R10049219

STRUCTURAL INTEGRITY ASSESSMENT OF THE HIGH LEVEL WASTE BELOW GRADE SECONDARY CONTAINMENT

COGEMA-IA-010 REV. 1

Bechtel Systems & Infrastructure, Inc.

JOB No. 24590

SUPPLIER DOCUMENT STATUS

1. ☒ WORK MAY PROCEED
2. ☐ REVISE AND RESUBMIT. WORK MAY PROCEED SUBJECT TO RESOLUTION OF INDICATED COMMENTS
3. ☐ REVISE AND RESUBMIT. WORK MAY NOT PROCEED
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PERMISSION TO PROCEED DOES NOT CONSTITUTE ACCEPTANCE OR APPROVAL OF DESIGN DETAILS, CALCULATIONS, ANALYSES, TEST METHODS, OR MATERIALS DEVELOPED OR SELECTED BY THE SUPPLIER AND DOES NOT RELIEVE SUPPLIER FROM FULL COMPLIANCE WITH CONTRACTUAL OBLIGATIONS.

	M	P	ML	H	MH	E	C&I	CS&A	PD	PT	ESH
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G-321 DOCUMENT CATEGORY
[From Supplement A to G-321-E (E) or G-321-V (V), as applicable]

RESPONSIBLE ENGINEER _____ DATE 5/16/03

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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.

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HIGH LEVEL WASTE FACILITY BELOW GRADE SECONDARY CONTAINMENT				COGEMA-IA-010, Rev. 1
	Information Assessed	Y/N	Source of Information	Assessment
Scope	Scope of this Integrity Assessment	This integrity assessment addresses High Level Waste Facility Below Grade Secondary Containment between the elevations of (-) 21'-0" and (-) 9'-0". The specific cells considered in this assessment are: H-B005, H-B014, H-B021, H-B035, H-B039A and H-B039B.		
	Drawings	The drawings are the general arrangement plan at elevation (-) 21'-0" and associated sections. 24590-HLW-P1-P01T-P0001, Rev. 4, HLW VITRIFICATION BUILDING GENERAL ARRANGEMENT PLAN AT EL. (-) 21'-0"; 24590-HLW-P1-P01T-P0008, Rev. 5, HLW VITRIFICATION BUILDING GENERAL ARRANGEMENT SECTIONS A-A, B-B & C-C; 24590-HLW-P1-P01T-P0009, Rev. 4, HLW VITRIFICATION BUILDING GENERAL ARRANGEMENT SECTIONS D-D, E-E & F-F; 24590-HLW-P1-P01T-P0010, Rev. 4, HLW VITRIFICATION BUILDING GENERAL ARRANGEMENT SECTION G-G & H-H; 24590-HLW-P1-P01T-P0011, Rev. 5, HLW VITRIFICATION BUILDING GENERAL ARRANGEMENT SECTION J-J & K-K		
Foundation Design	Description of subsurface conditions and soil bearing capacity are adequate.	Y	24590-WTP-DC-ST-01-001, Rev. 0, Structural Design Criteria; 24590-BOF-3PS-CE01-T0001, Rev. 4, Engineering Specification for Excavation and Backfill; 24590-BOF-3PS-C000-T0001, Rev. 2, Engineering Specification for Material Testing Services; WTSC99-1036-42-17, RPP-WTP Geotechnical Investigation Final Report, Shannon & Wilson, 2000	The Structural Design Criteria adequately presents design guidance for both mat and spread footings based on the geotechnical site investigation for the facility (WTSC99-1036-42-17, Shannon & Wilson, 2000). Bearing capacity and settlement design parameters are furnished for the dense Hanford Upper and Lower Sand Units and Structural Fill. Use of the loose wind blown (dune) sands for foundations is precluded. The Excavation and Backfill specification provides structural backfill requirements based on the geotechnical report and adequate current codes and standards for selection, placing, and compacting structural backfill including testing of candidate fill materials and completed backfills. The Specification for Material Testing Services provides current adequate codes and standards for testing of candidate structural fill materials and in-situ testing of structural fills as they are constructed. The codes and standards are consistent with those called out in the Excavation and Backfill specification.

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	Information Assessed	Y/N	Source of Information	Assessment
Foundation Design	Foundation design loads (including full tanks) and estimated settlement are adequately considered.	Y	24590-WTP-DC-ST-01-001, Rev. 0, Structural Design Criteria	The Structural Design Criteria uses current adequate standards to define design loads and load combinations (ASCE 7-98, ACI 318-99, ACI 349-01 and ACI 349R-01). Dead and Fluid loads are included in these loads and load combinations. Settlement design parameters are included in the Structural Design Criteria subsection on geotechnical design parameters and foundation design.
	Design calculation approach and design basis of footings with design standard references (e.g., ACI) are adequate.	Y	24590-WTP-DC-ST-01-001, Rev. 0, Structural Design Criteria	The Structural Design Criteria references current adequate design criteria for the design of concrete foundations and footings. ACI 318-99 is referenced for the strength design of commercial grade structures and ACI 349-01 and ACI 349R-01 are referenced for design of "safety" grade structures.
	Foundation material is compatible with the soil.	Y	24590-WTP-3PS-DB01-T0001, Rev. 1, Engineering Specification for Furnishing and Delivering Ready-Mix Concrete; 24590-BOF-3PS-C000-T0001, Rev. 2, Engineering Specification for Material Testing Services; 24590-WTP-DB-ENG-01-001, Rev. 0, Basis of Design	The specification for Furnishing and Delivering Ready-Mix Concrete provides adequate current requirements for the selection of coarse and fine aggregates and the procurement of cementitious materials. Adequate test procedures are provided in the Material Testing Services specification for testing candidate aggregates. Instructions for mixing and delivering Ready-Mix Concrete are adequate and current. As noted in the Basis of Design document (section 4.7), the water table lies about 200 feet below the deepest foundations so there is little reason to expect compatibility problems between the concrete foundations and the site soils.
	Foundation will withstand the effects of frost heave.	Y	24590-WTP-DC-ST-01-001, Rev. 0, Structural Design Criteria	The Structural Design Criteria includes adequate provisions to preclude frost heave in the section addressing lateral earth pressure loads. All foundations are required to extend into the soil more than 30 inches below finish grade to preclude frost heave. The frost line is 30 inches below finished grade.

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	Information Assessed	Y/N	Source of Information	Assessment
Foundation Design	Seismic considerations have been adequately addressed.	Y	24590-WTP-PER-CSA-02-001, Rev. 3, Secondary Containment Design; 24590-WTP-DC-ST-01-001, Rev. 0, Structural Design Criteria; ACI 349, Code Requirements for Nuclear Safety-Related Concrete Structures; ASCE 4, Seismic Analysis of Safety Related Nuclear Structures and Commentary; ANSI/AISC N690, Specification for the Design, Fabrication and Erection of Steel Safety-Related Structures for Nuclear Facilities; AISC MO16-89, Manual of Steel Construction - Allowable Stress Design, Ninth Edition.	The Secondary Containment Design document provides a summary description of the Design Methodology, Materials, Loads, and Load Combinations (including seismic loads) for the HLW secondary containment components. The Structural Design Criteria provides detailed discipline specific codes and standards for the design of Seismic Category I and II (SC-I/II) HLW secondary containment foundations, structures, and liners by the design engineers. ACI-349-01 and ACI 349R-01 provide the design code and load combinations for design of the secondary containment reinforced concrete foundations and structures. ASCE 4-98 is used for guidance on seismic analysis of safety-related nuclear structures. Stainless steel liners for SC-I/II secondary containments are to be designed using ANSI/AISC N690 and the AISC code. Lateral force response spectra for design of SC-I/II secondary containments and liners are provided in the Structural Design Criteria for input to the overall building seismic analysis models. The seismic design codes and standards and lateral force requirements have been adequately addressed.
Compatibility & Strength	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.	Y	24590-WTP-DB-ENG-01-001, Rev. 0, Basis of Design; 24590-WTP-PER-M-02-001, Rev. 2, Material Selections for Building Secondary Containment/Leak Detection; 24590-WTP-PER-CSA-02-001, Rev. 3, Secondary Containment Design; 24590-WTP-PER-J-02-001, Rev. 3, Leak Detection - Sump Level Measurement in Secondary Containment Systems	The Basis of Design states that cells and sumps are appropriately lined and any spills are removed and flushed within 24-hr or as timely as possible. Based on detailed analysis of the corrosive properties of expected waste process operations, the Material Selection report identifies appropriate corrosion resistant materials for Secondary Containment liners and coatings. The Secondary Containment Design report provides adequate typical construction details for liners including tank anchorage details, special protective coatings, sumps, and leak detection equipment to be used for Secondary Containment. Typical details are furnished for leak detection and sump level measurement systems equipment both in cell, and out of cell in the Leak Detection - Sump Level Measurement document.

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HIGH LEVEL WASTE FACILITY BELOW GRADE SECONDARY CONTAINMENT				COGEMA-IA-010, Rev. 1
	Information Assessed	Y/N	Source of Information	Assessment
Compatibility & Strength	The design shows that the Secondary Containment has sufficient strength and thickness to prevent failure owing to pressure gradients, static head during a release, physical contact with the waste, climatic conditions, and the stress of daily operations (e.g., vehicular traffic).	Y	24590-WTP-DB-ENG-01-001, Rev. 0, Basis of Design; 24590-WTP-PER-CSA-02-001, Rev. 2, Secondary Containment Design; 24590-HLW-P1-P01T-P0001, Rev. 4, HLW VITRIFICATION BUILDING GENERAL ARRANGEMENT PLAN AT EL. (-) 21'-0" and the associated Cross-Section drawings	These general requirements are stated as design goals in the Basis of Design document. The explicit design codes and standards and loads and load combinations for design are listed in the Secondary Containment Design requirements document. These requirements and codes and standards are adequate for the secondary containment design. Since the secondary containments being considered are located in cells inside the High Level Waste Vitrification Building rather than directly buried, pressure gradients and vehicular traffic are not applicable load cases. The drawings show the general arrangement of the secondary containment.
	The Secondary Containment system has sufficient strength in the presence of operational stresses from site-specific conditions (i.e., traffic, heavy equipment, precipitation, frost).	Y	24590-WTP-DB-ENG-01-001, Rev. 0, Basis of Design; 24590-WTP-PER-CSA-02-001, Rev. 3, Secondary Containment Design; 24590-WTP-3PS-NLLR-00002, Rev. 0, Engineering Specification for Furnishing, Detailing, Fabrication, Delivery and Installation of Stainless Steel Liner Plates; 24590-WTP-PER-M-02-001, Rev. 2, Material Selections for Building Secondary Containment/Leak Detection	The Secondary Containments being considered are installed below grade inside the High Level Waste Vitrification 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 of and repair of completed liners during the construction process. The Material Selections for Building Secondary Containment report addresses the potential effects of operations conditions on liner coatings integrity and the associated maintenance requirements.

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HIGH LEVEL WASTE FACILITY BELOW GRADE SECONDARY CONTAINMENT				COGEMA-IA-010, Rev. 1
	Information Assessed	Y/N	Source of Information	Assessment
Foundation Integrity	The Secondary Containment is properly supported by a foundation or base in order to prevent failure from settlement, compression, or uplift, including the residual effects of installation.	Y	24590-WTP-DC-ST-01-001, Rev. 0, Structural Design Criteria; 24590-WTP-PER-CSA-02-001, Rev. 3, Secondary Containment Design; 24590-HLW-P1-P01T-P0001, Rev. 4, HLW VITRIFICATION BUILDING GENERAL ARRANGEMENT PLAN AT EL. (-) 21'-0" and the associated Cross-Section drawings	These conditions are fully addressed in the Structural Design Criteria and the Secondary Containment Design document. The design requirements and codes and standards specified are adequate to satisfy these performance goals. The design and construction specifications adequately provide for proper foundation construction and installation of the Secondary Containment. The general arrangement plan drawing for elevation (-) 21'-0" and the associated cross-sections provide an adequate description of the Secondary Containment being considered.
	The placement, structural support, and type of material used for backfill around and below the Secondary Containment are appropriate.	Y	24590-BOF-3PS-CE01-T0001, Rev. 4, Engineering Specification for Excavation and Backfill; 24590-BOF-3PS-C000-T0001, Rev. 2, Engineering Specification for Material Testing Services	The Excavation and Backfill, and Material Testing specifications contain current adequate industry standards for selecting and testing fill materials, placing and compacting backfills, and testing not less than once each lift to assure adequate compaction. Requirements for testing and record keeping are current and adequate for both safety grade fills and commercial grade fills.
	The design or operation (e.g., diking & curbing) prevents run-on or infiltration of precipitation into the Secondary Containment system unless the collection system has sufficient excess capacity (25 yr rainfall) to contain the run-on precipitation.	Y	24590-WTP-DB-ENG-01-001, Rev. 0 Basis of Design; 24590-HLW-P1-P01T-P0001, Rev. 4, HLW VITRIFICATION BUILDING GENERAL ARRANGEMENT PLAN AT EL. (-) 21'-0" and the associated Cross-Section drawings	This requirement is specified in the Environmental section of the Basis of Design document. In addition, the secondary containment being reviewed is located inside the High Level Waste Vitrification Building where it is protected from precipitation as shown in the General Arrangement Plan and the associated Cross-Section drawings.

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	Information Assessed	Y/N	Source of Information	Assessment
Liner System	The design includes an external moisture barrier or other means to prevent moisture from entering the cell.	Y	24590-HLW-P1-P01T-P0001, Rev. 4, HLW VITRIFICATION BUILDING GENERAL ARRANGEMENT PLAN AT EL. (-) 21'-0" and the associated Cross-Section drawings; 24590-WTP-DB-ENG-01-001, Rev. 0, Basis of Design	The Secondary Containment shown in the general arrangement plan at elevation (-) 21'-0" is inside the High Level Waste Vitrification Building which shields it from precipitation and surface water percolation. The ground water table is located about 200 feet below the floors of the cells at elevation (-) 21'-0" as noted in the Basis of Design.
	The containment area is free of cracks or gaps and the design discusses methods of their minimization.	Y	24590-WTP-PER-CSA-02-001, Rev. 3, Secondary Containment Design; 24590-WTP-3PS-NLLR-T0002, Rev. 0, Engineering Specification for Furnishing, Detailing, Fabrication, Delivery and Installation of Stainless Steel Liner Plates	The Secondary Containment Design document provides current adequate design requirements and codes and standards to design leak tight stainless steel liners for Secondary Containment. This report (CSA-02-001) includes appropriate details for installation of protective coating liners free of cracks and gaps. The procurement specification for design, fabrication and installation of stainless steel liners identifies construction processes that are adequate and appropriate for installation of the liners.
	The design has considered the compatibility of the concrete liner or coatings and waste and presents information on coatings planning to be used from the manufacturer addressing compatibility with the stored waste. The lining or coating must prevent the waste from migrating into the concrete.	Y	24590-WTP-PER-M-02-001, Rev. 2, Material Selections for Building Secondary Containment/Leak Detection; 24590-WTP-PER-CSA-02-001, Rev. 3, Secondary Containment Design	The Material Selection Study contains general information on the compatibility of planned Secondary Containment stainless steel liners and protective coatings with the waste. The Secondary Containment Design report provides standard details for liners and coatings that will adequately prevent migration of the waste into the concrete.

Y = Yes N = No N/A = Not Applicable

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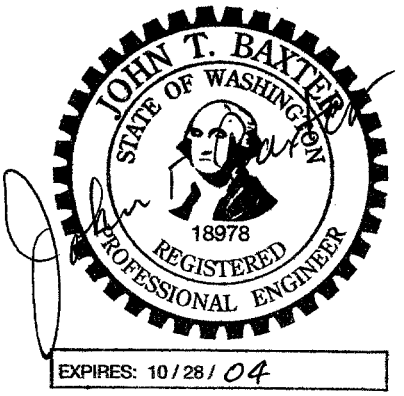
STRUCTURAL INTEGRITY ASSESSMENT OF THE HIGH LEVEL WASTE BELOW GRADE SECONDARY CONTAINMENT

"I, John T. Baxter 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 High Level Waste Facility Below Grade Secondary Containment as required by The Dangerous Waste Regulations, namely, WAC 173-303-640(3) applicable paragraphs (i.e., (a) through (g))."

"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 indicate that the design intent fully satisfies the requirements of the WAC.

The attached review is 6 sheets numbered 1 through 6.



John T. Baxter 05/15/03

Signature Date

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COGEMA ENGINEERING

May 15, 2003

COGEMA-03-0160

T. A. O'Toole
Bechtel National, Inc.
Waste Treatment Plant
2435 Stevens Center
Richland, Washington 99352

Dear Ms. O'Toole:

STRUCTURAL INTEGRITY ASSESSMENT OF THE HIGH LEVEL WASTE BELOW GRADE SECONDARY CONTAINMENT, REVISION 1

The integrity assessment has been completed per the contract requirements and is attached for your use. The assessment found the design intent is sufficient to ensure the foundations and secondary containments will be adequately designed and will have sufficient structural strength, compatibility with the waste(s) to be stored or treated, and corrosion protection to ensure that they will not collapse, rupture, or fail.

If you have any questions, please contact me at (509) 376-5445, or via facsimile at (509) 372-0504.

Sincerely,

K. V. Scott, Manager
Facilities, Structures & Components

kld

Attachment

cc: D. C. Pfluger w/ attachment

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Dan Pfluger	MS4-E2							LEAD REVIEWER
Brad Erlandson								Reviewer
Trisha O'Toole								Info

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DAN PFLUGER
Approver's Name (Print)

Approver's Signature

8/27/2002
Date

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Trisha O'Toole	MS9-B		X	X				Signed off sticker copy

Dan Pfluger
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10/1/02
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