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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 (Print Name) DC Pfluger (Signature) 10/27/04 (Date)

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

TP0406_34 7-04

SUBCONTRACT SUBMITTAL

R10404415

IQRPE REVIEW
OF
THE HIGH-LEVEL WASTE (HLW) FACILITY
PROCESS VESSEL VENT EXTRACTION SYSTEM (PVV)
ANCILLARY EQUIPMENT

"I, Tarlok Hundal, 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 Process Vessel Vent Extraction System (PVV) 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 nine (9) pages numbered one (1) through nine (9).

TARLOK SINGH HUNDAL
STATE OF WASHINGTON
20213
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES: 02/15/06

Signature

10/25/04
Date

24590-CM-HC4-HXYG1-00138-02-00010 Rev. 00A

STRUCTURAL INTEGRITY ASSESSMENT OF THE HIGH-LEVEL WASTE (HLW) FACILITY PROCESS VESSEL VENT EXTRACTION SYSTEM (PVV) ANCILLARY EQUIPMENT

COGEMA-IA-074
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	This Integrity Assessment includes the PVV ancillary equipment associated with various vessels, breakpots, siphon breaks, plant wash racks, and demisters located in HLW facility and as shown on the Drawings and as described in the System Description document listed in the References below.
References	Drawings and System Description	Drawings: 24590-HLW-M6-PVV-P0001, Rev. 0, P&ID – HLW Process Vessel Vent Exhaust System, Sheet 1 of 2; 24590-HLW-M6-PVV-P20001, Rev. 0, P&ID – HLW Process Vessel Vent Exhaust System Sheet 2 of 2; 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)- including System Description Change Notice (SDCN) Nos. 24590-HLW-3YN-HOP-00001,-00002,-00003, and -00004, against 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 ensure the design intent fully satisfies the requirements of Washington Administrative Code, WAC-173-303-640, *Dangerous Waste Regulations* for Tank Systems.

	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 systems for the WTP. The P&ID drawings identify the varying Seismic Categories and Quality Levels of the ancillary equipment components. To ensure continued function during normal operations, abnormal operations, and during and after a Design Basis Earthquake, the design requirements for all various Seismic Categories (SC-I, II, III, and IV) are discussed in detail in the Pipe Stress Design Criteria document. The Quality Levels are discussed in the PSAR. The above listed design criteria, codes, and standards are acceptable and adequate for the design of the ancillary equipment for its intended use.
	If the ancillary equipment to be used is not built to a design standard, the design calculations demonstrate sound engineering principles of construction.	ASME B31.3 Code, Process Piping, 1996 Edition, American Society of Mechanical Engineers; 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 Code.

	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"; 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, Code Case N-411, 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; 24590-WTP-DB-ENG-01-001, Rev. 1B, Basis of Design; 24590-WTP-PER-M-02-002, Rev. 1, Materials for Ancillary Equipment; DOE-STD-1020-94, Natural Phenomenon Hazards Design Evaluation Criteria for Department of Energy Facilities (including Change Notice #1, January 1996); UBC, Uniform Building Code, 1997 Edition.	The Basis of Design document specifies that the mechanical equipment is to be designed for a nominal plant life of 40 years. The Materials for Ancillary Equipment document specifies that ancillary equipment downstream of a waste source vessel or miscellaneous plant items is to be constructed of the same or better material and with the same corrosion allowance as the source vessel or plant items, unless the service seen in the downstream line warrants a different material, corrosion allowance, or other modification. The Pipe Stress Design Criteria requires the use of the ASME B31.3 Code and DOE-STD-1020-94 Standard, for piping design. ASME B31.3 requires explicit consideration of operating pressure, operating temperature, thermal expansion and contraction, settlement, vibration, and corrosion allowance in the design of piping. ASME BPV Code, Section III, Code Case N-411, Subsection NC, Appendix N, and Appendix F, and the Uniform Building Code (UBC) are used to supplement the requirements of ASME B31.3 and DOE-STD-1020-94 for design as applicable to the appropriate Seismic Category of the ancillary equipment. Details of the seismic design methods are discussed in the Pipe Stress Design Criteria document. These are appropriate and adequate codes and standards to ensure that the ancillary equipment has adequate strength at the end of its design life to withstand all anticipated loads.

	Information Assessed	Source of Information	Discussion
Supports	Ancillary equipment supports are adequately designed.	Drawings listed above under References; 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. The Ancillary Equipment Pipe Support Design document shows examples of typical equipment supports. Ancillary equipment supports are to be designed in such a way that the heat transferred from supports to the building structure does not raise the building structure temperature to exceed 150°F for concrete and 200°F for steel. These are appropriate codes and standards for design of the PVV system ancillary equipment supports.

Information Assessed		Source of Information	Discussion
Connections	Seams and connections are adequately designed.	24590-WTP-DB-ENG-01-001, Rev. 1B, Basis of Design; ASME B31.3 Code, Process Piping, 1996 Edition, American Society of Mechanical Engineers; 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.	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 PVV system ancillary equipment seams and connections.
Frost Heave	The system will withstand the effects of frost heave.	Drawings and System Description listed above under References; 24590-WTP-DC-ST-01-001, Rev. 4, Structural Design Criteria.	Structural Design Criteria requires that all structural foundations for outdoor equipment shall extend into the surrounding soil below the 30" frost line depth to preclude the frost heave. The ancillary equipment associated with the PVV system considered in this assessment is located in the inside interior of the HLW Facility. The majority of the HLW building foundation mat is at Elev. (-) 21'-0" level, therefore, the ancillary equipment 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)	Drawings and 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; 24590-WTP-PER-PR-03-001, Rev. 1, Prevention of Hydrogen Accumulation in WTP Tank Systems and Miscellaneous Treatment Unit Systems.	The PVV System Description identifies the only safety function for the PVV vessel offgas lines and headers shown on the P&ID drawings as providing primary confinement of the vessels offgases during normal operations, abnormal operations, and during and after a Design Basis seismic event. These functions are discussed with respect to vapors and emissions of acutely or chronically toxic (upon inhalation) extremely hazardous waste in the Toxic Vapors and Emissions document. Similar discussions are provided in the Prevention of Hydrogen Accumulation document with respect to ancillary equipment functions related to maintaining hydrogen concentrations below lower flammability limits during normal operations, abnormal operations and during and after a design level seismic event.
	Ancillary equipment is designed to handle the wastes with the characteristics defined above and any treatment reagents.	Drawings and System Description listed above under References; 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 System Description identifies that additional reagents are not added to the PVV system ancillary equipment during normal operations. The PVV system vessel offgas vent lines and headers provide for collection of vessel offgases from selected vessels and provide pathways to the melter offgas process treatment (HOP) system for treatment prior to release from 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 vessels except as noted therein. The vessel offgas vent lines and headers are to be fabricated from 316L stainless steel or from UNS N08367 (6% Molybdenum stainless steel alloy, grade AL-6XN), as shown in the P&ID drawings and as identified in Piping Material Class Description document.

	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 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-3PS-NN00-T0001, Rev 0, Engineering Specification for Hot and Anti-Sweat Thermal Insulation; Annual Book of ASTM Standards, American Society of Testing and Materials.	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 PVV system in the HLW facility during process design. The Materials for Ancillary Equipment document specifies that ancillary equipment downstream of a waste source vessel or miscellaneous plant items is to be constructed of the same or better material and with the same corrosion allowance as the source vessel or plant items, unless the service seen in the downstream line warrants a different material, corrosion allowance, or other modification. 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. Both internal and external corrosion has been considered for all ancillary equipment, therefore, the ancillary equipment will provide the expected design service life of 40 years.

	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 PVV system in the HLW Facility during process design. The Materials for Ancillary Equipment document specifies that ancillary equipment downstream of a waste source vessel or miscellaneous plant items is to be constructed of the same or better material and with the same corrosion allowance as the source vessel or plant items, unless the service seen in the downstream line warrants a different material, corrosion allowance, or other modification. Bounding corrosion allowances are listed for each piping material class in the Piping Material Class Description document. The corrosion/erosion allowance for the PVV system ancillary equipment is, 0.040 in. for the 316L stainless steel material and is 0.0425 in. for the UNS N08367 (6% Molybdenum stainless steel alloy, grade AL-6XN) material. The material and corrosion allowance are appropriate and adequate for the intended service life of the ancillary equipment.

	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.
	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&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 the code allowable values. 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 and System Description listed above under References.	The ancillary equipment considered in this assessment is located in the process cells inside the HLW. Secondary containment for ancillary equipment within the cells is provided by the stainless steel liners plates and sumps and is outside the scope of this integrity assessment.