24590-CM-HC4-HXYG-00138	- 02 - 00025	00B
PO/SCT	Submittal	Rev

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-V (V), as applicable, or "N/A" if SSRS is used]

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

Accepted by DC Pfluger [signature] 9/8/04
Print Name Signature Date

Released by N/A
[When applicable] Print Name Signature Date

TP0406_34 7-04

SUBCONTRACT SUBMITTAL

Best Available Copy

R10375550

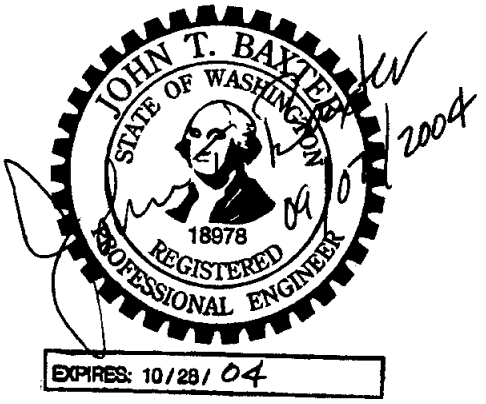
IQRPE REVIEW
OF
HIGH-LEVEL WASTE (HLW) FACILITY HLW MELTER OFFGAS TREATMENT PROCESS (HOP) SYSTEM ELEVATIONS 0'-0" TO 58'-0" MISCELLANEOUS TREATMENT UNITS (MTUS) ANCILLARY EQUIPMENT
(COGEMA-IA-050, REV. 1)

"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 HLW Melter Offgas Treatment Process (HOP) System Elevations 0'-0" to 58'-0" Miscellaneous Treatment Units (MTUs) 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 eleven (11) pages numbered one (1) through eleven (11).



John T. Baxter
Signature

09/07/2004
Date

24590-CM-HC4-HXYG-00188-02-00025 REV.00B

STRUCTURAL INTEGRITY ASSESSMENT OF THE HIGH-LEVEL WASTE (HLW) FACILITY HLW MELTER OFFGAS TREATMENT PROCESS (HOP) SYSTEM ELEVATIONS 0'-0" TO 58'-0" MISCELLANEOUS TREATMENT UNITS (MTUS) ANCILLARY EQUIPMENT (COGEMA-IA-050, REV. 1)

COGEMA-IA-050
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 ancillary equipment shown on the P&ID drawings listed below under References.
References	Drawings	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-P0001, Rev. 0, P&ID - HLW Melter Offgas System Melter 1 Primary Offgas Scrubber; 24590-HLW-M6-HOP-P20001, Rev. 0, P&ID - HLW Melter Offgas System Melter 2 Primary Offgas Scrubber; 24590-HLW-M6-HOP-P0002, Rev. 0, P&ID-HLW Melter Offgas System Melter 1 Primary Offgas WESP; 24590-HLW-M6-HOP-P20002, Rev. 0, P&ID-HLW Melter Offgas System Melter 2 Primary Offgas WESP; 24590-HLW-M6-HOP-P0009, Rev. 0, P&ID-HLW Melter Offgas System Melter 1 Primary Offgas HEME; 24590-HLW-M6-HOP-P20009, Rev. 0, P&ID-HLW Melter Offgas System Melter 2 Primary Offgas HEME; 24590-HLW-M6-HOP-P0010, Rev. 0, P&ID-HLW Melter Offgas System Melter 1 Primary Offgas HEPA Filters; 24590-HLW-M6-HOP-P20010, Rev. 0, P&ID-HLW Melter Offgas System Melter 2 Primary Offgas HEPA Filters;

References	System Description	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 Systems Description for HLW Melter Offgas Treatment Process and Process Vessel Vent Extraction (HOP and PVV Systems) SDCN NO. 24590-HLW-3YN-HOP-00003 for Systems Description for HLW Melter Offgas Treatment Process and Process Vessel Vent Extraction (HOP and PVV Systems); SDCN NO. 24590-HLW-3YN-HOP-00004 for Systems Description for HLW Melter Offgas Treatment Process and Process Vessel Vent Extraction (HOP and PVV Systems)

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 3, 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 and ancillary equipment systems of the WTP. Seismic Categories and Quality Levels vary among the ancillary equipment components. The PSAR identifies that the Primary Offgas Treatment System ductwork has a safety design significant function to provide confinement of hazardous melter offgas to protect the public, co-located workers, and facility workers. Most of the ancillary equipment is Seismic Category (SC-III) and Quality Level (QL-2) so that it can provide the confinement function during normal operations as discussed in the PSAR. The Seismic Categories and Quality Levels are explained in detail in the Pipe Stress Design Criteria document. 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 3, 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 3, 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 Test Plan/Test 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 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 Test Plan/Test 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 3, 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 Primary HOP system MTUs 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.

	Information Assessed	Source of Information	Discussion
Connections	Seams and connections are adequately designed.	24590-WTP-DB-ENG-01-001, Rev 1B, Basis of Design; 24590-WTP-DC-PS-01-001, Rev. 3, 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; 24590-WTP-3PS-PF00-T0001, Rev. 2, Engineering Specification for Process Jumper Fabrication for PT and HLW	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. HOP system ancillary equipment is located in the Melter Caves and surrounding process cells to provide for remote maintenance. Remote connection jumpers are designed and fabricated in accordance with the Engineering Specification for Process Jumper Fabrication. These are appropriate codes and standards for design and fabrication of the HOP system ancillary equipment seams and connections.
Frost Heave	The system will withstand the effects of frost heave.	System Description and SDCNs listed above under References; 24590-WTP-DC-ST-01-001, Rev. 3, Structural Design Criteria	The ancillary equipment associated with the HOP system considered in this assessment is located in the Melter Caves, a Filter Cave, Active Service Duct Areas, and a Secondary Offgas Room 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.

	Information Assessed	Source of Information	Discussion
Waste Characteristics	Characteristics of the waste to be stored or treated have been identified (ignitable, reactive, toxic, specific gravity, vapor pressure, flash point, temperature)	System Description listed above under References; 24590-WTP-PER-PR-03-002, Rev. 1, Toxic Vapors and Emissions from WTP Tank Systems and Miscellaneous Treatment Unit Systems	The HOP System Description identifies the only important to safety function for the HOP System Miscellaneous Treatment Units ancillary equipment is confinement of hazardous melter offgas to protect the public, co-located workers, and facility workers. This function is required during normal operations. This function is discussed in more detail in the Toxic Vapors and Emissions from WTP Systems and Miscellaneous Treatment Unit Systems document. Ancillary equipment shown on drawings 24590-HLW-M6-HOP-P0001, -P20001, -P0002, -P20002, -P0009 and –P20009 handle acidic offgas and offgas condensate. As discussed in the System Description, by the time the offgas reaches the Primary Offgas System HEPA filters (HEPAs) it is brought above the dew point by the preheaters and contains relatively small quantities of acid gases, toxic vapors (primarily NOx) and radioactive particulates.
	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 Primary HOP system Submerged Bed Scrubbers, WESPs, and HEMEs process wet melter offgas containing acids. 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 System Description indicates that the HEMEs are cleaned at intervals using deionized water sprays. Both the WESPs and the HEMEs can be filled with dilute nitric acid to enhance removal of solids. These soak solutions are disposed to the SBS Condensate Receiver Vessels.

	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.	Drawings, System Description and SDCNs listed above under References; 24590-WTP-DB-ENG-01-001, Rev 1B, 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 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. Ancillary equipment associated with the HLW melters and the SBSs are to be fabricated from Hastelloy C-22 (UNS N06022) which is highly resistant to the acid offgas and offgas condensate. Ancillary equipment associated with the WESPs and HEMEs is to be fabricated from AL6XN 6% Mo stainless steel (UNS N08367) which has more resistance to acids than 316L stainless steel, but less than Hastelloy C-22. The concentration of acid in the offgas at the HEMEs is much lower than that at the SBSs. Ancillary equipment associated with the Primary Offgas HEPAs is to be fabricated with 316L stainless steel from the intake duct at the preheater to the exhaust line. Offgas in the HEPAs is maintained above the dew point by the preheater. 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. 3, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria"; 24590-WTP-DB-ENG-01-001, Rev 1B, 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 allowance for Hastelloy C-22 ancillary equipment is 0.040 in. The corrosion allowance for AL-6XN 6% Mo stainless steel is 0.0425 in. and the corrosion/erosion allowance for the 316L stainless steel ancillary equipment is 0.040 in. These corrosion allowances are adequate to provide the intended service life.

	Information Assessed	Source of Information	Discussion
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. 3, 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. The offgas ductwork considered in this assessment operates slightly below atmospheric pressure.
	Maximum flows and any unusual operating stresses are identified	Drawings listed above under References; 24590-WTP-DC-PS-01-001, Rev 3, 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&IDs. 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.

	Information Assessed	Source of Information	Discussion
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 Melter Caves, a Filter Cave, Active Service Duct Areas, and a Secondary Offgas Room inside the HLW Facility. Secondary containment for ancillary equipment within the caves and rooms is provided by the liners and sumps within these areas as appropriate, which are outside the scope of this integrity assessment.