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
4. ☐ REVIEW NOT REQUIRED. WORK MAY PROCEED.

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
REVIEWED											HW

G-321 DOCUMENT CATEGORY N/A
[From Supplement A to G-321-E (E) or G-321-V (V), as applicable]
RESPONSIBLE ENGINEER [signature] DATE 4/8/03

24590-CM-HC4-HXYG-00138-01-05
REV. 00D

SUBCONTRACT SUBMITTAL

4/8/03

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COGEMA ENGINEERING

R10029986

STRUCTURAL INTEGRITY ASSESSMENT OF THE LOW ACTIVITY WASTE BELOW GRADE RADIOACTIVE LIQUID WASTE DISPOSAL SYSTEM TANK, REVISION 4

"I, Michael L. Vosk 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 Low Activity Waste Below Grade Radioactive Liquid Waste Disposal System Tank 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 5 sheets numbered 1 through 5.

MICHAEL L. VOSK
STATE OF WASHINGTON
38908
REGISTERED
PROFESSIONAL ENGINEER

4-4-03

EXPIRES: 9-11-03

Signature

4-4-03
Date

24590-CG-HCU-HXYG-00138-01-05
Rev 00D

(1)

COGEMA ENGINEERING

STRUCTURAL INTEGRITY ASSESSMENT OF THE WASTE TREATMENT AND IMMOBILIZATION PLANT

LOW ACTIVITY WASTE BELOW GRADE RADIOACTIVE LIQUID WASTE DISPOSAL SYSTEM TANK

COGEMA-IA-005
REV. 4

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 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.

(2)

Low Activity Waste Below Grade Radioactive Liquid Waste Disposal System Tank			COGEMA-IA-005, Rev. 4
Information assessed	Y/N	Source of Information	Assessment
Tank design standards are appropriate and adequate for the tank's intended use.	Y	24590-LAW-MV-RLD-P0001, Rev. 1, EQUIPMENT ASSEMBLY C3/C5 DRAINS/SUMP COLLECTION VESSEL RLD-VSL-00004; MECHANICAL DATA SHEET: VESSEL, 24590-LAW-MVD-RLD-P0001, Rev. 1, 3C3/C5 Drains/Sump Collection Vessel RLD-VSL-00004;; 24590-WTP-3PS-MV00-TP001, Rev. 0, Engineering Specification for Pressure Vessel Design and Fabrication.	The Engineering Specification for Pressure Vessel Design and Fabrication requires that the Low Activity Waste (LAW) C3/C5 Drains/Sump Collection Vessel RLD-VSL-00004 and all tank appurtenances be designed to ASME Section VIII, Division 1 rules. These rules are appropriate for an unfired pressure vessel operating with mixed waste solutions over the pressure and temperature range specified for this vessel. Supplementary requirements are specified in the Engineering Specification for Pressure Vessel Design and Fabrication. These supplementary requirements address positive material identification, standard fabrication tolerances, acceptable welding procedures for the tank and appurtenances, welder qualifications and testing records, NDE inspections and records, quality assurance requirements, and packaging, shipping, handling and storage requirements . These are acceptable codes and standards. The LAW RLD tank (RLD-VSL-00004) is a vertical tank with a 120 in. ID and a vertical length of 132 in. tangent to tangent supported on a cylindrical skirt. Top and bottom heads are torispherical with straight flanges. The shell and heads are to have a minimum thickness of 1/2 inch. Materials for the shell, head and appurtenances are to be SA-240 316L stainless steel (maximum Carbon 0.030%, dual certified). The lower head is to have a 0.125 in. minimum explosion-bonded internal clad layer of SB-443 Inconel 625 to improve corrosion resistance. The operating volume is to be about 6510 gallons and the total internal volume is to be about 7696 gallons.

(3)

Low Activity Waste Below Grade Radioactive Liquid Waste Disposal System Tank			COGEMA-IA-005, Rev. 4
Information assessed	Y/N	Source of Information	Assessment
If a non-standard tank is to be used, the design calculations demonstrate sound engineering principles of construction.	N/A	24590-WTP-3PS-MV00-TP001, Rev. 0, Engineering Specification for Pressure Vessel Design and Fabrication.	The Engineering Specification for Pressure Vessel Design and Fabrication requires that the ASME Section VIII, Division 1 vessel be delivered after design, fabrication, inspection and testing with an ASME U stamp and that the tank be registered with the National Board. It is a shop fabricated tank for mixed waste service in the Low Activity Waste Building. As discussed in the item immediately above, the tank design standards are appropriate and adequate for the tank's intended use.
Tank has adequate strength, after consideration of the corrosion allowance, to withstand the operating pressure, operating temperature, and seismic loads.	Y	24590-WTP-3PS-MV00-TP001, Rev. 0, Engineering Specification for Pressure Vessel Design and Fabrication; 24590-WTP-3PS-MV00-TP002, Rev. 1, Engineering Specification for Seismic Qualification Criteria for Pressure Vessels; 24590-WTP-3PS-FB01-T0001, Rev. 0, Engineering Specification for Structural Design Loads for Seismic Category III and IV Equipment and Tanks; MECHANICAL DATA SHEET: VESSEL, 24590-LAW-MVD-RLD-P0001, Rev. 1, 3C3/C5 Drains/Sump Collection Vessel RLD-VSL-00004; Drawing No. 24590-LAW-MV-RLD-P0001, Rev. 1, EQUIPMENT ASSEMBLY C3/C5 DRAINS/SUMP COLLECTION VESSEL RLD-VSL-00004.	The Engineering Specification for Pressure Vessel Design and Fabrication requires specific consideration of the operating pressures, temperatures, seismic loads and the corrosion allowance in the design process. Supplementary design criteria are specified in the Engineering Specifications for Seismic Qualification Criteria for Pressure Vessels and Structural Design Loads for Seismic Category III and IV Equipment and Tanks to provide for the seismic design analysis. The Mechanical Data Sheet identifies the tank operating pressure and temperature ranges, the materials selected for the tank, the design corrosion allowance for a 40 year service life, and the requirements for seismic qualification of the vessel. The Equipment Assembly drawing specifies a minimum thickness for the tank primary shell and heads of 1/2 in. stainless steel.
Tank foundation will maintain the load of a full tank.	Y	Drawing No. 24590-LAW-MV-RLD-P0001, Rev. 0, EQUIPMENT ASSEMBLY C3/C5 DRAINS/SUMP COLLECTION VESSEL RLD-VSL-00004; 24590-WTP-3PS-MV00-TP001, Rev. 0, Engineering Specification for Pressure Vessel Design and Fabrication.	The specification for Pressure Vessel Design and Fabrication requires the use of ASME Section VIII, Division 1 rules for design of vessel supports. These requirements are appropriate and adequate to ensure that the tank foundation can support the loads of a full tank.
If in an area subject to flooding, the tank is anchored.	Y	24590-WTP-3PS-MV00-TP001, Rev. 0, Engineering Specification for Pressure Vessel Design and Fabrication.	Buoyant forces of an empty tank in a flooded room are a standard design load case in this design and fabrication specification for pressure vessels.

Low Activity Waste Below Grade Radioactive Liquid Waste Disposal System Tank			COGEMA-IA-005, Rev. 4
Information assessed	Y/N	Source of Information	Assessment
Tank system will withstand the effects of frost heave.	Y	24590-LAW-3YD-20-00001, Rev. 0, Systems RLD and NLD LAW Vitrification Liquid Effluent System Description.	This tank is located in a shielded concrete cell at elevation (-) 21'-0" below the first floor of the Low Activity Waste Building. This location is below the annual frost line.
Characteristics of the waste to be stored or treated have been identified (ignitability, reactivity, toxicity, pH range, specific gravity, vapor pressure, flash point, storage temperature).	Y	Drawing No. 24590-LAW-MV-RLD-P0001, Rev. 1, EQUIPMENT ASSEMBLY C3/C5 DRAINS/SUMP COLLECTION VESSEL RLD-VSL-00004; MECHANICAL DATA SHEET: VESSEL, 24590-LAW-MVD-RLD-P0001, Rev. 1, 3C3/C5 Drains/Sump Collection Vessel RLD-VSL-00004; VESSEL/TANK MATERIAL SELECTION DATA SHEET, 24590-LAW-N1D-RLD-P0001, Rev. 1, RLD-VSL-00004 (LAW) C3/C5 Drains/Sump Collection Vessel; 24590-LAW-3YD-20-00001, Rev. 0, Systems RLD and NLD LAW Vitrification Liquid Effluent System Description. 24590-WTP-PSAR-ESH-01-002-03, Rev 0, Preliminary Safety Analysis Report to Support Construction Authorization; LAW Facility Specific Information	Design specific gravity 1.47, Operating temperature 158 °F, Vessel design temperature 183 °F, Internal operating pressure Atmospheric, Internal design pressure 15 psig, External operating pressure 0.6 psig, External vessel design condition full vacuum in the tank with external pressure of one atmosphere. The LAW RLD tank (RLD-VSL-00004) continuously collects the purge liquid from the Wet Electrostatic Precipitators in the LAW Melters offgas system and any wash discharges from the C3/C5 areas floor drains in the LAW facility. Vessel RLD-VSL-00004 is actively ventilated by the vessel vent system to prevent build-up of flammable gases. The tank is furnished with a grounding lug to control the discharge of static electricity and preclude ignition sources inside the tank. The Vessel/Tank Material Selection Data Sheet indicates that RLD-VSL-00004 will operate in a pH range of 0.71 to 1.57. The system description for the RLD Liquid Effluent System indicates that the RLD vessel and associated piping do not provide important to safety functions. The Preliminary Safety Analysis Report (PSAR) provides a summary of potential hazardous conditions associated with each LAW Facility vessel and the design provisions that are to be used to provide adequate control of each hazard. These hazards range from radioactive liquid spills to criticality.

5

Low Activity Waste Below Grade Radioactive Liquid Waste Disposal System Tank			COGEMA-IA-005, Rev. 4
Information assessed	Y/N	Source of Information	Assessment
Tank is designed to store or treat the wastes with the characteristics defined above and any treatment reagents.	Y	24590-LAW-3YD-20-00001, Rev. 0, Systems RLD and NLD LAW Vitrification Liquid Effluent System Description. 24590-WTP-PSAR-ESH-01-002-03, Rev 0, Preliminary Safety Analysis Report to Support Construction Authorization; LAW Facility Specific Information	As noted in the adjacent entry above, tank RLD-VSL-00004 is designed to store and transfer the waste and treatment reagents (if any) that it receives. Also as noted above, the Preliminary Safety Analysis (PSAR) identifies the potential hazards associated with the Liquid Effluent System. The PSAR also identifies design provisions for control of the identified credible hazards.
The waste types are compatible with each other.	Y	24590-LAW-3YD-20-00001, Rev. 0, Systems RLD and NLD LAW Vitrification Liquid Effluent System Description.	All sources of waste streams for RLD-VSL-00004 are discussed in the System Description, both normal and upset flows. The System Description notes that neutralization of vessel contents is not planned for the LAW RLD tank because these operations are normally conducted in the Pretreatment Facility.
Tank material and protective coatings ensure the tank structure is adequately protected from the corrosive effects of the waste stream and external environments (expected to not leak or fail for the design life of the system).	Y	VESSEL/TANK MATERIAL SELECTION DATA SHEET, 24590-LAW-N1D-RLD-P0001, Rev. 1, RLD-VSL-00004 (LAW) C3/C5 Drains/Sump Collection Vessel; MECHANICAL DATA SHEET: VESSEL, 24590-LAW-MVD-RLD-P0001, Rev. 1, 3C3/C5 Drains/Sump Collection Vessel RLD-VSL-00004.	The materials selected for the tank in the Vessel/Tank Material Selection Data Sheet are the materials listed in the Mechanical Data Sheet. The tank primary boundary, shell and heads, and all internals are to be SA-240 316L stainless steel (maximum Carbon 0.030%, dual certified). The bottom tank head is to be internally clad with a minimum of 0.125in. of SB-443 Inconel 625 Nickel-Chromium sheet to protect it from under-deposit corrosion. The Vessel/Tank Material Selection Data Sheet determined that the inclusion of the internal clad on the lower head is an adequate design feature to control pitting and stress corrosion cracking mechanisms. A corrosion allowance of 0.04 inches is specified for a 40 year service life for this tank.
Corrosion allowance is adequate for the intended service life of the tank.	Y	VESSEL/TANK MATERIAL SELECTION DATA SHEET, 24590-LAW-N1D-RLD-P0001, Rev. 1, RLD-VSL-00004 (LAW) C3/C5 Drains/Sump Collection Vessel; MECHANICAL DATA SHEET: VESSEL, 24590-LAW-MVD-RLD-P0001, Rev. 1, 3C3/C5 Drains/Sump Collection Vessel RLD-VSL-00004.	The uniform corrosion allowance of 0.040 inches for a 40 year tank life is adequate for the process conditions discussed in the Vessel/Tank Material Selection Data Sheet. This corrosion allowance is provided in the Mechanical Data Sheet for RLD-VSL-00004 so that it will be incorporated into the vessel design and fabrication. The materials chosen, welding processes selected, surface preparation, and preservice inspections are appropriate for the anticipated service conditions.

6

Low Activity Waste Below Grade Radioactive Liquid Waste Disposal System Tank			COGEMA-IA-005, Rev. 4
Information assessed	Y/N	Source of Information	Assessment
Pressure controls (vents and relief valves) are adequately designed to ensure pressure relief if normal operating pressures in the tank are exceeded.	Y	Drawing No. 24590-LAW-MV-RLD-P0001, Rev. 1, EQUIPMENT ASSEMBLY C3/C5 DRAINS/SUMP COLLECTION VESSEL RLD-VSL-00004; 24590-LAW-3YD-20-00001, Rev. 0, Systems RLD and NLD LAW Vitrification Liquid Effluent System Description.	The LAW RLD tank (RLD-VSL-00004) is the final receiver tank for the overflow systems of tanks in the LAW Building handling radioactive liquid effluent materials as discussed in the System Description. The tank is equipped with a 8-in. diameter overflow line with no obstructions as shown on the Assembly drawing that drains to the liner floor and sump in the vault where the tank is located. The overflow line is the larger than the inlet lines entering the tank from the C3/C5 building areas This tank is also designed to handle the maximum expected 30 minute firewater volume for a single fire in any of the contaminated C3/C5 areas in the building by overflowing to the secondary containment which is sized to handle this volume.
ID = Internal Diameter OD = Outside Diameter N/A = Not Applicable psig = pounds per square inch gage Y = Yes N = No			

COGEMA ENGINEERING

R10028314

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BNI-Subcontracts

April 4, 2003

COGEMA-03-0119

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 LOW ACTIVITY WASTE BELOW GRADE RADIOACTIVE LIQUID WASTE DISPOSAL SYSTEM TANK, REVISION 4

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 vessel 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 it 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

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

kld

Attachment

cc: D. C. Pfluger w/ attachment

(8)

2425 Stevens Center Place, Second Floor, Richland, Washington 99352 Tel: (509) 372-3572 - Fax: (509) 372-3169
COGEMA Engineering Corporation

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

Insert rows as necessary ↑

DAN PFLUGER
Approver's Name (Print)

Approver's Signature

8/27/2007
Date

(9)