Bechtel National, 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.

REVIEWED										

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

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

	Print Name	Signature	Date
Accepted by	Lisa Han		4/27/04
Released by [When applicable]	N/A		

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24590-CM-HC4-HXYG-00138-02-00026

REV. 00A

SUBCONTRACT SUBMITTAL

R10307330

IQRPE REVIEW
OF
THE HIGH LEVEL WASTE (HLW) FACILITY EL 0'-0" MELTER OFFGAS TREATMENT PROCESS SYSTEM (HOP) MISCELLANEOUS TREATMENT UNITS

"I, Fred Porter, 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 EL 0'-0" Melter Offgas Treatment Process System (HOP) Miscellaneous Treatment Units 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 9 pages numbered 1 through 9.

FRED E. PORTER
STATE OF WASHINGTON
11689
REGISTERED
PROFESSIONAL ENGINEER

Expires on 12/8/05

Fred E Porter
Signature

APRIL 27, 2004
Date

24590-CM-HC4-HXYG-00138-02-00026, REV. 00A

Best Available Copy

STRUCTURAL INTEGRITY ASSESSMENT OF THE HIGH LEVEL WASTE (HLW) FACILITY EL 0'-0" MELTER OFFGAS TREATMENT PROCESS SYSTEM (HOP) MISCELLANEOUS TREATMENT UNITS

COGEMA-IA-052

REV. 0

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	The scope of this integrity assessment includes Melter 1/2 Primary Offgas Treatment Process System (HOP) Submerged Bed Scrubbers (SBS) HOP-SCB-00001/2, High Efficiency Mist Eliminators (HEME) HOP-HEME-00001A/1B/2A/2B, HEPA Preheaters HOP-HTR-00001B/2A/5A/5B, HEPA Filters HOP-HEPA-00001A/2A/1B/2B/7A/8A/7B/8B and Secondary Offgas Process System Plate Heat Exchangers HOP-HX-00002/4.
References	Drawings, Mechanical Systems Data Sheets, Mechanical Data Sheets, Plant Item Material Selection Data Sheets, Engineering Specifications, System Description and System Description Change Notices.	Drawing:24590-HLW-M5-V17T-P0003, Rev. 0, Process Flow Diagram HLW Vitrification Melter 1 Primary Offgas Treatment (System HOP) ; Drawing:24590-HLW-M5-V17T-P20003, Rev. 0, Process Flow Diagram HLW Vitrification Melter 2 Primary Offgas Treatment (System HOP); Drawing:24590-HLW-M5-V17T-P0004, Rev. 1, Process Flow Diagram HLW Vitrification Melter 1 Secondary Offgas Treatment (System HOP) ; Drawing:24590-HLW-M5-V17T-P20004, Rev.0, Process Flow Diagram HLW Vitrification Melter 2 Secondary Offgas Treatment (System HOP) ; Drawing:24590-HLW-P1-P01T-P0002, Rev. 2, HLW Vitrification Building General Arrangement Plan at EL. 0'-0"; Drawing:24590-HLW-P1-P01T-P0008, Rev. 6, HLW Vitrification Building General Arrangement Sections A-A, B-B & C-C; Drawing:24590-HLW-P1-P01T-P0009, Rev. 5, HLW Vitrification Building General Arrangement Sections D-D,E-E & F-F; Drawing:24590-HLW-P1-P01T-P0010, Rev. 5, HLW Vitrification Building General Arrangement Sections G-G & H-H; Drawing:24590-HLW-P1-P01T-P0011, Rev. 6, HLW Vitrification Building General Arrangement Sections J-J & K-K; Drawing 24590-HLW-MK-HOP-00001001,1002,1003,1004, Rev. 1, Equipment Assembly HLW Submerged Bed Scrubber HOP-SCB-00001 (Q) & -00002 (Q) Sheets 1 thru 4 ; Drawing 24590-HLW-MV-HOP-00002001,2002,2003, Rev.0, Equipment Assembly HLW Primary Offgas HEME, HOP-HEME-00001A/B (Q) & -00002A/B Sheets 1 thru 3 ; Plant Item Material Selection Data Sheet: 24590-HLW-N1D-HOP-P0010, Rev. 0, Melter 1&2 Submerged Bed Scrubber (SBS) HOP-SCB-00001/2 (HLW); Plant Item Material Selection Data Sheet: 24590-HLW-N1D-HOP-P0001, Rev. 0, Melter 1&2 High Efficiency Mist Eliminator (HEME) HOP-HEME-00001A/1B/2A/2B (HLW); Plant Item Material Selection Data Sheet: 24590-HLW-N1D-HOP-P0007, Rev. 0, Silver Mordenite Preheater (Plate Heat Exchanger) HOP-HX-00002 & HOP- HX-00004 (HLW);

References	Drawings, Mechanical Systems Data Sheets, Mechanical Data Sheets, Plant Item Material Selection Data Sheets, Engineering Specifications, System Description and System Description Change Notices.(continued from above)	Mechanical Systems Data Sheet: SBS, 24590-HLW-MKD-HOP-00016, Rev. 1, HLW Submerged Bed Scrubbers HOP-SCB-00001/2 ; Mechanical Data Sheet: HEME, 24590-HLW-MVD-HOP-00007, Rev. 0, HLW Primary Offgas HEME HOP-HEME-00001A/1B/2A/2B ; Mechanical Data Sheet: HEPA Preheater, 24590-HLW-MED-HOP-00013, Rev. B, HEPA Preheaters HOP-HTR-00001B/2A/5A/5B ; Remote-Change HEPA Filter Housing Data Sheet: 24590-HLW-MAD-HOP-P0010 thru 017, Rev. 0, HEPA Filters HOP-HEPA-00001A/2A/1B/2B/7A/8A/7B/8B ; Mechanical Data Sheet: Plate Heat Exchanger, 24590-HLW-MED-HOP-00012, Rev. D, Plate Heat Exchanger HOP-HX-00002 ; Mechanical Data Sheet: Plate Heat Exchanger, 24590-HLW-MED-HOP-00017, Rev. C, Plate Heat Exchanger HOP-HX-00004 ; Engineering Specification for Pressure Vessel Design and Fabrication (SBS & HEME), 24590-WTP-3PS-MV00-T0001 ; Engineering Specification for HEPA Filter Preheaters: 24590-HLW-3PS-MEE0-T0001, Rev. A ; Engineering Specification for HEPA Filters: 24590-WTP-3PS-MKH0-TP002, Rev. 0 ; System Description for HLW Melter Offgas Treatment Process and Process Vent Extraction (HOP and PVV Systems); 24590-HLW-3YD-HOP-00001, Rev. 0 ; System Description Change Notices for System Description No. 24590-HLW-3YD-HOP-00001, Rev. 0: SDCN No. 24590-HLW-3YN-HOP-00001 ; SDCN No. 24590-HLW-3YN-HOP-00002 ; SDCN No. 24590-HLW-3YN-HOP-00003 ; SDCN No. 24590-HLW-3YN-HOP-00004 ;

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	Assessment
Design	Plant Item design standards are appropriate and adequate for the vessel's intended use.	Drawings, Mechanical Systems Data Sheets, Mechanical Data Sheets, Plant Item Material Selection Data Sheets and Engineering Specifications listed above under references; ASME AG-1-1997, Code on Nuclear Air and Gas Treatment; ASME AG-1a-2000, Addenda to ASME AG-1-1997, Code on Nuclear Air and Gas Treatment; ASME N509-1989, Nuclear Power Plant Air-Cleaning Units and Components; ASME Boiler & Pressure Vessel (B & PV) Code, Section VIII, Div. 1, Rules for Construction of Pressure Vessels.	Submerged Bed Scrubbers (HOP-SCB-00001/2), High Efficiency Mist Eliminators (HOP-HEME-00001A/1B/-2A/2B), HEPA Preheaters (HOP-HTR-00001B/2A/5A/5B) and HEPA Filters (HOP-HEPA-00001A/2A/1B/2B/7A/8A/7B/8B) are components of the Melter 1/2 Primary Offgas Treatment System (HOP). The Plate Heat Exchangers (HOP-HX-00002/4) are components of the Melter 1/2 Secondary Offgas Treatment System (HOP). Miscellaneous Treatment Units (MTUs) located in C5/R5 Remote Operating Areas include: Submerged Bed Scrubber (SBS) HOP-SCB-00001 and High Efficiency Mist Eliminators (HEME) HOP-HEME-00001A/1B located in Melter 1 Cave H-0117 as shown on HLW Vitrification Building General Arrangement Plan At EL. 0'-0" and Elevations At Section D-D & J-J; Submerged Bed Scrubber (SBS) HOP-SCB-00002 and High Efficiency Mist Eliminators (HEME) HOP-HEME-00002A/2B located in Melter 2 Cave H-0106 as shown on HLW Vitrification Building General Arrangement Plan At EL. 0'-0" and Elevation At Section J-J; HEPA Filter Preheaters HOP-HTR-00001B/2A/5A/5B and HEPA Filters HOP-HEPA-00001A/2A/1B/2B/7A/8A/7B/8B located in Filter Cave H-0104 as shown on HLW Vitrification Building General Arrangement Plan At EL 0'-0" and Elevations at Sections A-A, J-J & K-K. MTUs located in C3/R3 Contact Maintenance Areas include: Plate Heat Exchangers HOP-HX-00002/4 located in Room H-A123 as shown on HLW Vitrification Building Arrangement Plan At EL.0'-0"and Elevation at Section H-H. The Engineering Specifications for Design and Fabrication of MTUs in the Primary and Secondary Offgas Treatment Systems requires that these units be designed, fabricated, and tested in accordance with a consistent set of requirements taken from ASME AG-1-1997, ASME AG-1a-2000 and ASME N509-1989.

	Information Assessed	Source of Information	Assessment
Design	Plant Item design standards are appropriate and adequate for the Plant Item's intended use. (continued from above)	See items listed above.	The pressure containment boundaries are to be designed in accordance to ASME B & PV Code, Section VIII, Div. 1. Supplementary requirements are specified in Engineering Specifications and Mechanical Data Sheets for the MTUs. The supplementary requirements include structural design requirements, positive material identification, fabrication tolerances, welding procedures, welder qualifications and testing records, NDE inspections and records, shipping, handling and storage requirements. The MTUs are identified as Quality Level (QL-2) and Seismic Category (SC-I/SC-II/SC-III) in the Mechanical System Data Sheets and Specifications. These design requirements are appropriate for pressure vessels operating over the pressure and temperature ranges specified for these vessels.
	If a non-standard Plant Item is to be used, the design calculations demonstrate sound engineering principles of construction.	Mechanical Systems Data Sheets and Engineering Specifications listed above under References ; ASME AG-1-1997,Code on Nuclear Air and Gas Treatment ; ASME AG-1a-2000, Addenda to ASME AG-1-1997, Code on Nuclear Air and Gas Treatment ; ASMS Boiler & Pressure (B & PV) Code, Section VIII, Div. I, Rules for Construction of Pressure Vessels.	The MTUs in the Primary and Secondary Offgas Systems (HOP) noted above are standard offgas treatment assemblies that are shop fabricated. The Mechanical Systems Data Sheets and Specifications require that the ASME AG-1/1a and ASME B & PV Code, Section VIII, Div. 1 assemblies be delivered after design, fabrication, inspection, and testing. Design standards for the MTUs are appropriate and adequate for the intended service.

	Information Assessed	Source of Information	Assessment
Design	Plant Item has adequate strength, after consideration of the corrosion allowance, to withstand the operating pressure, operating temperature, and seismic loads.	Drawings, Mechanical Systems Data Sheets and Engineering Specifications listed above under references ; 24590-WTP-3PS-SS90-T0001, Rev. 0, Engineering Specification for Seismic Category 1 / II Equipment and Tanks ; 24590-WTP-3PS-FB01-T0001, Rev. 0, Engineering Specification for Structural Design Loads for Seismic Category III and IV Equipment and Tanks ; ASME Boiler & Pressure Vessel (B & PV) Code, Section VIII, Div. 1, Rules for Construction of Pressure Vessels ; ASME AG-1-1997, Code on Nuclear Air and Gas Treatment ; ASME AG-1a-2000, Addenda to ASME AG-1-1997, Code on Nuclear Air and Gas Treatment ; Uniform Building Code (UBC), 1997, International Conference of Building Officials.	The Mechanical Systems Data Sheets for MTUs identify the operating pressure and temperature ranges, the materials selected for the MTU shells and internal supports, the corrosion allowance(s), and the quality levels which determine the requirements for seismic design. The Engineering Specifications for the MTUs require specific consideration of the operating pressures and temperatures and seismic loads in the design process. ASME B & PV Code, Section VIII, Div. 1 requires that corrosion allowance material not be considered when evaluating the adequacy of MTU components for these loads at end of life. Detailed requirements for seismic design of the MTUs are furnished in the Engineering Specifications for Structural Design Loads for Seismic Category I/II and III and IV Equipment and Tanks. Seismic design loads are taken from the UBC and Level C service limits are taken from ASME AG-1 and ASME B & PV Code, Section VIII, Div. 1. These codes and standards are adequate and appropriate for design of the MTUs to withstand operating pressure and temperature loads and seismic loads for the specified design life while considering corrosion allowance.
Foundation	MTU foundation will maintain the load of a full MTU.	Drawings, Mechanical Data Sheets and Engineering Specifications listed above under references; ASME Boiler & Pressure Vessel (B & PV) Code, Section VIII, Div. 1, Rules for Construction of Pressure Vessels; 24590-WTP-DC-ST-01-001, Rev. 2, Structural Design Criteria	Design and Fabrication of MTUs that require Support Frames are to be in accordance with the Mechanical Data Sheets and the Structural Design Criteria. MTUs that utilize support skirts are designed in accordance with the requirements of the ASME B&PV Code, Section VIII. The codes and standards listed in the Mechanical Data Sheets and the Engineering Specifications are adequate and appropriate for design of the MTU support frames.

	Information Assessed	Source of Information	Assessment
Foundation	If in an area subject to flooding, the Plant Item is anchored.	Drawings, Mechanical System Data Sheets, Engineering Specifications, System Descriptions, and System Description Change Notices listed above under references ; ASME Boiler & Pressure Vessel (B & PV) Code, Section VIII, Div. I, Rules for Construction of Pressure Vessels ; ASME AG-1-1997, Code on Nuclear Air and Gas Treatment ; ASME AG-1a- 2000, Addenda to ASME AG-1-1997, Code on Nuclear Air and Gas Treatment ; Uniform Building Code (UBC), 1997, International Conference of Building Officials.	Primary Offgas System SBS and HEME Treatment Units located in Melter 1 Cave (H-0117) and Melter 2 Cave (H-0106) are a part of the Melter Offgas Treatment System (HOP). The Melter 1/2 Caves are lined and have sumps which will contain and allow removal of liquids. These MTUs are designed for a flood load case in accordance with their Engineering Specifications. HEPA Preheaters and HEPA Filters are located in HEPA Filter Cave (H-0104) and are components in the Melter 1/2 Primary Offgas Treatment System (HOP). These units receive offgas from SBS and HEME. HEPA Filter Cave (H-0104) MTUs do not contain liquids, therefore there are no local sources of liquids to flood the cell. Design for flooding is not a required load case in HEPA Preheater and HEPA Filter design and fabrication. Secondary Offgas System Treatment Units, Plate Heat Exchangers, are located in Room H-A123. These MTUs are gas/gas heat exchangers. They receive offgas from HEPA filters in the Primary Offgas System and offgas from the Silver Mordenite Column in the Secondary Offgas System. Room H-A123 contains only offgas system components, therefore there are no local sources of liquid to flood the room except for water from the sprinkler system. Design for flooding is not a required load case in the Plate Heat Exchanger Engineering Specification.
Frost Heave	Plant Item system will withstand the effects of frost heave.	Drawings listed above under references; 24590-WTP-DC-ST-01-001, Rev. 0, Structural Design Criteria	The Structural Design Criteria document requires that all structural foundations extend a distance below grade that exceeds the 30 in. depth of the frost line in order to preclude frost heave. Primary and Secondary Offgas System MTUs are located in the HLW Vitrification Building at EL. 0'-0" which is not subject to frost heave, therefore the MTUs are not subject to frost heave.

	Information Assessed	Source of Information	Assessment
Waste Characteristics	Characteristics of the waste to be stored or treated have been identified (ignitable, reactive, toxic, specific gravity, vapor pressure, flash point, storage temperature)	Mechanical Systems Data Sheets, Plant Item Material Selection Data Sheets, System Descriptions and System Description Change Notices listed above under References	The Mechanical Systems Data Sheets present the offgas specific gravity, operating temperatures and pressures. The Plant Item Material Selection Data Sheets address the chemical composition of the offgas and the normal operation and potential accident temperatures to select appropriate MTU materials and specify the corrosion allowance. The main safety function of the MTUs is to provide protection for the facility workers from the hazardous gases in the Melter 1/2 offgas Systems.The System Description identifies that the offgas in the MTUs is hazardous, but not ignitable or flammable. Primary Offgas System treatment includes: Removal of radioactive particulate and reduction of offgas temperatures in the SBS, removal of radioactive aerosols in the HEME, Preheat Offgas prior to HEPA filtration, provide particulate removal with HEPA filtration, and deliver Primary Offgas to the gas/gas counter-current flow Plate Heat Exchangers in the Secondary Offgas System. MTU vessel design is required to provide an intact housing pressure boundary during normal and abnormal operations and during and after design level seismic events.
	Plant Item is designed to store or treat the wastes with the characteristics defined above and any treatment reagents.	Plant Item Material Selection Data Sheet, Engineering Specifications, System Description and System Description Change Notices listed above under References	The Plant Item Material Selection Data Sheets and Engineering Specifications demonstrate that the MTUs are designed to process the Melter 1/2 Primary and Secondary offgas as discussed above. The System Descriptions discusses normal and abnormal operating conditions for Treatment Units in the offgas systems.
Compatibility	The waste types are compatible with each other.	Drawings, System Description and System Description Change Notices listed above under References;	The System Description for the HLW Melter Offgas Treatment Process (HOP) System does not describe any operations where incompatible wastes are mixed in these Treatment Units.

	Information Assessed	Source of Information	Assessment
Corrosion	Plant Item material and protective coatings ensure the plant item structure is adequately protected form the corrosive effects of the waste stream and external environments (expected to not leak or fail for the design life of the system)	Mechanical Systems Data Sheets, Mechanical Data Sheets, Engineering Specifications and Plant Item Material Selection Data Sheets listed above under References; ASME AG-1-1997, Code on Nuclear Air and Gas Treatment; ASME AG1a-2000, Addenda to ASNE AG-1-1997 Code on Nuclear Air and Gas Treatment.	The Plant Item Material Selection Data Sheet for Melter 1&2 Submerged Bed Scrubbers (SBS) recommends selection of UNS N06022, hereinafter referred to as Alloy 22, to provide improved resistance to pitting corrosion, stress corrosion cracking, and crevice corrosion. The Plant Item Material Selection Data Sheet for Melter 1&2 High Efficiency Mist Eliminators (HEME) recommends selection of UNS No. N08367, hereinafter referred to as AL6XN 6 % Mo, to provide improved resistance to pitting, stress corrosion cracking, crevice corrosion, and vapor phase corrosion. The Mechanical Data Sheet for HEPA Filter Preheaters recommends selection of Type 316L stainless steel for Plenum and Element Pockets, and Carbon Steel for Shield Plate and Mounting Frame materials, in accordance with the Engineering Specification for HEPA Filter Preheaters. The Engineering Specification for HEPA Filters specifies materials of construction shall conform to ASME AG-1,Section FC, Article 3000 with Type 304L stainless steel for HEPA Filter case material. The Plant Item Material Selection Data Sheet for Plate Heat Exchangers (Silver Mordenite Preheater) recommends selection of 316 (max 0.030% C; dual certified), hereinafter referred to as 316L (S31603), to provide improved resistance to pitting. The material recommendations from the Plant Item Material Selection Data Sheets have been adequately and appropriately incorporated into the Mechanical Systems Data Sheets for the specified MTUs.

	Information Assessed	Source of Information	Assessment
Corrosion Allowance	Corrosion allowance is adequate for the intended service life of the plant item.	Mechanical Systems Data Sheets, Mechanical Data Sheets, Engineering Specifications and Plant Item Material Selection Data Sheets listed above under references.	The basis for material selection and corrosion allowance is furnished in the Mechanical System Data Sheets, Mechanical Data Sheets, Engineering Specifications and Plant Item Material Selection Data Sheets for the following MTUs: Submerged Bed Scrubber (SBS); Material Alloy 22 with a corrosion allowance of 0.080 in. High Efficiency Mist Eliminator (HEME); Material AL6XN 6% Mo with a corrosion allowance of 0.040 in. HEPA Filter Preheater Plenum and Element Pocket; Material 304-L with 0.04 corrosion allowance. HEPA Filter Case; Material 304-L with no corrosion allowance Specified. Plate Heat Exchanger; Material 316L (S31603) with no corrosion allowance. Corrosion allowances for a service life of 40 years are adequate and appropriate.
Pressure Relief	Pressure controls (vents and relief valves) are adequately designed to ensure pressure relief if normal operating pressures in the plant items are exceeded.	Drawings, Mechanical Systems Data Sheets, Plant Item Material Selection Data Sheets, System Description and System Description Change Notices listed above under references;	The System Description provides a discussion of the normal operating conditions for the HLW Melter Offgas Treatment Process (HOP System) which is less than the internal and external design pressures listed on the Mechanical System Data Sheets for Treatment Units in the Primary and Secondary Offgas Systems. Therefore, the MTUs are designed for pressures which are higher than the pressure capabilities of the offgas system extraction fans.