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.

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	M	P	ML	H	MH	E	C&I	CS&A	PD	PT	ESH
REVIEWED											[illegible]

G-321 DOCUMENT CATEGORY N/A
[From Supplement A to G-321-E (E) or G-321-V (V), as applicable]
RESPONSIBLE ENGINEER [illegible] DATE 4/1/03

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REV. 00C

SUBCONTRACT SUBMITTAL

4/2/03

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4-2-03 [illegible]

R10029733

IQRPE REVIEW – PRETREATMENT FACILITY BELOW GRADE PLANT WASH AND DISPOSAL SYSTEM ANCILLARY EQUIPMENT

"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 Pretreatment Facility Below Grade Plant Wash and Disposal System Ancillary Equipment 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 indicates that the design intent fully satisfies the requirements of the WAC.

The attached review is 7 sheets numbered 1 through 7.

JOHN T. BAXTER
STATE OF WASHINGTON
18978
REGISTERED PROFESSIONAL ENGINEER

EXPIRES: 10/28/04

John T. Baxter 03/31/03

Signature Date

24590-CM-HC4-HX4G-00138-01-02 Rev 00C

STRUCTURAL INTEGRITY ASSESSMENT OF THE PRETREATMENT FACILITY BELOW GRADE PLANT WASH AND DISPOSAL SYSTEM ANCILLARY EQUIPMENT

COGEMA-IA-002
REV. 3

Pretreatment Facility (PTF) Below Grade Plant Wash Disposal System Ancillary Equipment			COGEMA-IA-002, Rev 3
Information assessed	Y/N	Source of Information	Assessment
Ancillary equipment design standards are appropriate and adequate for the equipment's intended use.	Y	24590-WTP-DC-PS-01-001, Rev 1, Pipe Stress Design Criteria; 24590-WTP-DC-PS-01-002, Rev 1, Pipe Support Design Criteria; 24590-PTF-M6-PWD-P0002, Rev 1, Drawing, P&ID-PTF Plant Wash & Disposal System Effluent Collection PWD-VSL-00033/00043/00044 (Q); 24590-PTF-M6-PWD-P0041, Rev 1, Drawing, P&ID-PTF Plant Wash & Disposal System C2 Area Floor Drains Collection Vessel; 24590-PTF-M6-PWD-P0043, Rev 1, Drawing; P&ID-PTF Plant Wash & Disposal System C3 Area Floor Drains; 24590-PTF-3YD-PWD-00001, Rev 0, System Description for Plant Wash and Disposal System PWD and Radioactive Liquid Waste Disposal System RLD; COGEMA-IA-009, current revision, Structural Integrity Assessment of the Pretreatment Facility Below Grade Plant Wash and Disposal System Tanks	The ancillary equipment evaluated in this integrity assessment of the PTF Plant Wash and Disposal System is the ancillary equipment associated with tanks PWD-VSL-00033/-00043/-00046. Design standards for tank internal equipment are discussed in COGEMA IA-009, the integrity assessment for the Plant Wash and Disposal System tanks. Pipe Stress Design Criteria identifies ASME B31.3 as the design code for piping systems of the WTP. Due to more stringent seismic requirements, the design criteria includes methodology provided in ASME Section III Code to supplement the design rules of ASME B31.3 Code for SC-I and SC-II piping. SC-III or SC-IV piping systems will be designed per UBC for seismic loads. Table 1 in Pipe Stress Design Criteria identifies categories of piping and the applicable design code and analysis methods, seismic loads and seismic analysis methods, and acceptance criteria. The codes and methods identified in Table 1 are appropriate for piping containing aqueous mixed waste over the range of conditions identified for this system. Pipe Support Design Criteria considers significant loadings identified in B31.3 and identifies ASME Section III as the applicable code for SC-1 through SC-IV linear pipe supports. These are appropriate loadings and codes for linear pipe supports of an aqueous mixed waste piping system over the range of conditions identified for this system.
If the ancillary equipment to be used is not built to a design standard, the design calculations demonstrate sound engineering principles of construction.	N/A	24590-WTP-DC-PS-01-001, Rev 1, Pipe Stress Design Criteria; 24590-WTP-DC-PS-01-002, Rev 1, Pipe Support Design Criteria.	The ancillary equipment is built to design standards. The WTP piping is to be designed per ASME B31.3 supplemented by ASME Section III, and the UBC as identified in the Pipe Stress Design Criteria. The piping supports are designed using load ratings for Component Standard type pipe supports and are otherwise designed using allowables from ASME Section III.

Pretreatment Facility (PTF) Below Grade Plant Wash Disposal System Ancillary Equipment			COGEMA-IA-002, Rev 3
Information assessed	Y/N	Source of Information	Assessment
Ancillary equipment has adequate strength at the end of its design life to withstand the operating pressure, operating temperature, thermal expansion, and seismic loads. Equipment is protected against physical damage and excessive stress due to settlement, vibration, expansion, or contraction.	Y	24590-WTP-DC-PS-01-001, Rev 1, Pipe Stress Design Criteria; 24590-WTP-DC-PS-01-002, Rev 1, Pipe Support Design Criteria; 24590-WTP-PER-M-02-002, Rev 0, Materials for Ancillary Equipment; 24590-PTF-3YD-PWD-00001, Rev 0, System Description for Plant Wash and Disposal System PWD and Radioactive Liquid Waste Disposal System RLD; 24590-WTP-DB-ENG-01-001, Rev 0, Basis of Design.	For piping design, rules for consideration of operating pressure, operating temperature, thermal expansion, and seismic loads are provided by ASME B31.3 (ASME B31.3 is identified as the design code for WTP in Pipe Stress Design Criteria). ASME B31.3 includes vibration, settlement and corrosion allowance as design considerations. The ASME Section III Code is used to supplement the design rules of the ASME B31.3 Code to provide appropriate seismic design requirements. Pipe Support Design Criteria considers all significant loadings identified in ASME B31.3. The required design life of 40 years for ancillary equipment is identified in the Basis of Design. Components in non-maintainable areas are to be designed to last the entire design life of the plant. Corrosion analyses and Mechanical Data Sheets for the vessels, and vessel internal equipment, identify corrosion allowances for a 40 year life. Materials for Ancillary Equipment identifies a conservative approach such that ancillary equipment downstream of a source vessel is constructed of the same or better material and with the same corrosion allowance as the source vessel itself. Since the vessels all have detailed corrosion analyses, using the same or better materials ensures that the material will be appropriate for the wastes for the entire design life. If the material for the ancillary equipment is to be different from the source vessel, an analysis by the materials group is required (Materials for Ancillary Equipment).

Pretreatment Facility (PTF) Below Grade Plant Wash Disposal System Ancillary Equipment			COGEMA-IA-002, Rev 3
Information assessed	Y/N	Source of Information	Assessment
Ancillary equipment supports are adequately designed.	Y	24590-WTP-DC-PS-01-002, Rev 1, Pipe Support Design Criteria; 24590-WTP-PL-PS-01-001, Rev 1, Verification and Validation Test Plan for Bechtel's ME150 Pipe Support Family of Programs (PCFAPPS); 24590-WTP-VV-PS-01-001, Rev 1, Verification and Validation Report for ME101, Linear Elastic Analysis of Piping Version N6. COGEMA-IA-009, current revision, Structural Integrity Assessment of the Pretreatment Facility Below Grade Plant Wash and Disposal System Tanks.	The Pipe Support Design Criteria considers the significant loadings (operating pressure, operating temperature, thermal expansion, vibration, settlement and seismic loads). Supporting components are to be designed to allow a minimum of heat to be transferred to the building structures (building structure not to exceed 150 deg F for concrete and 200 deg F for steel, Pipe Support Design Criteria). The Design criteria specifically addresses component standard type pipe supports, linear type pipe supports, design of welds, attachments to building structures, requirements for bolted joints, loads, load conditions, allowable stresses, clearances, multiple pipe frame supports, and clamps and attachments to pipe. Loads are evaluated against the design criteria provided in ASME Section III (using allowable limits for normal load conditions for SC-I/SC-II supports and allowable limits for faulted load conditions for SC-III/SC-IV supports). Analysis is by manual calculation or approved computer programs. The subjects covered in Pipe Support Design Criteria and the use of ASME Section III design criteria are appropriate and adequate for an aqueous mixed waste piping system over the range of conditions identified for this system. Use of approved and validated computer programs to analyze piping designs is appropriate. Design standards for vessel internal equipment supports are discussed in COGEMA-IA-009, the integrity assessment for the Plant Wash and Disposal System tanks.
Seams and connections are adequately designed.	Y	24590-WTP-DB-ENG-01-001, Rev 0, Basis of Design; 24590-WTP-DC-PS-01-001, Rev. 1, Pipe Stress Design Criteria.	The Basis of Design states that in-cell and in-cave process and service piping connections will be designed to minimize the potential for liquid waste leakage or seepage when disconnected. Basis of Design also states that in-cell pipework that is non-maintainable will be fully welded. Pipe Stress Design Criteria specifies ASME B31.3 design code for the piping systems supplemented by ASME III, Div. 1 for seismic design. ANSI B16.5 is applied for flange designs. Welding is per ASME B31.3 and ASME IX. These are appropriate basis of design and design codes for the aqueous mixed waste piping system being evaluated.

Pretreatment Facility (PTF) Below Grade Plant Wash Disposal System Ancillary Equipment			COGEMA-IA-002, Rev 3
Information assessed	Y/N	Source of Information	Assessment
The system will withstand the effects of frost heave.	N/A	24590-PTF-3YD-PWD-00001, Rev 0, System Description for Plant Wash and Disposal System PWD and Radioactive Liquid Waste Disposal System RLD.	The ancillary equipment considered in this assessment is located below grade at the (-) 19'-0" and (-) 45'-0" elevations of the Pretreatment Facility. These locations are below the frost line.
Characteristics of the waste to be stored or treated have been identified (ignitable, reactive, toxic, specific gravity, vapor pressure, flash point, temperature)	Y	24590-PTF-3YD-PWD-00001, Rev 0, System Description for Plant Wash and Disposal System PWD and Radioactive Liquid Waste Disposal System RLD; 24590-WTP-PSAR-ESH-01-002-02, Rev. 0, Preliminary Safety Analysis Report to Support Construction Authorization; PT Facility Specific Information.	The ancillary equipment considered in this assessment will handle wastes with the same characteristics as do the source vessels. Operating pressures for ancillary equipment will be different from those of the vessels, enveloping pressures and temperatures are reflected in the pipe class assigned to each pipe run. Mechanical Systems Data Sheets for the source vessels contain information on the characteristics of the waste carried by the downstream ancillary equipment (refer to the integrity assessment of the source vessel for waste characteristics for each pipe run). The Preliminary Safety Analysis Report (PSAR) provides a summary of potential hazardous conditions associated with each Pretreatment Facility vessel and the design provisions that are to be used to provide adequate control of each hazard. These hazards range from flammable gas accumulations in the vapor space of the PWD tanks to criticality. Design provisions for control of these hazards are listed in the PSAR. For example, the Pretreatment Vessel Vent Process System provides flammable gas dilution and control in the PWD tanks and ancillary equipment. A facility wide grounding system is furnished to control ignition sources in the same tanks and ancillary equipment.
Ancillary equipment is designed to handle the wastes with the characteristics defined above and any treatment reagents.	Y	24590-WTP-PER-M-02-002, Rev 0, Materials for Ancillary Equipment.	As noted in the adjacent entry above, source vessels are designed to store the waste and treatment reagents (if any) that they receive. The ancillary equipment materials that contact the waste are to be equal to or better than the upstream vessel.

Pretreatment Facility (PTF) Below Grade Plant Wash Disposal System Ancillary Equipment			COGEMA-IA-002, Rev 3
Information assessed	Y/N	Source of Information	Assessment
The pH range of the waste, waste temperature, and the corrosion behavior of the structural materials are adequately addressed. Ancillary equipment material and protective coatings ensure the ancillary equipment structure is adequately protected from the corrosive effects of the waste stream and external environments. The protection is sufficient to ensure the equipment will not leak or fail for the design life of the system.	Y	24590-PTF-3YD-PWD-00001, Rev 0, System Description for Plant Wash and Disposal System PWD and Radioactive Liquid Waste Disposal System RLD; 24590-WTP-PER-M-02-002, Rev 0, Materials for Ancillary Equipment; 24590-WTP-3PS-NN00-T0001, Rev 0, Engineering Specification for Hot and Anti-Sweat Thermal Insulation.	The Basis of Design identifies a service design life of 40 years for the ancillary equipment. All non-maintainable items will be designed to last the life of the facility. The Materials for Ancillary Equipment document requires that the material selection and corrosion/erosion allowances for ancillary equipment in contact with the waste will be equal to or better than the material and corrosion allowance of the waste source vessel. The pH range and temperature of the waste are identified on the mechanical data sheets for the source vessels. Corrosion interactions with the materials are addressed by the corrosion reports for the upstream vessels (refer to the integrity assessments for the source vessels). The Thermal Insulation specification requires that all insulating materials used in the building be pre-approved for use on austenitic stainless steel in accordance with applicable ASTM procedures and tests.
Corrosion allowance is adequate for the intended service life of the ancillary equipment.	Y	24590-WTP-PER-M-02-002, Rev 0, Materials for Ancillary Equipment; 24590-WTP-DC-PS-01-001, Rev. 1, Pipe Stress Design Criteria.	ASME B31.3 is the code for the WTP piping. Consideration of corrosion, including corrosion allowance, is a mandatory requirement of ASME B31.3. As noted above, the required service life of 40 years is identified in the Basis of Design and System Description. An appropriate corrosion allowance for a 40 year service life is identified on the Mechanical Data Sheets and corrosion reports for each of the source vessels. The Materials for Ancillary Equipment document requires that downstream ancillary equipment is to be constructed of equal or better materials, and with the same corrosion allowance as the source vessel.

Pretreatment Facility (PTF) Below Grade Plant Wash Disposal System Ancillary Equipment			COGEMA-IA-002, Rev 3
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	24590-WTP-DC-PS-01-001, Rev. 1, Pipe Stress Design Criteria.	Pressure controls related to the PWD-VSL-00033/-00043/-00046 vessels themselves are discussed in their structural integrity assessments. ASME B31.3 is the design code for the WTP piping. ASME B31.3 requires provision be made to safely contain or relieve any pressure to which the piping may be subjected. ASME B31.3 piping not protected by a pressure relieving device, or that can be isolated from a pressure reliving device must be designed for at least the highest pressure that can be developed.
Maximum flows and any unusual operating stresses are identified	Y	24590-PTF-M5K-V17T-00001, Rev B, Simplified Process Flow Diagram Pretreatment Facility (Sheet 1of 2); 24590-PTF-M5K-V17T-00002, Rev B, Simplified Process Flow Diagram Pretreatment Facility (Sheet 2 of 2); 24590-PTF-M5-V17T-P0022002, Rev 1, Process Flow Diagram Pretreatment Plant Wash and Drain System PWD; 24590-WTP-DB-ENG-01-001, Rev 0, Basis of Design.	The expected flow paths for the ancillary equipment are identified on the Process Flow Diagrams. The maximum flows will be determined later in detail design; however, ASME B31.3 requires piping to be designed to the highest pressure that can be developed assuring that maximum operating stresses remain within code allowables.

Pretreatment Facility (PTF) Below Grade Plant Wash Disposal System Ancillary Equipment			COGEMA-IA-002, Rev 3
Information assessed	Y/N	Source of Information	Assessment
Ancillary equipment is designed with secondary containment that is constructed of materials compatible with the waste and of sufficient strength to prevent failure (pressure gradients, waste, climatic conditions, daily operations), provided with a leak-detection system, and designed to drain and remove liquids.	Y	24590-PTF-M6-PWD-P0002, Rev 1, P&ID-PTF Plant Wash & Disposal System Effluent Collection PWD-VSL-00033/00043/00044 (Q); 24590-PTF-M6-PWD-P0041, Rev 1, P&ID-PTF Plant Wash & Disposal System C2 Area Floor Drains Collection Vessel; 24590-PTF-M6-PWD-P0043, Rev 1, P&ID-PTF Plant Wash & Disposal System C3 Area Floor Drains; 24590-PTF-3YD-PWD-00001, Rev 0, System Description for Plant Wash and Disposal System PWD and Radioactive Liquid Waste Disposal System RLD; 24590-WTP-DB-ENG-01-001, Rev 0, Basis of Design.	The ancillary equipment considered in this assessment is located below grade within the Pretreatment facility. Tanks -00033 and -00043 are located in a (-) 45'-0" elevation pit with limited remote access. Tank -00046 is located in a C3 cell of the Pretreatment facility at elevation (-) 19'-0". Secondary containment for ancillary equipment within the cells is provided by the liners and sumps within the cells. The liners and the sumps are discussed separately in the PTF below grade secondary containment integrity assessment. Where process pipes exit cells, the secondary containment is to be either a co-axial pipeline system or an appropriately lined enclosure. All secondary containments will be provided with leak detection systems. The P&ID indicates that RLD drain lines to PWD from the High-Level Waste building are coaxial lines with leak detection.

R10045585

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BNI-Subcontracts

March 31, 2003

COGEMA-03-0101

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 PRETREATMENT FACILITY BELOW GRADE PLANT WASH AND DISPOSAL SYSTEM ANCILLARY EQUIPMENT

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 ancillary equipment will be adequately designed and that the ancillary equipment 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

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

8/27/2002
Date