Job No. 24590

Bechtel National, Inc.

SUPPLIER DOCUMENT STATUS

1. [X] **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.

REVIEWED									

G-321 Document Category N/A
[From Supplement A to G-321-E (E) or G-321-Y (V), as applicable, or "N/A" if SSRS is used]

Supersedes BNI Document No. N/A Rev. _____
[When applicable]

Accepted by D.C. Pflueger D C Pflueger 4/26/04
Print Name Signature Date

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24590-CM-HC4-HXYG-00138-02-08
REV. 00B

SUBCONTRACT SUBMITTAL

Best Available Copy

R10281663

IQRPE REVIEW –
HIGH LEVEL WASTE (HLW) FACILITY ELEVATION (-) 21'-0" HLW MELTER OFFGAS TREATMENT PROCESS (HOP) SYSTEM ANCILLARY EQUIPMENT FOR MISCELLANEOUS TREATMENT UNITS AND VESSELS

"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 (HLW) Facility Elevation (-) 21'-0" HLW Melter Offgas Treatment Process (HOP) System Ancillary Equipment for Miscellaneous Treatment Units and Vessels 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 ten (10) sheets numbered one (1) through ten (10).

John T. Baxter
Signature

04/02/2004
Date

24590-CM-HC4-HXYG-00138-02-08, REV. 00B

STRUCTURAL INTEGRITY ASSESSMENT OF THE HIGH LEVEL WASTE (HLW) FACILITY ELEVATION (-) 21'-0" HLW MELTER OFFGAS TREATMENT PROCESS (HOP) SYSTEM ANCILLARY EQUIPMENT FOR MISCELLANEOUS TREATMENT UNITS AND VESSELS

COGEMA-IA-028
REV. 1

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.

Scope	Scope of this Integrity Assessment	This integrity assessment includes: a. Ancillary equipment associated with the HLW Melter Offgas System Melter 1 Primary Offgas Scrubber (Q) Condensate Vessel as shown on drawing No. 24590-HLW-M6-HOP-P0006, Rev. 1; b. Ancillary equipment associated with the HLW Melter Offgas System Melter 2 Primary Offgas Scrubber (Q) Condensate Vessel as shown on drawing No. 24590-HLW-M6-HOP-P20006, Rev. 0 ; c. Ancillary equipment associated with the HLW Melter 1 Offgas Fluidic Air Rack HOP-RK-00025 (Q) shown on drawing 24590-HLW-M6-HOP-P0004, Rev. 1; d. Ancillary equipment associated with the HLW Melter 2 Offgas Fluidic Air Rack HOP-RK-00048 (Q) shown on drawing 24590-HLW-M6-HOP-P20004, Rev. 0; e. Ancillary equipment associated with the HLW Offgas Booster Fans (HOP-FAN-00001A/B/C shown on drawing 24590-HLW-M6-HOP-P0003, Rev. 0; f. Ancillary equipment associated with the Silver Mordenite Column (HOP-ABS-00002) shown on drawing 24590-HLW-M6-HOP-P0008, Rev. 0; g. Ancillary equipment associated with the HLW Offgas Booster Fans (HOP-FAN-00009A/B/C shown on drawing 24590-HLW-M6-HOP-P20003, Rev. 0; h. Ancillary equipment associated with the Silver Mordenite Column (HOP-ABS-00003) shown on drawing 24590-HLW-M6-HOP-P20008, Rev. 0

References	Drawings and System Description	24590-HLW-M5-V17T-P0003, Rev. 0, Process Flow Diagram HLW Vit Primary Offgas Treatment (System HOP); 24590-HLW-M5-V17T-P20003, Rev. 0, Process Flow Diagram HLW Vit Melter 2 Primary Offgas Treatment (System HOP); 24590-HLW-M6-HOP-P0006, Rev. 1, P&ID - HLW Melter Offgas System Melter 1 Primary Offgas Scrubber (Q) Condensate Vessel; 24590-HLW-M6-HOP-P20006, Rev. 0, P&ID - HLW Melter Offgas System Melter 2 Primary Offgas Scrubber (Q) Condensate Vessel; 24590-HLW-M6-HOP-P0004, Rev. 1, P&ID - HLW Melter 1 Offgas Fluidic Air Rack HOP-RK-00025 (Q); 24590-HLW-M6-HOP-P20004, Rev. 0, P&ID - HLW Melter 2 Offgas Fluidic Air Rack HOP-RK-00048; 24590-HLW-M6-HOP-P0003, Rev. 0, P&ID-HLW Melter Offgas System Melter 1 Secondary Offgas Treatment Sheet 1 of 2; 24590-HLW-M6-HOP-P0008, Rev. 0, P&ID-HLW Melter Offgas System Melter 1 Secondary Offgas Treatment Sheet 2 of 2; 24590-HLW-M6-HOP-P20003, Rev. 0, P&ID-HLW Melter Offgas System Melter 2 Secondary Offgas Treatment Sheet 1 of 2; 24590-HLW-M6-HOP-P20008, Rev. 0, P&ID-HLW Melter Offgas System Melter 2 Secondary Offgas Treatment Sheet 2 of 2; 24590-HLW-3YD-HOP-00001, Rev. 0, Systems Description for HLW Melter Offgas Treatment Process and Process Vessel Vent Extraction (HOP and PVV Systems); System Description Change Notice (SDCN), SDCN NO. 24590-HLW-3YN-HOP-00001 for System Description Number 24590-HLW-3YD-HOP-00001, Rev. 0, Systems Description for HLW Melter Offgas Treatment Process and Process Vessel Vent Extraction (HOP and PVV Systems); SDCN NO. 24590-HLW-3YN-HOP-00002 for System Description Number 24590-HLW-3YD-HOP-00001, Rev. 0; SDCN NO. 24590-HLW-3YN-HOP-00003 for System Description Number 24590-HLW-3YD-HOP-00001, Rev. 0; SDCN NO. 24590-HLW-3YN-HOP-00004 for System Description Number 24590-HLW-3YD-HOP-00001, Rev. 0

Summary of Assessment

For each item of "Information Assessed" (i.e., Criteria) on the following pages, the items listed under "Source of Information" were reviewed and found to furnish adequate design controls and requirements to assure the design intent fully satisfies the WAC requirements.

	Information Assessed	Source of Information	Discussion
Design	Ancillary equipment design standards are appropriate and adequate for the equipment's intended use.	Drawings listed above under References; 24590-WTP-DC-PS-01-001, Rev 2, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria"; ASME B31.3 Code, Process Piping, 1996 Edition, American Society of Mechanical Engineers; 24590-WTP-PSAR-ESH-01-002-04, Rev. 1a, Preliminary Safety Analysis Report (PSAR) to Support Construction Authorization; HLW Facility Specific Information	The Pipe Stress Design Criteria document identifies ASME B31.3 as the design code for piping systems of the WTP. Seismic Categories and Quality Levels vary among the ancillary equipment components. For example, the Pulse Jet Vent line shown on P&ID drawing no. 24590-HLW-M6-HOP-P0004 is Seismic Category (SC-1) and Quality Level (QL-1) to ensure continued function during normal operations, abnormal operations, and during and after a Design Basis Earthquake. Much of the ancillary equipment is Seismic Category (SC-III) and Quality Level (QL-2) as noted for example on P&ID drawing no. 24590-HLW-M6-HOP-P0006. The Seismic Categories are explained in detail in the Pipe Stress Design Criteria document. Quality Levels are discussed in the PSAR. These codes and standards are acceptable and adequate for the design of the ancillary equipment for the intended service.
	If the ancillary equipment to be used is not built to a design standard, the design calculations demonstrate sound engineering principles of construction.	24590-WTP-DC-PS-01-001, Rev 2, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria"	The ancillary equipment is built to design standards. The Pipe Stress Design Criteria document specifies that piping is to be designed in accordance with ASME B31.3.

	Information Assessed	Source of Information	Discussion
Design	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.	24590-WTP-DC-PS-01-001, Rev 2, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria"; Uniform Building Code (UBC), 1997 Edition, International Conference of Building Officials; ASME Boiler and Pressure Vessel Code, Section III, Rules for Construction of Nuclear Facility Components, Division 1, Subsection NC, Appendix N and Appendix F, 1995; 24590-WTP-VV-PS-01-001, Rev. 2, Verification and Validation Report for ME101, Linear Elastic Analysis of Piping, Version N8	The Pipe Stress Design Criteria document requires the use of the ASME B31.3 Code for piping design. ASME B31.3 requires explicit consideration of many loadings including operating pressure, operating temperature, thermal expansion/contraction, settlement, vibration, and corrosion allowance in the design of piping. Elements of the ASME B&PV Code, Section III, Division 1, Subsection NC, Appendix N and Appendix F are used to supplement the requirements of ASME B31.3 for seismic design of SC-I/SC-II piping. Similarly, ASME B&PV Code, Section III, Division 1, Subsection NC and Appendix F, and the Uniform Building Code (UBC) are used to supplement the requirements of ASME B31.3 for seismic design of SC-III/SC-IV piping. Details of the seismic design methods are discussed in the Pipe Stress Design Criteria document. Design is by hand calculations and computer codes that have been tested and approved as discussed in the Verification and Validation Report for ME101, Linear Elastic Analysis of Piping, Version N8. These are adequate and appropriate codes and standards to ensure that the ancillary equipment will have adequate strength at end of design life to withstand all anticipated loadings.

	Information Assessed	Source of Information	Discussion
Supports	Ancillary equipment supports are adequately designed.	Drawings - see references above; 24590-WTP-DC-PS-01-002, Rev 2, Pipe Support Design Criteria; 24590-WTP-PER-PS-02-001, Rev. 4, Ancillary Equipment Pipe Support Design; ASME B31.3 Code, Process Piping, 1996 Edition, American Society of Mechanical Engineers; ASME Boiler and Pressure Vessel Code, Section III, Rules for Construction of Nuclear Facility Components, Division 1, Subsection NF and Appendix F, 1995; 24590-WTP-PL-PS-01-001, Rev 1, Verification and Validation Test Plan for Bechtel's ME150 Pipe Support Family of Programs (PCFAPPS)	The Pipe Support Design Criteria considers all load types identified in ASME B31.3 and utilizes ASME Section III, Division 1, Subsection NF and Appendix F to supplement the requirements of ASME B31.3 for seismic design of SC-I/II and SC-III/IV pipe supports. Bounding load cases are passed to the pipe support designers from the results of the ancillary equipment piping stress analyses. Details of the seismic design methodology are discussed in the Pipe Support Design Criteria document. Analysis is by manual calculation and computer programs that have been tested and approved as discussed in the Verification and Validation Test Plan for Bechtel's ME150 Pipe Support Family of Programs (PCFAPPS). The Ancillary Equipment Pipe Support Design document shows examples of typical equipment supports. These are appropriate codes and standards for design of the HOP system ancillary equipment supports. Ancillary equipment supports are to be designed to allow a minimum of heat to be transferred to the building structures (building structures not to exceed 150 deg F for concrete and 200 deg F for steel). Design standards for vessel internal equipment supports are discussed in the integrity assessment for the HOP system vessels.
Connections	Seams and connections are adequately designed.	24590-WTP-DB-ENG-01-001, Rev 1A, Basis of Design; 24590-WTP-DC-PS-01-001, Rev. 2, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria"; ASME Boiler and Pressure Vessel Code, Section IX, Welding and Brazing Qualifications; ASME/ANSI B16.5, 1988 Edition, Piping Flanges and Flanged Fittings	The Basis of Design states that in-cell piping that is non-maintainable will be fully welded. The Pipe Stress Design Criteria document specifies the ASME B31.3 Process Piping design code for the piping systems. Welding is to be performed in accordance with the requirements of ASME B31.3 and the ASME B&PV Code, Section IX. Flange connections are to be designed in accordance with ANSI B16.5. These are appropriate codes and standards for design and fabrication of the HOP system ancillary equipment.

	Information Assessed	Source of Information	Discussion
Supports	The system will withstand the effects of frost heave.	System Description and SDCNs listed above under References; 24590-WTP-DC-ST-01-001, Rev. 2, Structural Design Criteria	The ancillary equipment associated with the HOP system considered in this assessment is located in below grade process cells inside the HLW Facility. The Structural Design Criteria requires that all structural foundations shall extend into the surrounding soil below the frost line to preclude frost heave. The frost line is 30 in. below grade. The HLW building foundations are not subject to frost heave; therefore, the ancillary equipment located inside the building is not subject to frost heave.
Waste Characteristics	Characteristics of the waste to be stored or treated have been identified (ignitable, reactive, toxic, specific gravity, vapor pressure, flash point, temperature)	24590-WTP-PSAR-ESH-01-002-04, Rev. 1a, Preliminary Safety Analysis Report (PSAR) to Support Construction Authorization; HLW Facility Specific Information; System Description and SDCNs listed above under References	The PSAR provides a summary of potential hazardous conditions associated with each HLW vessel and the associated ancillary equipment. Design provisions for control of these hazards are listed in the PSAR and the individual System Descriptions. The HOP System Description identifies the only safety function for ancillary equipment as providing primary confinement of the wastes during normal operations, upset conditions and during and after a SC-III Design Basis Seismic Event. Ancillary equipment associated with the Submerged Bed Scrubber (SBS) Condensate Receiver Vessels (HOP-VSL-00903 and HOP-VSL-00904) handles an acidic condensate. This condensate is collected from the offgas system Submerged Bed Scrubbers, Wet Electrostatic Precipitators and High Efficiency Mist Eliminators as shown on the Process Flow Diagrams. The primary function of the ancillary equipment associated with the HOP System is to provide a primary pressure boundary to protect facility workers from the hazardous materials in the melter offgas streams.

	Information Assessed	Source of Information	Discussion
Waste Characteristics	Ancillary equipment is designed to handle the wastes with the characteristics defined above and any treatment reagents.	24590-WTP-PER-M-02-002, Rev 1, Materials for Ancillary Equipment; System Description and SDCNs listed above under References; 24590-WTP-PER-PL-02-001, Rev. 5, Piping Material Class Description	The System Description indicates that the HOP system SBS Condensate Receiver Vessels collect acidic condensate from the offgas system Submerged Bed Scrubbers, Wet Electrostatic Precipitators and High Efficiency Mist Eliminators as shown on the Process Flow Diagrams. Additional reagents are not added to this system during normal operations. 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 vessels except as noted therein. The Piping Material Class Description lists 316L stainless steel as the material selection for the melter offgas system ancillary equipment. Reagents are not normally added to the melter offgas system ancillary equipment during normal operations.

	Information Assessed	Source of Information	Discussion
Compatibility	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.	System Description and SDCNs listed above under References; 24590-WTP-DB-ENG-01-001, Rev 1A, Basis of Design; 24590-WTP-PER-M-02-002, Rev 1, 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. Detailed material selection (corrosion) analyses are conducted for each vessel and major components in the melter offgas systems in the HLW facility during process design. 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 vessels and melter offgas system components except as noted therein. The Thermal Insulation specification requires that all insulating materials used on the outside of ancillary equipment be pre-approved for use on austenitic stainless steel in accordance with applicable ASTM procedures and tests to preclude external corrosion of ancillary equipment. Corrosion allowances are considered for all ancillary equipment, therefore, the ancillary equipment will provide the expected design service life.

	Information Assessed	Source of Information	Discussion
Corrosion Allowance	Corrosion allowance is adequate for the intended service life of the ancillary equipment.	Drawings listed above under References; 24590-WTP-DC-PS-01-001, Rev. 2, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria"; 24590-WTP-DB-ENG-01-001, Rev 1A, Basis of Design; 24590-WTP-PER-M-02-002, Rev 1, Materials for Ancillary Equipment; 24590-WTP-PER-PL-02-001, Rev. 5, Piping Material Class Description	The Pipe Stress Design Criteria document requires use of the ASME B31.3 Code for ancillary equipment design. Consideration of corrosion, including corrosion allowance, is a mandatory requirement of ASME B31.3. A required service design life of 40 years is identified in the Basis of Design for ancillary equipment located in inaccessible process cells. Detailed material selection (corrosion) analyses are conducted for each vessel and major components in the melter offgas systems in the HLW Facility during process design. The Materials for Ancillary Equipment document requires that downstream ancillary equipment is to be constructed of equal or better materials than the source vessel, and with the same corrosion allowance as the source vessel except as noted therein. Bounding corrosion allowances are listed for each piping material class in the Piping Material Class Description document. The corrosion/erosion allowance for the 316L stainless steel melter offgas system ancillary equipment is 0.040 in.
Strength	Pressure controls (vents and relief valves) are adequately designed to ensure pressure relief if normal operating pressures in the vessels are exceeded.	Drawings listed above under References; 24590-WTP-DC-PS-01-001, Rev. 2, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria"; 24590-WTP-PER-PL-02-001, Rev. 5, Piping Material Class Description	The Pipe Stress Design Criteria document specifies use of ASME B31.3 as 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. Bounding pressure and temperature limits are listed for each of the piping material classes in the Piping Material Class Description document.

	Information Assessed	Source of Information	Discussion
	Maximum flows and any unusual operating stresses are identified	Drawings listed above under References; 24590-WTP-DC-PS-01-001, Rev 2, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria"; 24590-WTP-PER-PL-02-001, Rev. 5, Piping Material Class Description	The expected flow paths for the ancillary equipment are identified on the P&ID drawings. The Pipe Stress Design Criteria document specifies the ASME B31.3 code for piping design. This code requires piping to be designed to the highest pressure that can be developed in a piping system assuring that maximum operating stresses remain within code allowables. The Piping Material Class Description document lists the bounding pressure and temperature limits for each piping material class.
Secondary Containment	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.	Drawings, System Description and SDCNs listed above under References	The ancillary equipment considered in this assessment is located in inaccessible below grade process cells and the secondary offgas room inside the HLW Facility. Secondary containment for ancillary equipment within the cells is provided by the liners and sumps as appropriate and is outside the scope of this integrity assessment.