-LAW-MXD-RLD-00001, Rev. 2, Mechanical Systems Data Sheet: Process Bulge (RLD-BULGE-00001); 24590-LAW-MXD-RLD-00002, Rev. 5, Mechanical Systems Data Sheet: Process Bulge (RLD-BULGE-00004). System Description: 24590-LAW-3YD-RLD-00001, Rev. 2, System Description for the LAW Radioactive Liquid Waste Disposal (RLD) System, (including SDCN # 24590-LAW-3YN-RLD-00006).

	Information Assessed	Source of Information	Assessment
Design	The bulge enclosures secondary containment design standards and codes used are appropriate and adequate for their intended use.	Specifications, Drawings, and Mechanical Data Sheets listed above under References; ASME Boiler and Pressure Vessel (B&PV) Code, Section III, Division 1, Rules for Construction of Pressure Vessels, American Society of Mechanical Engineers; ASME Boiler and Pressure Vessel (B&PV) Code, Section III, Division 2, Alternate Rules for Construction of Pressure Vessels, American Society of Mechanical Engineers; AISC M016, Manual of Steel Construction, Allowable Stress Design, 9th Edition (as tailored for the Project), American Institute of Steel Construction; UBC 1997, Uniform Building Code, International Conference of Building Officials.	The Engineering Specification for Process Bulge Design and Fabrication requires that various components of the RLD bulge enclosures be designed, fabricated, tested, and delivered in accordance with the requirements specified in the codes and standards listed in the Source of Information column in this section. Supplemental detailed requirements for the RLD bulge enclosures fabrication are specified in various engineering specifications listed in the References section herein. These requirements include items such as, positive material identification, fabrication tolerances, welding procedures, welder qualifications, and testing records, NDE inspections and records, packaging, handling, and storage requirements. The Mechanical Data Sheets (MDS) for the RLD bulges list their Quality Level as (CM) and Seismic Category as (SC-III). The Vendor Fabrication drawings show that the approx. dimensions of RLD-BULGE-00001 are 109" L x 78" W x 99" H, with an operating platform including 42" high handrails above. The Vendor Fabrication drawings show that the approx. dimensions of RLD-BULGE-00004 are 107" L x 56" W x 34" H, with a davit crane used for maintenance. Each enclosure has removable top cover/access plates and its various components and support frame are built with various stainless steel grade materials as shown on the drawings. The MDS for each unit requires that it be designed for temperature range of 59° F to 113° F and pressure range of (-) 2" WC to full hydrostatic test pressure WC. MDS also provide applicable nozzle and fatigue loads. The design codes and standards listed in the Source of Information column are appropriate and adequate to provide secondary containment design for the intended use of the RLD bulges.

	Information Assessed	Source of Information	Assessment
Design (cont'd)	The bulge enclosure components, supports, and foundation design include full weight of bulge enclosure.	Mechanical Data Sheets, Drawings, and Specifications listed above under References; 24590-WTP-DB-ENG-01-001, Rev. 1Q, Basis of Design; 24590-WTP-DC-ST-01-001, Rev. 13, Structural Design Criteria; 24590-QL-HC4-W000-00085-T08-01-00001, Rev. 00C, FEA of LAW and PTF Bulges Analysis Methodology (Design Calculations); 24590-QL-HC4-W000-00085-T08-02-00007, Rev. 00C, Structural Analysis of LAW & PTF Bulges, Plant Wash/SBS Concentration Collection Vessel Valve Bulge (24590-LAW-PY-RLD-BULGE-00004) (Design Calculation); 24590-QL-HC4-W000-00085-T08-02-00008, Rev. 00B, Structural Analysis of LAW & PTF Bulges, LAW RLD C3/C5 Pump Bulge (24590-LAW-PY-RLD-BULGE-00001) (Design Calculation); 24590-LAW-DDC-S13T-00028, Rev. 2, Misc. Equipment Anchorage (Design Calculation); 24590-CM-POA-PY33-00002-07-00001, Rev. 00G, Process Bulges Seismic Data Report (Design Calculation).	The Engineering Specification for Process Bulge Design and Fabrication identifies the system to be of commercial grade (CM) quality and the seismic category to be SC-III. The drawings show that the secondary containment enclosure components are fully welded to confine any waste spillage within them. Any spill within the RLD-BULGE-00001 enclosure is drained into RLD-SUMP-00028 located in floor at Elevation (-) 21'-0", and any spill within the RLD-BULGE-00004 enclosure is drained into RLD-SUMP-00036 located in floor at Elevation 3'-0". Each sump has a radar leak detection device to alarm any spillage incidents. Each enclosure structure is attached to and supported by structural steel framing members. The Structural Design Criteria uses appropriate applicable standards to define design loads and load combinations. The Basis of Design and the MDS documents require that along with dead weights of the components, the weight of the bulge filled with water, and the specified temperature and pressure environmental conditions should be appropriately included in the loads and load combinations. Review of the RLD bulge design calculation and drawing documents shows that the support system for each unit has adequate strength to sustain the aforementioned loads and is in turn anchored (welded) to the steel embed plates in the concrete floor slab. Furthermore, Chapter 14 of the Basis of Design document requires that the foundation underlying the bulge supports must be adequate to sustain the full load of the units, which is out of scope of this assessment. The assessment of the adequacy of the underlying foundation slab is part of the final Structural Integrity Assessment Report for LAW Secondary Containment assessment report for the plant items on floor (Elev. - 21'-0") and floor (Elev. + 28'-0").

	Information Assessed	Source of Information	Assessment
Design (cont'd)	Design calculation approach and design basis of support and foundation with design standard and codes references such as AISC codes are adequate.	Drawings listed above under References; 24590-WTP-DB-ENG-01-001, Rev. 1Q, Basis of Design; 24590-WTP-DC-ST-01-001, Rev. 13, Structural Design Criteria; 24590-WTP-DC-ENG-06-001, Rev. 1, Design Criteria for Equipment Seismic and Environmental Qualification; AISC M016, Manual of Steel Construction, Allowable Stress Design, 9th Edition (as tailored for the Project), American Institute of Steel Construction; UBC 1997, Uniform Building Code, International Conference of Building Officials; 24590-QL-HC4-W000-00085-T08-01-00001, Rev. 00C, FEA of LAW and PTF Bulges Analysis Methodology (Design Calculations); 24590-QL-HC4-W000-00085-T08-02-00007, Rev. 00C, Structural Analysis of LAW & PTF Bulges, Plant Wash/SBS Concentration Collection Vessel Valve Bulge (24590-LAW-PY-RLD-BULGE-00004) (Design Calculation); 24590-QL-HC4-W000-00085-T08-02-00008, Rev. 00B, Structural Analysis of LAW & PTF Bulges, LAW RLD C3/C5 Pump Bulge (24590-LAW-PY-RLD-BULGE-00001) (Design Calculation). 24590-LAW-DDC-S13T-00028, Rev. 2, Misc. Equipment Anchorage (Design Calculation); 24590-CM-POA-PY33-00002-07-00001, Rev. 00G, Process Bulges Seismic Data Report (Design Calculation).	The Basis of Design document provides many fundamental general requirements for support and foundation design. The Structural Design Criteria and Design Criteria for Equipment Seismic and Environmental Qualification documents provide adequate detailed design criteria for the design of support steel framing and concrete foundations and footings. AISC M016 and UBC 1997 codes are referenced for support design of SC-III structural steel components. Design Calculation documents and drawings reviewed show that each RLD bulge secondary containment enclosure and support system is adequately designed to meet the applicable code requirements.

	Information Assessed	Source of Information	Assessment
Foundation	Foundation material is compatible with the support structure.	Specifications, Mechanical Data Sheets, and Drawings listed above under References.	The Engineering Specification for Process Bulge Design and Fabrication and MDS require that stainless steel material be used for all bulge enclosure components. The drawings show that the RLD-BULGE-00001 is located in Room L-B001A at floor Elevation (-) 21'-0" and RLD-BULGE-00004 is located in Room L-0202 at floor Elevation 28-0" of the LAW building. The stainless steel support structure frame is welded to the carbon steel base plates which in turn are welded (anchored) to the carbon steel plates embedded in concrete floor slab. All components are weld compatible with each other as per Engineering Specification for Welding of Structural Stainless Steel and Welding of Structural Carbon Steel to Structural Stainless Steel.
	If in an area subject to flooding, the Bulge is anchored.	Drawings and Mechanical Data Sheets listed above under References; 24590-LAW-PER-M-02-002, Rev. 7, Dangerous Waste Permit (DWP) Liner Heights in the LAW Facility; 24590-LAW-DDC-S13T-00028, Rev. 2, Misc. Equipment Anchorage (Design Calculation); 24590-LAW-DDC-S13T-00019, Rev. 0, Elevation +3'-0" Slab Embedded Plates (Design Calculation); 24590-QL-HC4-W000-00085-T08-02-00008, Rev. 00B, Structural Analysis of LAW & PTF Bulges, LAW RLD C3/C5 Pump Bulge (24590-LAW-PY-RLD-BULGE-00001) (Design Calculation); 24590-CM-POA-PY33-00002-07-00001, Rev. 00G, Process Bulges Seismic Data Report (Design Calculation).	The referenced drawings show that RLD-BULGE-00001 is located in Room L-B001A @ Floor Elev.(-) 21'-0" and RLD-BULGE 00004 is located in Room L-0202 @ Floor Elev. 28'-0" of the LAW facility. The DWP Liner Heights document does not identify any flooding condition in these rooms, nor do the Mechanical Data Sheets identify any submergence conditions of the RLD bulge enclosures, therefore, they need not be evaluated for anchoring due to any buoyant forces. However, in order to sustain any other applicable forces such as seismic, nozzle, and internal hydrostatic loads, these units are adequately anchored by welding to the embedded steel plates in the concrete floor slab as shown on the drawings and in the Misc. Equipment Anchorage and design calculation documents.
	Foundation will withstand the effects of frost heave.	Drawings listed above under References; 24590-WTP-DC-ST-01-001, Rev. 13, Structural Design Criteria.	The Structural Design Criteria document requires that all structural foundations extend into the surrounding soil below the 30 inch frost line in order to preclude frost heave. As shown on the referenced general arrangement drawings, the RLD bulges considered in this assessment are installed in the LAW facility @ Floor Elev. (-) 21'-0" and 28'-0" which are not subject to frost heave. Therefore, the foundation beneath these units is not subject to the frost heave effects.

Information Assessed		Source of Information	Assessment
Seismic	Seismic considerations have been adequately addressed.	Specifications, Mechanical Data Sheets, and Drawings listed above under References; 24590-WTP-PER-CSA-02-001, Rev. 10 Secondary Containment Design; 24590-WTP-DC-ST-01-001, Rev. 13, Structural Design Criteria; 24590-WTP-DC-ENG-06-001, Rev. 1, Design Criteria for Equipment Seismic and Environmental Qualification; AISC M016, Manual of Steel Construction, Allowable Stress Design, 9th Edition (as tailored for the Project), American Institute of Steel Construction; UBC 1997, Uniform Building Code, International Conference of Building Officials; 24590-QL-HC4-W000-00085-T08-01-00001, Rev. 00C, FEA of LAW and PTF Bulges Analysis Methodology (Design Calculations); 24590-QL-HC4-W000-00085-T08-02-00007, Rev. 00C, Structural Analysis of LAW & PTF Bulges, Plant Wash/SBS Concentration Collection Vessel Valve Bulge (24590-LAW-PY-RLD-BULGE-00004) (Design Calculation); 24590-QL-HC4-W000-00085-T08-02-00008, Rev. 00B, Structural Analysis of LAW & PTF Bulges, LAW RLD C3/C5 Pump Bulge (24590-LAW-PY-RLD-BULGE-00001) (Design Calculation). 24590-LAW-DDC-S13T-00028, Rev. 2, Misc. Equipment Anchorage (Design Calculation); 24590-CM-POA-PY33-00002-07-00001, Rev. 00G, Process Bulges Seismic Data Report (Design Calculation).	The Secondary Containment Design, Structural Design Criteria, and Design Criteria for Seismic and Environmental Qualification documents provide detailed information of design methodology, materials, loads, and load combinations applicable to the RLD bulge enclosures. The Engineering Specification for Process Bulge Design and Fabrication and MDS documents identify the Quality Level of the Bulges to be CM and the Seismic Classification as SC-III. The RLD bulge enclosure system design loads combinations are taken from UBC 1997 code and analysis for SC-III secondary containment enclosure is performed in accordance with the Specification for Structural Design Loads for Seismic Category III/IV Equipment and Tanks document. The AISC M016 code is used for the design of SC-III secondary containment enclosure and support frame, as applicable. The frame structure is designed to sustain all applicable loads including seismic and its bases are adequately welded to the embedded steel plates in concrete floor slab supporting the RLD bulges. The design calculation documents and drawings reviewed show that sound engineering techniques are used for adequate consideration of forces due to applicable seismic event.

	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.	Drawings listed above under References; 24590-WTP-DB-ENG-01-001, Rev. 1Q, 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. 10, Secondary Containment Design; 24590-WTP-PER-J-02-002, Rev. 4, Leak Detection in Secondary Containment Systems; 24590-QL-HC4-W000-00085-T08-02-00007, Rev. 00C, Structural Analysis of LAW & PTF Bulges, Plant Wash/SBS Concentration Collection Vessel Valve Bulge (24590-LAW-PY-RLD-BULGE-00004) (Design Calculation); 24590-QL-HC4-W000-00085-T08-02-00008, Rev. 00B, Structural Analysis of LAW & PTF Bulges, LAW RLD C3/C5 Pump Bulge (24590-LAW-PY-RLD-BULGE-00001) (Design Calculation).	The Basis of Design document states that the secondary containment components are to be appropriately lined and any leaks or spills will be removed within 24 hours of a leak detection or in as timely a manner as possible. Based on a detailed chemical and physical analysis of the wastes and other process information sources, the Material Selections document identifies appropriate compatible corrosion resistant materials (stainless steel) for the RLD bulge secondary containment components and leak detection hardware. Leak detection technology and methods are described in Leak Detection in Secondary Containment Systems document. The drawings and design calculations reviewed show that the stainless steel as recommended in Material Selections document is used for the fabrication of the RLD bulges. The Secondary Containment Design document provides adequate typical construction details including attachment details for the leak detection equipment to be used for secondary containment where required.

	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, seismic event, and the stress of daily operations (e.g., vehicular traffic).	Drawings listed above under References; 24590-WTP-DB-ENG-01-001, Rev. 1Q, Basis of Design; 24590-WTP-PER-CSA-02-001, Rev. 10, Secondary Containment Design; 24590-QL-HC4-W000-00085-T08-02-00007, Rev. 00C, Structural Analysis of LAW & PTF Bulges, Plant Wash/SBS Concentration Collection Vessel Valve Bulge (24590-LAW-PY-RLD-BULGE-00004) (Design Calculation); 24590-QL-HC4-W000-00085-T08-02-00008, Rev. 00B, Structural Analysis of LAW & PTF Bulges, LAW RLD C3/C5 Pump Bulge (24590-LAW-PY-RLD-BULGE-00001) (Design Calculation); 24590-CM-POA-PY33-00002-07-00001, Rev. 00G, Process Bulges Seismic Data Report (Design Calculation).	The LAW general arrangement drawings show RLD bulges are located inside the building. Pressure gradients, static head during a release, physical contact with the waste, climatic conditions, and the stresses of daily operations are adequately stated as design goals in the Basis of Design document. The Secondary Containment Design document describes and provides references to the design methodology, materials of construction, loads, and load combinations (including seismic loads) for the LAW facility secondary containment components. The RLD secondary containment bulge enclosures being considered are located in the room inside the LAW Vitrification Building rather than being directly buried in ground, therefore, pressure gradients and vehicular traffic are not considered applicable load cases. The design calculations, drawings, and related design change documents such as DCNs, FCNs, BODCNs, NCRs, CDRs, and SDDRs were reviewed. The review of these aforementioned design media documents show that the secondary containment enclosures of the said bulges have been adequately designed to provide sufficient strength required to sustain the forces due to applicable load cases including full hydrostatic load and design basis seismic event. Furthermore, the review, acceptance, and approval of design media by BNI, provides added assurance of the sound design of the secondary containment having sufficient strength required for the intended use of these bulges.

	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., frost, precipitation etc.).	Drawings listed above under References; 24590-WTP-PER-CSA-02-001, Rev. 10, 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-QL-HC4-W000-00085-T08-02-00007, Rev. 00C, Structural Analysis of LAW & PTF Bulges, Plant Wash/SBS Concentration Collection Vessel Valve Bulge (24590-LAW-PY-RLD-BULGE-00004) (Design Calculation); 24590-QL-HC4-W000-00085-T08-02-00008, Rev. 00B, Structural Analysis of LAW & PTF Bulges, LAW RLD C3/C5 Pump Bulge (24590-LAW-PY-RLD-BULGE-00001) (Design Calculation).	The LAW facility drawings show that the secondary containment units being considered are installed inside the building. Because they are located inside the building, precipitation and frost are not applicable load cases. The Secondary Containment Design document identifies the 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 and repair of completed liners during the construction process. The Material Selections for Building Secondary Containment document addresses the potential effects of operations conditions on metal liner and the associated maintenance requirements. The Design Calculation documents reviewed show that the secondary containment components are adequately designed and have sufficient strength to sustain the applicable design loads.

	Information Assessed	Source of Information	Assessment
Foundation Integrity	The secondary containment is adequately supported by the enclosure structure frame and foundation below has adequate strength.	Drawings listed above under References; 24590-QL-HC4-W000-00085-T08-02-00007, Rev. 00C, Structural Analysis of LAW & PTF Bulges, Plant Wash/SBS Concentration Collection Vessel Valve Bulge (24590-LAW-PY-RLD-BULGE-00004) (Design Calculation); 24590-QL-HC4-W000-00085-T08-02-00008, Rev. 00B, Structural Analysis of LAW & PTF Bulges, LAW RLD C3/C5 Pump Bulge (24590-LAW-PY-RLD-BULGE-00001) (Design Calculation); 24590-WTP-DB-ENG-01-001, Rev. 1Q, Basis of Design.	Review of the design calculation and drawings documents shows that the support system for each RLD bulge has adequate strength to sustain the applicable design loads and is in turn anchored (welded) to the steel embed plates in the concrete floor slab. Chapter 14 of the Basis of Design document requires that the foundation underlying each Bulge Enclosure support system must be adequate to sustain the loads from the weight of the bulge unit filled with water, which is out of scope of this assessment. The assessment of the adequacy of the underlying foundation slab is part of the final Structural Integrity Assessment Report for LAW Secondary Containment integrity assessment report for the plant items on a specific floor elevation.
Infiltration	The design or operation prevents run-on or infiltration of precipitation into the secondary containment.	Drawings listed above under References; 24590-WTP-DB-ENG-01-001, Rev. 1Q, Basis of Design.	The Basis of Design document requires the design to provide adequate measures to prevent run-on or infiltration of precipitation. The RLD secondary containment bulges are located inside the LAW Vitrification Building where they are protected from direct run-on or infiltration of precipitation by the building structure as shown in the general arrangement drawings. Therefore, this section is not applicable to the RLD bulges being assessed.
	The design includes an external moisture barrier or other means to prevent moisture from entering the room.	Drawings listed above under References; 24590-WTP-DB-ENG-01-001, Rev. 1Q, Basis of Design.	The Basis of Design document requires the design include provisions to prevent external moisture intrusion. The RLD bulges shown on the general arrangement drawings are inside the LAW Vitrification Building which protects them from precipitation and surface water percolation, therefore, this section is not applicable to them.

	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-DB-ENG-01-001, Rev. 1Q, Basis of Design; 24590-WTP-PER-CSA-02-001, Rev. 10, Secondary Containment Design; 24590-WTP-PER-M-02-001, Rev. 3, Material Selections for Building Secondary Containment/Leak Detection.	The Basis of Design document requires the liner system to be free of cracks and gaps. The Secondary Containment Design document provides current adequate design requirements, and codes and standards to design leak tight liners. This document includes appropriate details for installation of stainless steel components free of cracks and gaps. The Material Selections document provides adequate requirements for the secondary containment components materials.
	The design has considered the compatibility of the secondary containment elements with the waste and for preventing it from migrating into the concrete slab below.	24590-WTP-PER-M-02-001, Rev. 3, Material Selections for Building Secondary Containment/Leak Detection; 24590-WTP-PER-CSA-02-001, Rev. 10, Secondary Containment Design.	The Material Selections document contains information on the compatibility of secondary containment stainless steel material usage for containing the waste. The Secondary Containment Design document provides standard installation details for the secondary containment components of the RLD bulges which ensures leak-tight connections that will prevent the migration of the waste onto the concrete slab below.

Master Distribution Schedule for
WTP Project Subcontract Management Group

GAE 12/6/12

SUBMITTAL TRANSMITTAL:	☒ **First Submittal**	☐ **Re-Submittal**	☐ **QVRP Package**	☐ **RFI**
☒ **No Review Required**	☐ **No Review Required Re-Submittal**	☐ **Submittal Supplement**		
CORRESPONDENCE:	☐ **With Attachment**	☐ **W/O Attachment (letter only)**	☐ **RFI**	
	☐ **Fax as Original (Letter Only)**	☐ **Fax as Original (With Attachment)**		
☐ **Pre-Award/Award Package**		☐ **Executed Change Order Package**		
☐ **Executed Amendment Package**		☐ **Back Charge**	☐ **Closeout Package**	

Subcontract Number:	24590-CM-HC4-HXYG-00240
Subcontract Title:	IQRPE TANK INTEGRITY SUPPORT
Subcontractor Name:	AREVA FEDERAL SERVICES, LLC
Subcontract Administrator:	GARY ELLERS

PDC Document Number	Rev	Document Title	Rev
24590-CM-HC4-HXYG-00240-02-00006		IQRPE STRUCTURAL INTEGRITY ASSESSMENT REPORT FOR LAW SECONDARY CONTAINMENT BULGE ENCLOSURES (LCP/LFP/LOP/RLD) IA-3008143-000	

DUE BACK TO SUBCONTRACT ADMINISTRATOR NO LATER THAN: N/A

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