Department of Energy
Richland Operations Office
P.O. Box 550
Richland, Washington 99352

12-EMD-0114

OCT 1 2 2012

Mr. E. R. Skinnarland
Nuclear Waste Program
State of Washington
Department of Ecology
3100 Port of Benton Boulevard
Richland, Washington 99354

Dear Mr. Skinnarland:

CLASS 1 MODIFICATIONS TO THE HANFORD FACILITY RESOURCE CONSERVATION AND RECOVERY ACT PERMIT, QUARTER ENDING SEPTEMBER 30, 2012

In accordance with Hanford Facility Resource Conservation and Recovery Act Permit (Permit) Condition I.C.3, enclosed for your notification are the Class 1 modifications for the quarter ending September 30, 2012.

These modifications update information in Part III of Permit Revision 8C. The modifications pertain to the 400 Area Waste Management Unit and the Waste Treatment and Immobilization Plant. The Class 1 modifications are being made to ensure that activities are conducted in compliance with the Permit. A record of these modifications is maintained in the Hanford Facility Operating Record.

If you have any questions, please contact me, or your staff may contact Ray J. Corey, Assistant Manager for Safety and Environment, on (509) 376-0108.

Sincerely,

Matt McCormick
Manager

EMD:ACM

Enclosure

cc w/encl: See Page 2

OCT 1 2 2012

cc w/encl:
P. G. Harrington, ORP (CD ROM)
Ecology NWP Library (Hardcopy)
Environmental Portal, LMSI, A3-95 (CD ROM)
Administrative Record, TSD: H-0-1, H-0-8, T-3-4, H6-08 (Hard Copy & CD ROM)
HF Operating Record (J. K. Perry, MSA, H7-28) (CD ROM)

cc w/o encl:
F. W. Bond, Ecology
D. M. Busche, BNI
A. S. Carlson, Ecology
B. L. Curn, URS
S. L. Dahl, Ecology
L. L. Fritz, MSA
J. A. Hedges, Ecology
D. L. McDonald, Ecology
A. L. Prignano, Ecology
J. R. Seaver, CHPRC

ENCLOSURE

CLASS 1 MODIFICATIONS FOR QUARTER ENDING SEPTEMBER 30, 2012

Mr. E. R. Skinnarland, Ecology
Consisting of 313 pages, including this cover sheet

Hanford Facility RCRA Permit Modification Notification Forms

Part III, Operating Unit 16

400 Area Waste Management Unit

Index

Page 2 of 5	Hanford Facility RCRA Permit III.16 Conditions
Page 3 of 5	Addendum F, Header
Page 4 of 5	Addendum F, Section F.1.1.2
Page 5 of 5	Addendum G, 400 Area Waste Management Unit Training Matrix

Submitted by Co-Operator: 9/26/12 Date

Reviewed by RL Program Office: FOR J. DONELL 9.27.12 Date

Hanford Facility RCRA Permit Modification Notification Form

Unit:	Permit Part
400 Area Waste Management	**Part III, Operating Unit 16**

Description of Modification:
Hanford Facility RCRA Permit III.16:

PART III, OPERATING UNIT GROUP 16 PERMIT CONDITIONS
400 Area Waste Management Unit

UNIT DESCRIPTION:

The 400 Area Waste Management Unit (WMU) is in the Property Protected Area (PPA) at the Fast Flux Test Facility (FFTF), in Hanford's 400 Area. The 400 Area WMU consists of two container storage units:

- Fuel Storage Facility (FSF, Building 403). The FSF is a large steel-frame, metal-sided, high bay building. Its dimensions are 34 x 27 x 12 meters (112 x 90 x 40 feet). The container storage unit is on the ground-level floor. In it are two large steel boxes that store sodium-contaminated core component pots (CCPs). The Permittees do not plan to store more mixed waste than is currently stored in the facility; however, the FSF is physically capable of storing additional mixed waste. They will store any additional wastes at the 400 Area WMU in the Interim Storage Area.
- Interim Storage Area, 4718 (ISA). The ISA consists of 156 x 247 meters (513 x 247 feet) totally fenced area. This area is for aboveground dry cask storage of spent fuel. A concrete pad in the ISA, which measures 27 x 37 meters (90 x 120 feet), was used for dry cask storage, but will not necessarily be used for mixed waste management. The rest of the ISA surface is gravel. The ISA is generally flat. However, it is graded to drain in accordance with the general drainage plan for the FFTF PPA. Inside the ISA, there is also one building along the west fence line, and open on the side. This building, Building 432A, is not authorized for mixed waste management.

The scale map in Addendum A shows the location of each storage unit. The only mixed waste stored in these two container storage units is elemental sodium, and sodium potassium (D001, D003, and WSC2), sodium hydroxide (D002), and potassium hydroxide (D002) and debris (e.g., piping, equipment, and components) contaminated with elemental sodium, sodium potassium, sodium hydroxide, and potassium hydroxide. The 400 Area WMU will not store, treat, or dispose of bulk metallic sodium or bulk sodium hydroxide.

LIST OF ADDENDA SPECIFIC TO OPERATING UNIT GROUP 16

Addendum A	Part A Form, dated June 30, 2012
Addendum B	Waste Analysis Plan, dated June 30, 2012
Addendum C	Process Information, dated June 30, 2012
Addendum D	Groundwater Monitoring – Reserved
Addendum E	Security Requirements, dated June 30, 2009
Addendum F	Preparedness and Prevention, dated September 30, 2012~~June 30, 2009~~
Addendum G	Personnel Training, dated September 30, 2012~~June 30, 2012~~
Addendum H	Closure Plan, dated June 30, 2009
Addendum I	Inspection Requirements, dated September 30, 2009
Addendum J	Contingency Plan, dated December 31, 2011

WAC 173-303-830 Modification Class [1] [2]	Class 1	Class 1	Class 2	Class 3
Please mark the Modification Class:	X			

Enter relevant WAC 173-303-830, Appendix I Modification citation number: A.1
Enter wording of WAC 173-303-830, Appendix I Modification citation:
Administrative and informational changes.

Modification Approved: [X] Yes [ ] No (state reason for denial)
Reason for denial:

Reviewed by Ecology: E. R. Skinnarland 9/26/12 Date

[1] Class 1 modifications requiring prior Agency approval.

[2] If the proposed modification does not match any modification listed in WAC 173-303-830 Appendix I, then the proposed modification should automatically be given a Class 3 status. This status may be maintained by the Department of Ecology, or down graded to a Class 1, if appropriate.

Hanford Facility RCRA Permit Modification Notification Form

Unit:	Permit Part
400 Area Waste Management	**Part III, Operating Unit 16**

Description of Modification:
Addendum F, Header:

~~DRAFT Permit Revision 9~~Class 1 Modification
September 30, 2012~~April 7, 2009~~

WA7 89000 8967, Part III Operating Unit 16
400 Area Waste Management Unit

Addendum F **Preparedness and Prevention**

F PREPARDENESS AND PREVENTION F.1
F.1 PREPAREDNESS AND PREVENTION REQUIREMENTS F.1
F.1.1 Equipment Requirements F.1
F.1.2 Aisle Space Requirement F.2
F.2 PREVENTIVE PROCEDURES, STRUCTURES, AND EQUIPMENT F.2
F.2.1 Unloading Operations F.2
F.2.2 Run Off F.2
F.2.3 Water Supplies F.2
F.2.4 Equipment and Power Failure F.2
F.2.5 Personnel Protection Equipment F.2
F.3 PREVENTION OF REACTION OF IGNITABLE, REACTIVE, AND/OR INCOMPATIBLE WASTE F.2
F.3.1 Precautions to Prevent Ignition or Reaction of Ignitable or Reactive Waste F.2
F.3.2 Precautions for Handling Ignitable or Reactive Waste and Mixing of Incompatible Waste F.3

WAC 173-303-830 Modification Class [1 2]	Class 1	Class [1]1	Class 2	Class 3
Please mark the Modification Class:	X			

Enter relevant WAC 173-303-830, Appendix I Modification citation number: A.2
Enter wording of WAC 173-303-830, Appendix I Modification citation: Correction of typographical errors. The header is being corrected for a typographical error that occurred in association with the March 31, 2009 quarterly Class 1 modification. The header section incorrectly stated "Draft Permit Revision 9". The typographical error correction is proposed as a Class 1 Modification.

Modification Approved: [X] Yes [ ] No (state reason for denial)
Reason for denial:

Reviewed by Ecology:
E. R. Skinnarland 9/26/12
Date

[1] Class 1 modifications requiring prior Agency approval.
[2] If the proposed modification does not match any modification listed in WAC 173-303-830 Appendix I, then the proposed modification should automatically be given a Class 3 status. This status may be maintained by the Department of Ecology, or down graded to a Class [1]1, if appropriate.

Hanford Facility RCRA Permit Modification Notification Form

Unit:	Permit Part
400 Area Waste Management	**Part III, Operating Unit 16**

Description of Modification:
Addendum F, Section F.1.1.2:

F.1.1.2 External Communications

~~T~~Personnel at the 400 Area WMU are~~is~~ equipped with devices for summoning emergency assistance from the Hanford Fire Department, the Hazardous Materials Response Team, and/or Hanford Patrol as necessary. External communication to summon emergency assistance is made via ~~a telephone communication system, fire alarm pull boxes, a two-way radio base station, and~~ two-way portable radios or cell phones as described in Addendum J~~as described in Permit Attachment 4, *Hanford Emergency Management Plan* (DOE/RL-94-02)~~. The locations of the primary staging area are identified in Addendum J, Contingency Plan.

WAC 173-303-830 Modification Class [1 2]	Class 1	Class [1]1	Class 2	Class 3
Please mark the Modification Class:	X			

Enter relevant WAC 173-303-830, Appendix I Modification citation number: A.1
Enter wording of WAC 173-303-830, Appendix I Modification citation:
Administrative and information changes. Text is being updated to be consistent with the recently approved modification to Addendum J (September 4, 2012) and to clarify the current communication devices at the 400 Area WMU.

Modification Approved: [X] Yes [ ] No (state reason for denial)
Reason for denial:

Reviewed by Ecology:
E R Skinnarland 9/20/12
~~R~~ E R. Skinnarland Date

[1] Class 1 modifications requiring prior Agency approval.

[2] If the proposed modification does not match any modification listed in WAC 173-303-830 Appendix I, then the proposed modification should automatically be given a Class 3 status. This status may be maintained by the Department of Ecology, or down graded to a Class [1]1, if appropriate.

Hanford Facility RCRA Permit Modification Notification Form

Unit:	Permit Part
400 Area Waste Management	**Part III, Operating Unit 16**

Description of Modification:
Addendum G, 400 Area Waste Management Unit Training Matrix:

400 Area Waste Management Unit Training Matrix

	Training Category*				
Permit Attachment 5, Training Category	General Hanford Facility Training	Contingency Plan Training	Emergency Coordinator Training	Operations Training	
400 Area WMU DWTP implementing plan	Orientation Program	Emergency Response (Contingency Plan)	Emergency Coordinator Training	General Waste Management	Container Management
Job title/position					
Nuclear Chemical Operator	X	X			X
D&D Worker	X	X			
Operations Supervisor	X	X			
Field Work Supervisor	X	X			
Environmental Compliance Officer	X			X	X
Building Emergency Director	X		X		
Waste Service Provider	X			X	
Sampler	X			X	

*Refer to the 400 Area WMU Dangerous Waste Training Plan (DWTP) for a complete description.

WAC 173-303-830 Modification Class [1 2]	Class 1	Class 1	Class 2	Class 3
Please mark the Modification Class:	X			

Enter relevant WAC 173-303-830, Appendix I Modification citation number: B.5.b
Enter wording of WAC 173-303-830, Appendix I Modification citation: Other changes. Changes in responsibilities due to the recent inspection plan changes, additions of personnel that can serve as emergency responders, and changes in titles of personnel that do not affect the type, or decrease the amount of training given to employees.

Modification Approved: ☒ Yes ☐ No (state reason for denial)
Reason for denial:

Reviewed by Ecology:
R. R. Skinnarland 9/26/12
R. R. Skinnarland Date
E.

[1] Class 1 modifications requiring prior Agency approval.
[2] If the proposed modification does not match any modification listed in WAC 173-303-830 Appendix I, then the proposed modification should automatically be given a Class 3 status. This status may be maintained by the Department of Ecology, or down graded to a Class 1, if appropriate.

Remove and Replace the Following Sections:

Remove Part III Permit Conditions, dated June 30, 2012, and replace with Permit Conditions, dated September 30, 2012.

Remove Addendum F, dated June 30, 2009, and replace with Addendum F, dated September 30, 2012.

Remove Addendum G, dated June 30, 2012, and replace with Addendum G, dated September 30, 2012.

PART III, OPERATING UNIT GROUP 16 PERMIT CONDITIONS

400 Area Waste Management Unit

UNIT DESCRIPTION:

The 400 Area Waste Management Unit (WMU) is in the Property Protected Area (PPA) at the Fast Flux Test Facility (FFTF), in Hanford's 400 Area. The 400 Area WMU consists of two container storage units:

- Fuel Storage Facility (FSF, Building 403). The FSF is a large steel-frame, metal-sided, high bay building. Its dimensions are 34 x 27 x 12 meters (112 x 90 x 40 feet). The container storage unit is on the ground-level floor. In it are two large steel boxes that store sodium-contaminated core component pots (CCPs). The Permittees do not plan to store more mixed waste than is currently stored in the facility; however, the FSF is physically capable of storing additional mixed waste. They will store any additional wastes at the 400 Area WMU in the Interim Storage Area.
- Interim Storage Area, 4718 (ISA). The ISA consists of 156 x 247 meters (513 x 247 feet) totally fenced area. This area is for aboveground dry cask storage of spent fuel. A concrete pad in the ISA, which measures 27 x 37 meters (90 x 120 feet), was used for dry cask storage, but will not necessarily be used for mixed waste management. The rest of the ISA surface is gravel. The ISA is generally flat. However, it is graded to drain in accordance with the general drainage plan for the FFTF PPA. Inside the ISA, there is also one building along the west fence line, and open on the side. This building, Building 432A, is not authorized for mixed waste management.

The scale map in Addendum A shows the location of each storage unit. The only mixed waste stored in these two container storage units is elemental sodium, and sodium potassium (D001, D003, and WSC2), sodium hydroxide (D002), and potassium hydroxide (D002) and debris (e.g., piping, equipment, and components) contaminated with elemental sodium, sodium potassium, sodium hydroxide, and potassium hydroxide. The 400 Area WMU will not store, treat, or dispose of bulk metallic sodium or bulk sodium hydroxide.

LIST OF ADDENDA SPECIFIC TO OPERATING UNIT GROUP 16

Addendum A	Part A Form, dated June 30, 2012
Addendum B	Waste Analysis Plan, dated June 30, 2012
Addendum C	Process Information, dated June 30, 2012
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Addendum F	Preparedness and Prevention, dated September 30, 2012
Addendum G	Personnel Training, dated September 30, 2012
Addendum H	Closure Plan, dated June 30, 2009
Addendum I	Inspection Requirements, dated September 30, 2009
Addendum J	Contingency Plan, dated December 31, 2011

DEFINITIONS

The term **"CCP" or Core Component Pot** means one of 109 cylindrical containers, each containing 3.75 gallons of un-reacted sodium totaling 405 gallons, currently stored as mixed waste in the FFTF Fuel Storage Facility. The CCPs were previously filled with sodium and used in the FFTF Interim Decay Storage Vessel to store spent FFTF Driver Fuel Assemblies under inert gas.

ACRONYMS

FFTF	Fast Flux Test Facility
CCP	Core Component Pot
PPA	Property Protected Area
ISA	Interim Storage Area
FSF	Fuel Storage Facility
WMU	Waste Management Unit

III.16.A COMPLIANCE WITH UNIT-SPECIFIC PERMIT CONDITIONS

III.16.A.1 The Permittees will comply with all conditions in this Chapter and its addenda with respect to dangerous waste management and dangerous waste management units in the 400 Area WMU, in addition to conditions in Permit Parts I and II.

III.16.B GENERAL WASTE MANAGEMENT

III.16.B.1 The Permittees are authorized to accept, according to the waste acceptance procedure documented in Addendum B, Section B.2, mixed debris generated from demolition and decommissioning of the Fast Flux Test Facility reactor system containing or contaminated with residual elemental sodium and sodium hydroxide. The Permittee will store these wastes in the ISA.

III.16.B.2 The Permittees are authorized to store core component pots generated prior to the effective date of this permit in two large metal boxes in the 400 Area WMU, FSF.

III.16.B.3 The Permittees are authorized store mixed waste in the ISA up to a maximum capacity of 19,000 gallons.

III.16.B.4 The Permittees will maintain the physical structure of dangerous waste management units in the 400 Area WMU as documented in the Unit Description above and Addendum C, Figures C.1 and C.2.

III.16.B.5 The Permittees will maintain appropriate administrative controls and work practices to ensure that only wastes specified in Permit Condition III.16.B.1, are received by the ISA for storage, and that no co-mingling or cross-contamination of the waste stream specified in Permit Condition III.16.B.1 with any other waste stream may occur.

III.16.C WASTE ANALYSIS

III.16.C.1 The Permittees will have an accurate and complete waste profile for the waste stream identified in Permit Condition III.16.B.1. This waste profile will be signed and dated upon approval by the 400 Area WMU authorized representative. [WAC 173-303-380(1)(a)]

III.16.C.2 The Permittees will make a copy of the waste profile required by Permit Condition III.16.C.1 available upon request. [WAC 173-303-815(2)(b)(ii)]

III.16.D RECORDKEEPING AND REPORTING

III.16.D.1 The Permittees will place the following into the Hanford Facility Operating Record, 400 Area WMU File required by Permit Condition II.I.2. [WAC 173-303-380]

III.16.D.2 Records required by WAC 173-303-380(1)(o), incorporated by reference;

III.16.E SECURITY

III.16.E.1 The Permittees will post warning signs at all entrances to the FSF and the ISA specified in Addendum E, Section E.1.1. [WAC 173-303-310(2)(a)]

III.16.F PREPAREDNESS AND PREVENTION

III.16.F.1 The Permittees will comply with the Addendum F, Preparedness and Prevention requirements specific to the 400 Area WMU. [WAC 173-303-340]

III.16.G CONTINGENCY PLAN

III.16.G.1 The Permittees will comply with Addendum J, Contingency Plan in addition to the requirements of Permit Condition II.A when applicable. [WAC 173-303-350]

III.16.H INSPECTIONS

III.16.H.1 The Permittees will perform inspections of the 400 Area WMU according to Addendum I, Inspection Plan for inspecting all monitoring equipment, safety and emergency equipment, security devices, and operating and structural equipment that help prevent, detect, or respond to hazards to the public health or the environment pursuant to the requirements of WAC 173-303-320 [WAC 173-303-320(2)]

III.16.I TRAINING PLAN

III.16.I.1 The Permittees will include Addendum G unit-specific training requirements in the written training plan required by Permit Condition II.C. [WAC 173-303-330]

III.16.J OTHER GENERAL REQUIREMENTS

III.16.J.1 The Permittees will comply with the requirements of WAC 173-303-395(1)(a)-(c), incorporated by reference, for prevention of reaction of ignitable, reactive, or incompatible wastes.

III.16.J.2 Land Disposal Restriction Requirements

III.16.J.2.a The Permittees will ensure a schedule of compliance and any applicable associated work requirements are included in the land disposal restrictions report required by the HFFACO Milestone M-26, incorporated by reference by Permit Condition II.O for treatment and/or acquisition of treatment capacity for wastes which are or are expected to be stored in the 400 Area WMU container storage units.

III.16.K CLOSURE

III.16.K.1 The Permittees will close the 400 Area WMU Container Storage Units in accordance with Addendum H, Closure Plan. [WAC 173-303-610(4)]

III.16.L POST CLOSURE

Reserved

III.16.M CRITICAL SYSTEMS

Reserved

III.16.N RESERVED

III.16.O CONTAINERS

III.16.O.1 Container Management Standards

III.16.O.1.a The Permittees will ensure that all containers remain in good condition. If a container holding mixed waste is not in good condition (e.g., severe rusting or corrosion, or apparent structural defects), or if it begins to leak, the Permittee must transfer the waste from the container to a container that is in good condition or place the leaking container in an appropriate over-pack container. [WAC 173-303-630(2)]

III.16.O.1.b The Permittees shall ensure that all containers are constructed of carbon steel or stainless steel, or other materials compatible with metallic sodium and sodium hydroxide. [WAC 173-303-630(4)]

III.16.O.1.c The Permittees must remove spilled or leaked waste within secondary containment pursuant to WAC 173-303-630(7)(a)(ii), incorporated by reference.

III.16.O.1.d Requirements for the Fuel Storage Facility

III.16.O.1.e The Permittee will maintain an inert gas (argon or nitrogen) cover within each large metal box to prevent contact of the metallic sodium with the water vapor in the air and the formation of free liquids.

III.16.O.1.f The Permittees will place large boxes stored in the FSF in drip pans to ensure a base free of cracks or gaps, and ensure that the large boxes are elevated or otherwise protected from contact with accumulated liquids.

III.16.O.1.g Requirements for the Interim Storage Area

III.16.O.1.h The Permittee may store wastes in the ISA in standard metal containers (e.g., 208-liter drums), large metal boxes fabricated to accommodate the size and shape of a particular component or debris, or unique components removed from FFTF that when closed in accordance with WAC 173-303-630(5)(a) serve as a primary container.

III.16.O.1.i The Permittees will manage unique components stored in the ISA on the gravel surface with sufficient open space between components and between components and the fence line to accommodate inspections and movement of equipment.

III.16.O.1.j The Permittees will not place wastes in the open-sided structure (Building 432A) within the ISA identified in the Unit Description above.

Addendum F **Preparedness and Prevention**

F PREPARDENESS AND PREVENTION F.1

F.1 PREPAREDNESS AND PREVENTION REQUIREMENTS F.1
F.1.1 Equipment Requirements F.1
F.1.2 Aisle Space Requirement F.2

F.2 PREVENTIVE PROCEDURES, STRUCTURES, AND EQUIPMENT F.2
F.2.1 Unloading Operations F.2
F.2.2 Run Off F.2
F.2.3 Water Supplies F.2
F.2.4 Equipment and Power Failure F.2
F.2.5 Personnel Protection Equipment F.2

F.3 PREVENTION OF REACTION OF IGNITABLE, REACTIVE, AND/OR INCOMPATIBLE WASTE F.2
F.3.1 Precautions to Prevent Ignition or Reaction of Ignitable or Reactive Waste F.2
F.3.2 Precautions for Handling Ignitable or Reactive Waste and Mixing of Incompatible Waste F.3

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F PREPARDENESS AND PREVENTION

This Addendum discusses preparedness and prevention requirements; preventive procedures, structures, and equipment; and prevention of reaction of ignitable and reactive waste stored at 400 Area WMU.

The 400 Area WMU is designed and operated to minimize exposure of the general public and operating personnel to waste. Shielding, control of toxic or dangerous material, safety and security procedures, and structures are used to keep exposure within ALARA requirements. In addition, the 400 Area WMU is designed to withstand accidents without undue risk to the health and safety of the general public and operating personnel.

F.1 PREPAREDNESS AND PREVENTION REQUIREMENTS

The following sections document the preparedness and prevention measures taken at the 400 Area WMU.

F.1.1 Equipment Requirements

The following sections describe the internal and external communications systems and the emergency equipment required that could be activated by the 400 Area WMU Building Emergency Director. Hanford Facility-wide equipment is identified in Permit Attachment 4, *Hanford Emergency Management Plan* (DOE/RL-94-02).

F.1.1.1 Internal Communications

Groups or individuals working in any of the 400 Area WMU mixed waste storage areas communicate by two-way radio or cell phone. The S&M Operations Manager is the point of contact and all operations personnel with radios may function as a backup. The public address (PA) system is also available. The Hanford Patrol Operations Center (POC) is available by dialing 911. Cell phones should use 373-3800 to call the POC.

The ISA has no installed communication or alarm systems. The PA system can be heard throughout the 400 Area property protection area (PPA). A pressure alarm in the feed line for the inert gas to the CCP storage boxes in the FSF is wired to an alarm panel in Building 481A to alert the stationary operating engineer t in the event of low pressure.

F.1.1.2 External Communications

Personnel at the 400 Area WMU are equipped with devices for summoning emergency assistance from the Hanford Fire Department, the Hazardous Materials Response Team, and/or Hanford Patrol as necessary. External communication to summon emergency assistance is made via two-way portable radios or cell phones as described in Addendum J. The locations of the primary staging area are identified in Addendum J, Contingency Plan.

F.1.1.3 Emergency Equipment

The 400 Area WMU relies primarily on the Hanford Fire Department to respond to fires and other emergencies as described in Permit Attachment 4, *Hanford Emergency Management Plan* (DOE/RL-94-02). The Hanford Fire Department is capable of providing rapid response to fires within the 400 Area WMU.

A detailed list of emergency response equipment is included in Addendum J, Contingency Plan. Permit Attachment 4, *Hanford Emergency Management Plan* (DOE/RL-94-02) also contains the Hanford Facility wide equipment list. Fire extinguishers (Class D) are in the areas of the stored ignitable and/or reactive waste. Personnel are trained in the use of emergency equipment (Addendum G, Personnel Training).

F.1.1.4 Water for Fire Control

The only mixed waste stored in the 400 Area WMU consists of containerized reactive sodium metal as a residual contaminant on piping and components. Therefore, water will not be used to extinguish a fire

associated with this waste stream. Existing water fire suppressions systems have been physically disconnected in any case where sprinkled water could potentially contact the stored metallic sodium waste in the 400 Area WMU.

F.1.2 Aisle Space Requirement

A discussion on the applicability of aisle space is found in Addendum C, Process Information.

F.2 PREVENTIVE PROCEDURES, STRUCTURES, AND EQUIPMENT

The following sections describe preventive procedures, structures, and equipment.

F.2.1 Unloading Operations

Unloading requirements in WAC 173-303-395(4) do not apply to the 400 Area WMU because liquid dangerous waste will not be accepted into the TSD unit on a manifest shipment.

F.2.2 Run Off

The 400 Area storm water drainage system and appropriate grading prevent run-off.

F.2.3 Water Supplies

The discussion of water supplies in the context of the 400 Area WMU is not applicable, because water is not connected. Therefore, no potential for cross connection or back flow that could contaminate a water source exists.

F.2.4 Equipment and Power Failure

Loss of electrical power does not constitute an emergency situation regarding storage of mixed waste at the 400 Area WMU. The FFTF facility is deactivated and in a long-term surveillance and maintenance mode. Therefore, the 400 Area WMU only has minimal electrical power is available. Indoor waste areas will not be occupied during power outages without adequate alternate substitutes for those systems except for personnel providing a fire watch or other emergency response activity.

As described in Section F.1.1.2, emergency communication equipment is available to summon emergency assistance in the event of a power loss.

F.2.5 Personnel Protection Equipment

Refer to Addendum J, Contingency Plan, for information regarding required personnel protection equipment available for use at 400 Area WMU.

F.3 PREVENTION OF REACTION OF IGNITABLE, REACTIVE, AND/OR INCOMPATIBLE WASTE

The following section describes prevention of reaction of ignitable, reactive, and/or incompatible waste.

F.3.1 Precautions to Prevent Ignition or Reaction of Ignitable or Reactive Waste

All waste stored in the 400 Area WMU is stored in closed containers.

Activities involving heat generation (welding, cutting, open flames, hot surfaces, frictional heat, sparks, or radiant heat) are not allowed within the 400 Area WMU, without specific authorization by the S & M Operations Manager.

'NO SMOKING' signs are conspicuously placed wherever there is a hazard from ignitable or reactive waste.

The containerized waste (metallic sodium) is also water reactive. Precautions have been taken to ensure that water does not contact the waste. These precautions included removal of water fire suppression systems in the immediate area of waste containers, sealing the containers, and ensuring that outdoor container storage provides protection from precipitation and run-on.

WAC 173-303-630 requires managing ignitable and reactive waste containers in a manner equivalent to the International Fire Code. The Hanford Fire Department will determine whether the storage of ignitable and reactive waste meets the International Fire Code or equivalent.

F.3.2 Precautions for Handling Ignitable or Reactive Waste and Mixing of Incompatible Waste

Metallic sodium, in a solid form due to its high melting point (98°C), is the only waste stored at the 400 Area WMU. This waste is adhered to or contained in the interior of debris that has been generated from FFTF. This waste, which is a mixed waste, exhibits the characteristics of ignitability and reactivity due to the metallic sodium. It is also designated as a corrosive waste, as it may generate sodium hydroxide if it comes into contact with water vapor in the air.

There is no potential for mixing the metallic sodium waste with another waste that could result in an incompatible reaction, as the sodium waste is the only waste stored in the 400 Area WMU. The containers selected for storage of the waste are made of either carbon steel or stainless steel and are well suited to store the waste, even if small amounts of highly alkaline sodium hydroxide are generated inside the container. Either new containers are used or existing containers are thoroughly cleaned and dried before waste is placed in them.

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400 Area Waste Management Unit Training Matrix

	Training Category*				
Permit Attachment 5, Training Category	General Hanford Facility Training	Contingency Plan Training	Emergency Coordinator Training	Operations Training	
400 Area WMU DWTP implementing plan	Orientation Program	Emergency Response (Contingency Plan)	Emergency Coordinator Training	General Waste Management	Container Management
Job title/position					
Nuclear Chemical Operator	X	X			X
D&D Worker	X	X			
Operations Supervisor	X	X			
Field Work Supervisor	X	X			
Environmental Compliance Officer	X			X	
Building Emergency Director	X		X		
Waste Service Provider	X			X	
Sampler	X			X	

*Refer to the 400 Area WMU Dangerous Waste Training Plan (DWTP) for a complete description.

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Quarter Ending 12/31/2011 24590-HLW-PCN-ENV-11-004

Hanford Facility RCRA Permit Modification Notification Form
Part III, Operating Unit 10
Waste Treatment and Immobilization Plant

Index

Page 2 of 3: Hanford Facility RCRA Permit, Part III, Operating Unit 10, Waste Treatment and Immobilization Plant
Update Corrosion Evaluation Data Sheets for the HLW Melter Offgas Treatment Process System (HOP) in Appendix 10.9.

Submitted by Co-Operator:

Donna Busche 9/21/11
D. M. Busche Date

Reviewed by ORP Program Office:

Thomas M. Brown for 10/18/2011
D. L. Noyes Date

Quarter Ending 12/31/2011 24590-HLW-PCN-ENV-11-004

Hanford Facility RCRA Permit Modification Notification Form	
Unit: **Waste Treatment and Immobilization Plant**	Permit Part: **Part III, Operating Unit 10**

Description of Modification:

The purpose of this Class 1 prime modification is to update the Corrosion Evaluation Data Sheets for the HLW Melter HOP System in Appendix 10.9 of the Dangerous Waste Permit (DWP). This PCN will replace two permit Material Selection Data Sheets incorporated into the DWP with two source Corrosion Evaluation Data Sheets as indicated in the Table below. Additionally, a Corrosion Evaluation Data Sheet is included for the Catalyst Skid Electric Heater (see discussion below). Note that the title of the data sheet has been changed from the permit version "*Plant Item Material Selection Data Sheet*" to the source "*Corrosion Evaluation.*"

The following source documents are submitted to replace the permit documents currently in Appendix 10.9:

Appendix 10.9			
Replace:	24590-HLW-N1D-HOP-P0004 Rev. 1	With:	24590-HLW-N1D-HOP-00004 Rev. 5
	24590-HLW-N1D-HOP-P0007 Rev. 0		24590-HLW-N1D-HOP-00007 Rev. 1
	See discussion below		24590-HLW-N1D-HOP-00011 Rev. 0

This modification requests Ecology approval and incorporation into the permit, the specific changes to these Data Sheets, as indicated by revision bars that have been issued since the last revision of the permitted version. Revisions are the result of ongoing design changes. The following identifies the significant types of changes on the attached data sheets.

As indicated above,

24590-HLW-N1D-HOP-00004:

- Updated equipment description from "Thermal Catalytic Oxidizer" to "Selective Catalytic Oxidizer"
- Updated design conditions (temperature and pressure) based on vendor submittal
- Updated Operating Modes Considered
- Revised Materials Considered table and material recommendations based on updated design temperature
- Updated corrosion allowance and updated Corrosion Considerations
- Added References and Bibliography
- Updated Process Corrosion Data Sheet; added references, notes, and assumptions
- Revised text for Section 5.3.8.3 of WTP Process Corrosion Data (24590-WTP-RPT-PR-04-0001)

24590-HLW-N1D-HOP-00007:

- Updated design temperature and inserted design pressure
- Revised Recommended Corrosion Allowance from NA to 0.00
- Revised format of Materials Considered table
- Updated Corrosion Considerations; added section p – Inadvertent Addition of Nitric Acid
- Added References and Bibliography
- Incorporated Process Corrosion Data Sheet
- Added text for Section 5.3.6 of WTP Process Corrosion Data (24590-WTP-RPT-PR-04-0001)

24590-HLW-N1D-HOP-00011:

- The Catalyst Skid Electric Heater was incorporated into the DWP under Package HLW-026 and discussed in Thermal Catalytic Oxidizers/Reducers Specification 24590-WTP-3PS-MBTV-TP001 Rev. 0

Quarter Ending 12/31/2011 24590-HLW-PCN-ENV-11-004

This modification requests Ecology approval and incorporation of the following outstanding change document(s) into the permit. Although not yet incorporated into the revised documents included in this PCN, the listed change document(s) are intended to be incorporated into the permit.
None

WAC 173-303-830 Modification Class:	Class 1	Class [1]1	Class 2	Class 3
Please mark the Modification Class:		X		

Enter relevant WAC 173-303-830, Appendix I Modification citation number: NA

Enter wording of WAC 173-303-830, Appendix I Modification citation:

In accordance with WAC 173-303-830(4)(d)(i), this modification notification is requested to be reviewed and approved as a Class [1]1 modification. WAC 173-303-830(4)(d)(ii)(A) states, "Class 1 modifications apply to minor changes that keep the permit current with routine changes to the facility or its operation. These changes do not substantially alter the permit conditions or reduce the capacity of the facility to protect human health or the environment. In the case of Class 1 modifications, the director may require prior approval."

Modification Approved/Concur: ☑ Yes ☐ Denied (state reason below)

Reason for denial:

Reviewed by Ecology:

D. McDonald 7/2/12 Date

CORROSION EVALUATION

HOP-SCO-00001 & HOP-SCO-00004(HLW)
Selective Catalytic Oxidizer

R11416990

- Design Temperature (°F): 1000
- Design Pressure (in WG) (internal/external): 84/82
- Location: out cell; Room H-A123

Contents of this document are Dangerous Waste Permit affecting

Operating conditions are as stated on attached Process Corrosion Data Sheet

Operating Modes Considered:

- Assume off-normal conditions same as normal operations.
- Design to include a cool down mode that will prevent condensation of acid gasses.

Materials Considered:

Material (UNS No.)	Acceptable Material	Unacceptable Material
Carbon Steel		X
Type 304L (S30403)	X[1]	
Type 316L (S31603)	X[2]	
Type 347 (S34700)	X	
Incoloy® 800 (N08800)	X	
Hastelloy® C-22® (N06022)		X
Ti-2 (R50400)		X

Recommended Material:

- Enclosure/shell-side components: Type 347
- Catalyst support frame & instrument housings: Type 347 stainless steel or Incoloy® 800
- [1]Structural support (not in contact with offgas stream): Type 304 (or Type 316) stainless steel (max 0.030% C; dual certified)
- [2]Instrument materials: Type 316 stainless steel (max 0.030% C, dual certified)

Recommended Corrosion Allowance: 0.010 inch (includes 0.00 inch erosion allowance)

Process & Operations Limitations:

- None

Concurrence NA
Operations

REV	DATE	REASON FOR REVISION	PREPARER	CHECKER	MET	APPROVER
5	8/30/11	Make correction to Recommended Materials and Page 1 to match change made to text at last revision	DLAdler	RBDavis	NA	SWVail

CORROSION EVALUATION

REVISION HISTORY

4	6/30/11	Update equipment description Replace alloy 690 with alloy800 for instrument housings Incorporate revised PCDS Update design temp Add AEA notice Editorial and format changes	DLAdler	RBDavis	NA	SWVail
3	1/25/05	Update design conditions based on vendor submittal Revise material recommendation based on updated design temp	DLAdler	JRDivine	APR	SWVail
2	9/15/04	Update equipment quantity Update equipment description Update temperature Incorporate new PCDS Add section p -- Inadvertent Addition of Nitric Acid Extensive non-technical revisions	DLAdler	JRDivine	NA	APRangus
1	9/17/02	Add DWP note Update format Eliminate open issues	DLAdler	JRDivine	SS	SMKirk
0	2/7/02	Initial Issue	JRDivine	DLAdler	NA	BP
REV	**DATE**	**REASON FOR REVISION**	**PREPARER**	**CHECKER**	**MET**	**APPROVER**

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.

This bound document contains a total of 7 sheets.

CORROSION EVALUATION

Corrosion Considerations:

The selective catalytic oxidizers oxidize organics to carbon dioxide, water, and possibly acid gases. The equipment operates at low relative humidity. The gas treatment system is designed to remove aerosols, acid gases, and radionuclides from the off-gas. The system includes coolers, scrubbers, precipitators, mist eliminators, heaters, fans, pre-heaters, catalytic beds, and exhaust blowers. The type of corrosion mechanism and its rate of attack depend on the nature of the atmosphere (temperature, chemistry, moisture, and particulates). In general, corrosion occurs when process gases contain moisture, N_2, O_2, CO_2, NH_3, NO, N_2O, NO_2, HCl, HF, I_2, SO_2, and Hg. The temperature in the component is higher than the condensation temperature of water; therefore the component will remain dry during operation.

Preventing condensation during off normal operation is important. Proper insulation and its maintenance can sometimes solve corrosion problems during short temperature transients or cause the condensation to occur on surfaces distant from the housing. However, insulated equipment with operating gas temperatures during startup and shutdown will pass through the dew point can still have significant corrosion issues. Using corrosion resistant material will limit corrosion losses due to the condensation.

The moisture content in the gas that reaches the catalyst skid components (pre heater, heater, SCO and SCR) is less than 30% relative humidity. Dry surfaces do not corrode. The uniform corrosion, crevice corrosion, and pitting corrosion can be managed with austenitic stainless steel alloys Type 304/304L and Type 316/316L. The corrosion with these alloys is expected to be relatively low, 0.25 mpy max. Therefore, a total corrosion allowance of 0.010 inch is adequate for the offgas treatment system.

a General Corrosion
Uniform corrosion is not anticipated for all normal operating conditions. The dry air eliminates the electrolyte necessary to support electrochemical processes. However, because sections of the selective catalytic oxidizer may experience elevated temperatures, both types 304L and 316L stainless steel are precluded from use as the primary pressure boundary or enclosure. The stabilized austenitic grade of type 347 stainless steel is recommended and is suitable for the elevated temperatures and design conditions for the enclosure.

Conclusion
Type 304L is satisfactory for structural components not in contact with the offgas stream. Type 347 is recommended for all components of the pressure boundary and enclosure that are in contact with the offgas. A uniform corrosion allowance is added for normal wear and corrosion during off-normal events.

b Pitting Corrosion
Pitting corrosion is not anticipated for all normal, dry-air operating conditions. Localized corrosion for short durations during off-normal conditions may occur.

Conclusion
At the stated operating conditions, pitting corrosion is not a concern. Type 316L and Type 347 are both resistant to pitting corrosion.

c End Grain Corrosion
End grain corrosion only occurs in metal with exposed end grains and in highly oxidizing acid conditions.

Conclusion:
Not applicable to this system.

d Stress Corrosion Cracking
Stress corrosion cracking will only be a concern in the presence of moisture. It is assumed that there will be no condensation in the unit. During cleaning, the surfaces shall be well-flushed.

Conclusion
At the stated operating conditions, stress corrosion is not a significant concern.

e Crevice Corrosion
Crevice corrosion will only be a concern if column is allowed to have multiple cooling cycles and the formation of liquid. The enclosure design uses lap joints that form crevices.

Conclusion
At the stated operating conditions, crevice corrosion is not a significant concern.

f Corrosion at Welds
None anticipated.

Conclusion
Not a concern.

CORROSION EVALUATION

g Microbiologically Induced Corrosion (MIC)
Conditions in this equipment are not conducive to MIC

Conclusion
Not a concern.

h Fatigue/Corrosion Fatigue
Equipment shall be designed to accommodate the expected fatigue cycles over the 40 year design life.

Conclusion
Not a concern.

i Vapor Phase Corrosion
Offgas equipment is essentially entirely vapor space. Comments under General Corrosion apply.

Conclusion
See comments under General Corrosion.

j Erosion
Velocities are not expected to be sufficient to cause concern.

Conclusion
Not a concern.

k Galling of Moving Surfaces
None expected.

Conclusion
Not a concern.

l Fretting/Wear
None anticipated.

Conclusion
Not a concern.

m Galvanic Corrosion
None anticipated.

Conclusion
Not a concern.

n Cavitation
None anticipated.

Conclusion
Not a concern.

o Creep
The operating and design temperatures do not extend into the creep range.

Conclusion
Creep is not a concern under these conditions.

p Inadvertent Addition of Nitric Acid
Introduction of nitric acid into the offgas stream is not a likely scenario.

Conclusion
Not applicable.

CORROSION EVALUATION

References:

1. 24590-HLW-M4C-HOP-00011, Rev. 1, *HLW Melter Offgas System Design Basis Flowsheets*
2. 24590-WTP-RPT-PR-04-0001, Rev. 0CD, *WTP Process Corrosion Data*
3. CCN 174990, e-mail from J Wood to R Davis, 25 March, 2008, "Design Temperatures For HOP TCOs"

Bibliography:

1. 24590-CM-POA-MBT0-00002-03-00001, *Data Sheet – HLW Thermal Catalytic Oxidizers/Reducers – Mechanical Data Sheet*
2. Allegheny Ludlum, 2003, *Stainless Steels, Types 321, 347, and 348, Technical Data Blue Sheet*, Allegheny Technologies, Inc.
3. Maziasz, PJ, RW Swindeman, JP Shingledecker, KL More, BA Pint, E Lara-Curzio, and ND Evans, 2003, *Improving High-Temperature Performance of Austenitic Stainless Steels for Advanced Microturbine Recuperators,* The Institute for Materials, Minerals and Mining, Maney Publishing, London, UK
4. Sedriks, AJ, 1996, *Corrosion of Stainless Steels*, John Wiley & Sons, Inc., New York, NY 10158
5. Special Metals Corp, *Inconel Alloy 690*, Huntington, WV, 25701

CORROSION EVALUATION

24590-WTP-RPT-PR-04-0001, Rev. 0CD
WTP Process Corrosion Data

PROCESS CORROSION DATA SHEET

Component(s) (Name/ID #) Thermal catalytic oxidizer (HOP-SCO-00001, HOP-SCO-00004)

Facility HLW

In Black Cell? No

Chemicals	Unit[1]	Contract Maximum[2]		Non-Routine		Notes
		Leach	No leach	Leach	No Leach	
Aluminum	g/m^3					
HCl	g/m^3					
HF	g/m^3					
Iron	g/m^3					
NO	g/m^3	2.92E-01	3.02E-01			
NO_2	g/m^3	1.07E-01	1.16E-01			
Phosphate	g/m^3					
SO_2	g/m^3	9.0E-04	9.0E-04			Note 5
Mercury	g/m^3					
Carbonate	g/m^3					
Particulate	g/m^3					
HNO_3	g/m^3	2.6E-03	2.6E-03			Assumption 1
HNO_2	g/m^3	3.4E-03	3.4E-03			Assumption 1
Humidity	%	0.1%	0.1%			Note 5
Temperature	°F					Note 3

List of Organic Species:

References

System Description: 24590-HLW-3YD-HOP-00001
Mass Balance Document: 24590-WTP-M4C-V11T-00005, Rev A
Normally Associated Streams: HOP27, HOP28
Off Normal Streams (e.g., overflow from other vessels): N/A
P&ID: N/A
PFD: 24590-HLW-M5-V17T-00004; 24590-HLW-M5-V17T-20004
Technical Reports: N/A

Notes:

1. Concentrations less than $1x\ 10^{-4}\ g/m^3$ do not need to be reported; list concentration values to three significant digits max.
2. Data developed from a mass balance model which has constituents in the plant feed which are important to corrosion, adjusted to contract maximum values, except as noted.
4. The normal and maximum operating temperature is 750 °F at the inlet and outlet (pages A-6 and A-10, 24590-HLW-M4C-HOP-00011, Rev 1)
5. Source: 24590-HLW-M4C-HOP-00011, Rev 1, pages A-10 through A-13

Assumptions

1. Based on empirical data from testing per Attachment 28 of 24590-HLW-M4E-HOP-00005, page 4.

5.3.8.3 Thermal Catalytic Oxidizer (HOP-SCO-00001, HOP-SCO-00004)

Routine Operations

The gas from the catalyst skid electric heater flows to the thermal catalytic oxidizer (TCO). The TCO oxidizes organics to carbon dioxide and water and possibly acid gases (depending on the presence of halogenated organics in the gas). The TCO operates at about the same temperature as the NO_x selective catalytic oxidizer reducer (NO_x SCR). The TCO is placed in front of the NO_x SCR to take advantage of the decomposition reaction heat generation to maintain the NO_x SCR operating temperature. This arrangement also prevents the formation of NO_x in the TCO from the oxidation of ammonia used in the NO_x SCR. The TCO catalyst is likely to be a platinum-based material deposited on a substructure that is held in frames and is inserted and removed through access doors. This facilitates easy changeout.

Non-Routine Operations

None identified.

R11385139

CORROSION EVALUATION

HOP-HX-00002 & HOP-HX-00004 (HLW)
Silver Mordenite Preheater

- Design Temperature (°F) (max/min): Hot side: 500/14; Cold side: 500/14
- Design Pressure (psig) (max/min): Hot side: 5/FV; Cold side: 5/FV
- Location: Room H-A123; out cell

ISSUED BY
RPP-WTP PDC

Contents of this document are Dangerous Waste Permit affecting

Operating conditions are as stated on attached Process Data Sheets

Operating Modes Considered:

- Equipment is maintainable.

Materials Considered:

Material (UNS No.)	Acceptable Material	Unacceptable Material
Carbon Steel		X
Type 304L (S30403)		X
Type 316L (S31603)	X	
6% Mo (N08367/N08926)	X	
Hastelloy® C-22® (N06022)	X	
Ti-2 (R50400)		X

Recommended Material: Type 316 (max 0.030% C; dual certified)

Recommended Corrosion Allowance: 0.00

Process & Operations Limitations:

- None

Concurrence NA
Operations

REV	DATE	REASON FOR REVISION	PREPARER	CHECKER	MET	APPROVER
1	6/30/11	Update design temperature Incorporate PCDS Insert design pressure Add section p – Inadvertent Addition of Nitric Acid Add AEA notice Minor editorial & format changes	DLAdler	RBDavis	NA	SWVail
0	4/21/04	Initial Issue	DLAdler	JRDivine	APR	SWV for APRangus

CORROSION EVALUATION

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.

CORROSION EVALUATION

Corrosion Considerations:

The silver mordenite preheater recovers heat from the catalyst skid discharge offgas. The preheater maintains the appropriate inlet temperature to the silver mordenite column. This equipment is operated at low relative humidity.

a General Corrosion
The anticipated dry-air conditions are not conductive to general corrosion and none is expected.

Conclusion
Either Type 304L or Type 316L would be satisfactory.

b Pitting Corrosion
Pitting corrosion will only be a concern if moisture is present. It is assumed that there will be no condensation in the unit. For conservatism, Type 316L is recommended.

Conclusion
At the stated operating conditions, pitting corrosion is not a significant concern. Recommend Type 316L.

c End Grain Corrosion:
End grain corrosion only occurs in high acid conditions and is not a concern.

Conclusion:
Not a concern

d Stress Corrosion Cracking
Stress corrosion cracking will only be a concern if the preheaters experience multiple cooling cycles below 225°F on the hot side in the presence of moisture.

Conclusion
At the stated operating conditions, stress corrosion cracking is not a concern.

e Crevice Corrosion
Crevice corrosion will only be a concern if moisture is present. Dry air conditions are expected.

Conclusion
At the stated operating conditions, crevice corrosion is not a concern.

f Corrosion at Welds
Assuming dry air and proper welding procedures, corrosion at welds is not anticipated.

Conclusion
At the stated operating conditions, weld corrosion is not a concern.

g Microbiologically Induced Corrosion (MIC)
The stated operating conditions are not suitable for microbial growth.

Conclusion
At the stated operating conditions, MIC is not a concern.

h Fatigue/Corrosion Fatigue
Extreme temperature cycling or fluctuations are not expected during normal operations. During the life of the equipment such fluctuation are expected to be very infrequent.

Conclusion
At the expected operating conditions, corrosion fatigue is not a concern.

i Vapor Phase Corrosion
Components essentially consist entirely of vapor space so general corrosion comments apply.

Conclusion:
See comments under general corrosion.

CORROSION EVALUATION

j Erosion
The velocity and solids content are sufficiently low that erosion is not a concern.

Conclusion
Erosion is not a concern.

k Galling of Moving Surfaces
There are no unlubricated moving surfaces present.

Conclusion:
Galling is not a concern.

l Fretting/Wear
No metal/metal contacting surfaces are expected.

Conclusion:
Fretting is not a concern.

m Galvanic Corrosion
No significantly dissimilar metals are present and it is assumed that no moisture is normally present.

Conclusion:
Galvanic corrosion is not a concern.

n Cavitation
Cavitation is not expected in an off-gas system

Conclusion:
Cavitation is not a concern.

o Creep
Creep is not expected at stated operating conditions.

Conclusion
At the stated operating conditions, creep is not a problem.

p Inadvertent Addition of Nitric Acid
The addition of nitric acid into the offgas system is not a plausible scenario.

Conclusion
Not applicable.

CORROSION EVALUATION

References:

1. 24590-WTP-RPT-PR-04-0001, Rev. 0CC, *WTP Process Corrosion Data*

Bibliography:

1. 24590-HLW-MED-HOP-00031, *24590-HLW-ME-HOP-HX-00002 & 24590-HLW-ME-HOP-HX-00004 - Welded Plate And Frame Heat Exchanger Mechanical Data Sheet*

CORROSION EVALUATION

24590-WTP-RPT-PR-04-0001, Rev. 0CC
WTP Process Corrosion Data

PROCESS CORROSION DATA SHEET

Component(s) (Name/ID #) Silver mordenite preheater (HOP-HX-00002, HOP-HX-00004)

Facility HLW

In Black Cell? No

Chemicals	Unit[1]	Contract Maximum[2]		Non-Routine		Notes
		Leach	No leach	Leach	No Leach	
Aluminum	g/m^3					
HCl	g/m^3	1.7E-03	1.7E-03			Note 5
HF	g/m^3	1.0E-03	1.0E-03			Note 5
Iron	g/m^3					
NO	g/m^3	5.94E-01	6.16E-01			
NO_2	g/m^3	1.96E-01	2.12E-01			
Phosphate	g/m^3					
SO_2	g/m^3	1.7E-03	1.7E-03			Note 5
Mercury	g/m^3					
Carbonate	g/m^3					
Particulate	g/m^3					
HNO_3	g/m^3	4.6E-03	4.6E-03			Assumption 1
HNO_2	g/m^3	5.9E-03	5.9E-03			Assumption 1
Humidity	%	39%	38%			
Temperature	°F					Note 3, Note 4

List of Organic Species:

References

System Description: 24590-HLW-3YD-HOP-00001
Mass Balance Document: 24590-WTP-M4C-V11T-00005, Rev A
Normally Associated Streams: HOP33, HOP21, HOP24, HOP25
Off Normal Streams (e.g., overflow from other vessels): N/A
P&ID: N/A
PFD: 24590-HLW-M5-V17T-00004; 24590-HLW-M5-V17T-20004
Technical Reports: N/A

Notes:

1. Concentrations less than 1×10^{-4} g/m^3 do not need to be reported; list concentration values to three significant digits max.
2. Data developed from a mass balance model which has constituents in the plant feed which are important to corrosion, adjusted to contract maximum values, except as noted.
3. Normal operating temperatures range from 197 °F at inlet of the cool side, to 391 °F at the outlet of the cool side and 421 °F at inlet of the hot side, to 257 °F at the outlet of the hot side (page A-8, 24590-HLW-M4C-HOP-00011, Rev 1).
4. Maximum operating temperatures range from 239 °F at inlet of the cool side, to 398 °F at the outlet of the cool side and 431 °F at inlet of the hot side, to 294 °F at the outlet of the hot side (page A-10, 24590-HLW-M4C-HOP-00011, Rev 1).
5. Source: 24590-HLW-M4C-HOP-00011, Rev 1, pages A-10 through A-13

Assumptions

1. Based on empirical data from testing per Attachment 28 of 24590-HLW-M4E-HOP-00005, page 4.

CORROSION EVALUATION

5.3.6 Silver Mordenite Preheater (HOP-HX-00002, HOP-HX-00004)

Routine Operations

The silver mordenite preheater recovers heat from the catalyst skid discharge offgas. The preheater is a plate heat exchanger with plates and end covers.

Non-Routine Operations that Could Affect Corrosion or Erosion

Any extended facility shutdown mode that results in cessation of airflow thorough offgas system, resulting in condensation of effluent inside equipment, is not desirable.

CORROSION EVALUATION

HOP-HTR-00001 & HOP-HTR-00007(HLW)
Catalyst Skid Electric Heater

- Design Temperature (°F): 1000
- Design Pressure (in WG) (internal/external): 84/82
- Location: Room H-A123; outcell

Contents of this document are Dangerous Waste Permit affecting

Operating conditions are as stated on attached Selections Data Sheet

Operating Modes Considered:

- Assume off-normal conditions same as normal operations

Materials Considered:

Material (UNS No.)	Acceptable Material	Unacceptable Material
Carbon Steel		X
Type 304L (S30403)	X[1]	
Type 316L (S31603)	X[1]	
Type 347 (S34700.)	X[2]	
6% Mo (N08367/N08926)		X
Incoloy 800 (N08800)	X[3]	
Inconel 600 (N06600)	X[3]	
Hastelloy® C-22® (N06022)		X
Ti-2 (R50400)		X

Recommended Materials

- [2]Housing – Type 347 stainless steel
- [2]Internal components – Type 347 stainless steel
- [3]Heating element sheath– Incoloy 800 or Inconel 600
- Electric heater elements are ASME unlisted components. The sheath mechanical connection is resistant to corrosion.
- [1]Structural support (not in contact with offgas stream): Type 304 (or Type 316) stainless steel (max 0.030% C; dual certified)
- Seals shall use high temperature materials to limit air leakage.

Recommended Corrosion Allowance: Housing - 0.010 inch (includes 0.00 inch erosion allowance)

Process & Operations Limitations:

The objective is to minimize corrosion due to condensation of acid gases during system shutdown and lay-up. To support that objective:

- The system will be operated within normal operating limits that are established to prevent condensation. The operating limits will be documented in the system description.
- Condensation will be prevented during extended system outages.

Concurrence Operations

REV	DATE	REASON FOR REVISION	PREPARER	CHECKER	MET	APPROVER
0	12/16/10	Initial Issue	DLAdler	RBDavis	APRangus via e-mail	SWVail

CORROSION EVALUATION

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.

This bound document contains a total of 7 sheets.

CORROSION EVALUATION

Corrosion Considerations:

Heaters heat the offgas to the final temperature for reaction. Electric heaters are used to heat incoming gas to approximately 750 °F to volatize hydrocarbons and inorganic contaminants.

a General Corrosion
The anticipated dry-air conditions are not conducive to general corrosion and none is expected.

Conclusion
No external corrosion is expected; no internal aqueous corrosion is expected.

b Pitting Corrosion
Pitting corrosion will only be a concern if moisture is present. It is assumed that there will be no condensation in the unit during operation. Condensation on the cold surfaces during shutdown may lead to localized pitting corrosion.

Conclusion
At the stated operating conditions, pitting corrosion is not a concern.

c End Grain Corrosion
End grain corrosion only occurs in high acid conditions and is not a concern.

Conclusion:
Not a concern

d Stress Corrosion Cracking
Stress corrosion cracking will only be a concern during thermal transients and in the presence of moisture. Aggressive ion concentrations are small. While concentration mechanisms are unknown, they certainly could be present.

Conclusion
At the stated operating conditions, with low carbon grades of stainless steel and with no free moisture, stress corrosion cracking is not a concern. During non-operational periods the unit interior will be dry.

e Crevice Corrosion
The design of the enclosure will produce crevices near the weld lap joints. However, with no moisture present, crevice corrosion is not a concern.

Conclusion
At the stated operating conditions, with stainless steel, crevice corrosion is not a concern.

f Corrosion at Welds
Assuming dry conditions and proper welding procedures, corrosion at welds is not anticipated.

Conclusion
At the stated operating conditions, weld corrosion is not a concern.

g Microbiologically Induced Corrosion (MIC)
The stated operating conditions are not suitable for microbial growth.

Conclusion
At the stated operating conditions, MIC is not a concern.

h Fatigue/Corrosion Fatigue
Extreme temperature cycling or fluctuations are not expected.

Conclusion
At the expected operating conditions, corrosion fatigue is not a concern.

i Vapor Phase Corrosion
Components essentially consist entirely of vapor space so general corrosion comments apply.

Conclusion:
See comments under general corrosion.

j Erosion
The velocity and solids content are sufficiently low that erosion is not a concern.

Conclusion
Erosion is not a concern.

CORROSION EVALUATION

k Galling of Moving Surfaces
There are no unlubricated moving surfaces present.

Conclusion:
Galling is not a concern.

l Fretting/Wear
No metal/metal contacting surfaces are expected.

Conclusion:
Fretting is not a concern.

m Galvanic Corrosion
No significantly dissimilar metals are present and it is assumed no moisture is present.

Conclusion:
Galvanic corrosion is not a concern.

n Cavitation
Cavitation is not expected in an off-gas system

Conclusion:
Cavitation is not a concern.

o Creep
The enclosure and internal components operate as sufficiently low enough temperatures that creep is not an issue. The heating element will operate at much higher temperatures such that oxidation and creep become factors. Heater elements should be oxidation and creep resistant Incoloy 800 or Inconel 600.

Conclusion
At the stated operating conditions, creep is not a concern, except that heater elements should be oxidation and creep resistant Incoloy 800 or Inconel 600.

p Inadvertent Addition of Nitric Acid
Introduction of nitric acid into the offgas stream is not a likely scenario.

Conclusion
Not applicable.

q Thermal Shock
With each energizing cycle of the elements, the performance and life of the heating elements will degrade.

Conclusion
Thermal shock should be avoided.

r Oxidation
Oxidation will degrade the performance and life of the heating elements. These nickel-based, high-temperature alloys are susceptible to accelerated oxidation with increasing sulfur in the gas. Only the heating elements will be thermally hot enough for oxidation.

Conclusion
Heater elements should be oxidation and creep resistant Incoloy 800 or Inconel 600.

CORROSION EVALUATION

References:

1. 24590-HLW-M4C-HOP-00011, Rev. 1, *HLW Melter Offgas System Design Basis Flowsheets*
2. 24590-WTP-RPT-PR-04-0001, Rev. 0CC, *WTP Process Corrosion Data*
3. CCN 174990, e-mail from J Wood to R Davis, 25 March, 2008, "Design Temperatures For HOP TCOs"

Bibliography:

1. 24590-CM-POA-MBT0-00002-03-00001, *Data Sheet – HLW Thermal Catalytic Oxidizers/Reducers – Mechanical Data Sheet*
2. Allegheny Ludlum, 2003, Stainless Steels, Types 321, 347, and 348, Technical Data Blue Sheet, Allegheny Technologies, Inc.
3. Maziasz, PJ, RW Swindeman, JP Shingledecker, KL More, BA Pint, E Lara-Curzio, and ND Evans, 2003, *Improving High-Temperature Performance of Austenitic Stainless Steels for Advanced Microturbine Recuperators,* The Institute for Materials, Minerals and Mining, Maney Publishing, London, UK
4. Sedriks, AJ, 1996, *Corrosion of Stainless Steels*, John Wiley & Sons, Inc., New York, NY 10158

CORROSION EVALUATION

24590-WTP-RPT-PR-04-0001, Rev. 0CC
WTP Process Corrosion Data

PROCESS CORROSION DATA SHEET

Component(s) (Name/ID #) Catalyst skid electric heater (HOP-HTR-00001, HOP-HTR-00007)

Facility HLW

In Black Cell? No

Chemicals	Unit[1]	Contract Maximum[2]		Non-Routine		Notes
		Leach	No leach	Leach	No Leach	
Aluminum	g/m^3					
HCl	g/m^3					
HF	g/m^3					
Iron	g/m^3					
NO	g/m^3	3.33E-01	3.45E-01			
NO_2	g/m^3	1.4E-02	1.4E-02			Note 5
Phosphate	g/m^3					
SO_2	g/m^3	1.0E-03	1.0E-03			Note 5
Mercury	g/m^3					
Carbonate	g/m^3					
Particulate	g/m^3					
HNO_3	g/m^3	2.8E-03	2.8E-03			Assumption 1
HNO_2	g/m^3	3.6E-03	3.6E-03			Assumption 1
Humidity	%					Note 3
Temperature	°F					Note 4

List of Organic Species:

References

System Description: 24590-HLW-3YD-HOP-00001
Mass Balance Document: 24590-WTP-M4C-V11T-00005, Rev A
Normally Associated Streams: HOP26, HOP27
Off Normal Streams (e.g., overflow from other vessels): N/A
P&ID: N/A
PFD: 24590-HLW-M5-V17T-00004; 24590-HLW-M5-V17T-20004
Technical Reports: N/A

Notes:

1. Concentrations less than 1×10^{-4} g/m^3 do not need to be reported; list concentration values to three significant digits max.
2. Data developed from a mass balance model which has constituents in the plant feed which are important to corrosion, adjusted to contract maximum values, except as noted.
3. Relative humidity inlet 0.1 % (page A-10, 24590-HLW-M4C-HOP-00011, rev 1)
4. The operating range of temperature is 621 °F to 624 °F at the inlet, and 750 °F at the outlet (pages A-6 and A-10, 24590-HLW-M4C-HOP-00011, Rev 1)
5. Source: 24590-HLW-M4C-HOP-00011, Rev 1, pages A-10 through A-13

Assumptions

1. Based on empirical data from testing per Attachment 28 of 24590-HLW-M4E-HOP-00005, page 4.

CORROSION EVALUATION

5.3.8.1 Catalyst Skid Electric Heater (HOP-HTR-00001, and -00007)

Normal Operations

The catalyst skid electric heater heats the offgas to the final temperature for reaction.

Non-Routine Operations that Could Affect Corrosion or Erosion

None identified.

Quarter Ending June 30, 2012 24590-HLW-PCN-ENV-11-008

Hanford Facility RCRA Permit Modification Notification Form
Part III, Operating Unit 10
Waste Treatment and Immobilization Plant

Index

Page 2 of 3: Hanford Facility RCRA Permit, Part III, Operating Unit 10, Waste Treatment and Immobilization Plant
Replace Piping and Instrumentation Diagrams (P&ID) for the HLW Vitrification Facility HLW Melter Cave Support Handling (HSH) System, Pulse-Jet Ventilation (PJV) System, and Radioactive Liquid Waste Disposal (RLD) System in Appendix 10.2 of the Dangerous Waste Permit (DWP).

Submitted by Co-Operator:		Reviewed by ORP Program Office:	
Donna Busche	6/5/12	Del C May	7/2/12
D. M. Busche	Date	D. L. Noyes	Date

Quarter Ending June 30, 2012 24590-HLW-PCN-ENV-11-008

Hanford Facility RCRA Permit Modification Notification Form	
Unit: **Waste Treatment and Immobilization Plant**	Permit Part: **Part III, Operating Unit 10**

Description of Modification:

The purpose of this Class 1 prime modification is to update and replace the following P&IDs for the HLW HSH System, PJV System, and the RLD miscellaneous sumps in Appendix 10.2 of the DWP. The five P&IDs incorporated into the permit are being replaced with seven P&IDs as indicated in the table below. The additional drawings are the result of converting two of the permit drawings into source drawing multiple sheets in an effort to provide clearer representation of the support systems, including additional details for instrumentation and logic controls.

Appendix 10.2			
Replace:	24590-HLW-M6-HSH-P0004, Rev. 0	With:	24590-HLW-M6-HSH-00004001, Rev. 1
			24590-HLW-M6-HSH-00004002, Rev. 1
	24590-HLW-M6-HSH-P20004, Rev. 0		24590-HLW-M6-HSH-20004001, Rev. 1
			24590-HLW-M6-HSH-20004002, Rev. 1
	24590-HLW-M6-PJV-00001, Rev. 4		24590-HLW-M6-PJV-00001001, Rev. 0
	24590-HLW-M6-PJV-00002, Rev. 4		24590-HLW-M6-PJV-00002001, Rev. 0
	24590-HLW-M6-RLD-20004, Rev. 6		24590-HLW-M6-RLD-20004001, Rev. 0

This modification requests Ecology approval and incorporation into the permit the specific changes to the P&IDs that are indicated by revision notes and clouds. The P&IDs include changes provided in applicable document change forms (e.g., DCN, SCN, SDDR, FCN, FCR, etc.) that were submitted to Ecology in accordance with Condition III.10.C.9.h. In addition, these P&IDs include changes associated with the resolution to comments on change documents since the issuance of the last revision of the permitted documents.

Please note there are no significant design changes shown on the expanded P&IDs. Typical changes to the P&IDs are summarized below:

- Converted HSH drawings from a single sheet to multi-sheet drawings
- Modified, deleted, and added notes, holds, and references
- Modified, identified, and added support/utility system lines, valves, in-line components, instruments, and logic controls
- Deleted high pressure steam supply line in order to resolve issues concerning use of direct steam addition to clear plugs in the HSH decon tank drain line (CCN 173321 and DCN 24590-HLW-M6N-30-00016)
- Incorporated changes from change documentation identified in the Notes section on each drawing

This modification requests Ecology approval and incorporation of the following list of outstanding change documents into the permit. Although not yet incorporated into the revised documents attached to this PCN, this list of outstanding DCNs is intended to be incorporated into this modification.

24590-HLW-M6-PJV-00002001

- 24590-HLW-M6LN-PJV-00002

In accordance with Permit Condition III.10.C.2.e, this permit modification may include page changes to the Permit, attachments, and permit application supporting documentation. Necessary permit changes are attached to this PCN. Ecology is requested to approve the attached permit changes and incorporate the changes in the next revision of the WTP Dangerous Waste Permit.

See attached.

Quarter Ending June 30, 2012 24590-HLW-PCN-ENV-11-008

WAC 173-303-830 Modification Class:	Class 1	Class [1]1	Class 2	Class 3
Please mark the Modification Class:		X		

Enter relevant WAC 173-303-830, Appendix I Modification citation number: NA

Enter wording of WAC 173-303-830, Appendix I Modification citation:

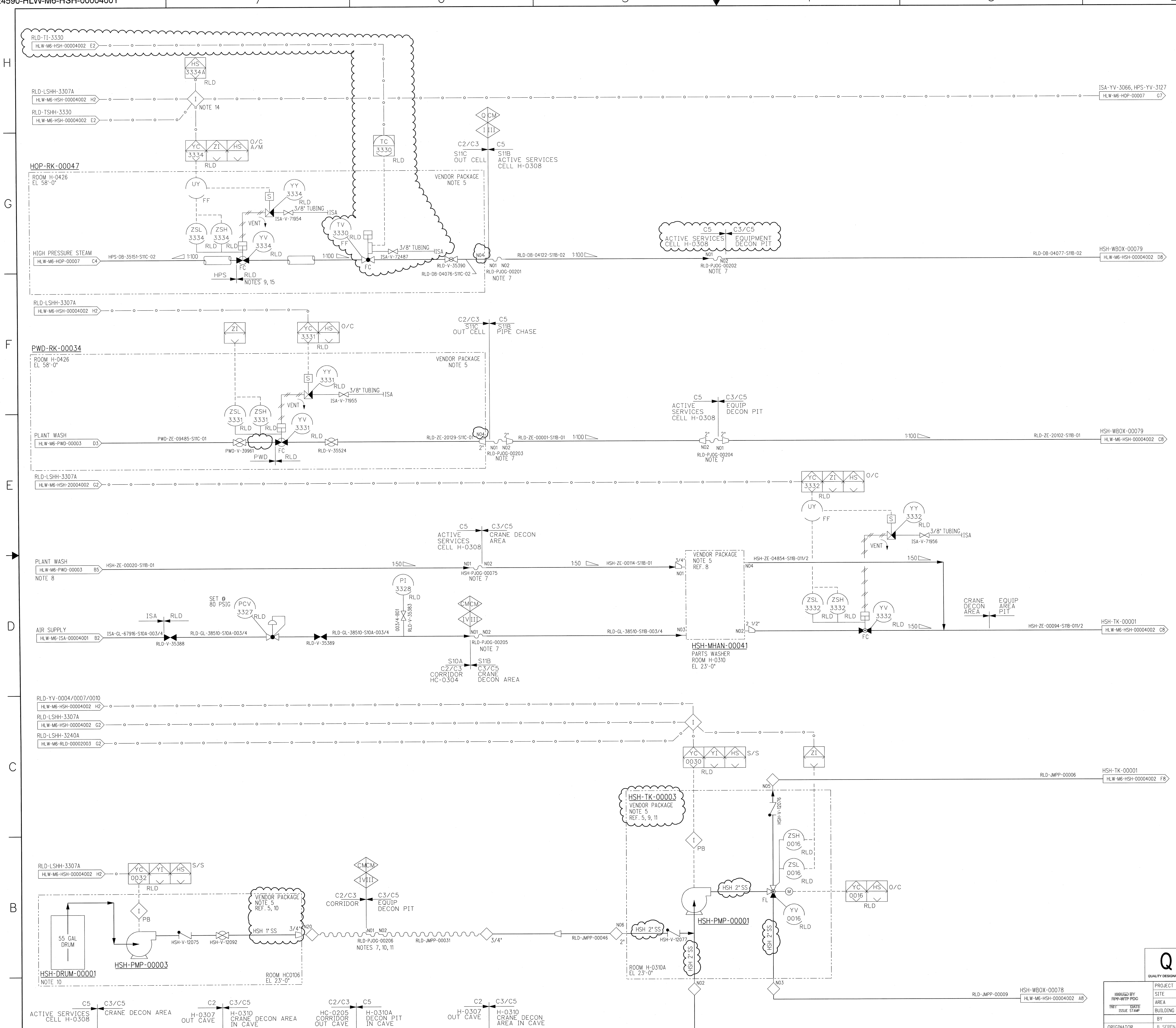
In accordance with WAC 173-303-830(4)(d)(i), this modification notification is requested to be reviewed and approved as a Class [1]1 modification. WAC 173-303-830(4)(d)(ii)(A) states, "Class 1 modifications apply to minor changes that keep the permit current with routine changes to the facility or its operation. These changes do not substantially alter the permit conditions or reduce the capacity of the facility to protect human health or the environment. In the case of Class 1 modifications, the director may require prior approval."

Modification Approved/Concur: [√] Yes [ ] Denied (state reason below)

Reason for denial:

Reviewed by Ecology:

A. Carlson 7/25/12 Date



NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
2. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
3. THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-III, UNLESS OTHERWISE NOTED.
4. ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, UNLESS OTHERWISE NOTED.
5. THIS DRAWING CONTAINS INFORMATION FROM SUPPLIER SUBMITTAL 24590-CM-POA-HDYR-00001-01-00231.
6. INSTRUMENTS ARE QUALITY LEVEL CM UNLESS DESIGNATED BY A "Z" OR ARE AIR PERMIT AFFECTING. INSTRUMENT, ROOT VALVES AND TUBING CONFINEMENT REQUIREMENTS ARE THE SAME AS THE CONNECTING PROCESS PIPE, UNLESS OTHERWISE NOTED.
7. THE GEOMETRY OF JOGGLED (OFFSET) PENETRATION IS QUALITY LEVEL Q FOR RADIATION PROTECTION. THE QUALITY LEVEL AND SEISMIC CATEGORY DESIGNATIONS OF PIPING WITHIN JOGGLES ARE THE SAME AS CONNECTING PIPING UNLESS OTHERWISE SHOWN OR NOTED. PIPING WITHIN SPARE JOGGLES IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I. JOGGLED PENETRATIONS FOR THREAD THROUGH HOSES ARE DESIGNATED AS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I.
8. PLANT WASH SUPPLY LINE TO PARTS WASHER HSH-MHAN-00041 SHALL BE LOCATED ABOVE OVERFLOW LEVEL OF PARTS WASHER.
9. STEAM SUPPLY LINES REQUIRE A MINIMUM OF 34 FEET OF BAROMETRIC HEAD ABOVE THE HSH-TK-00002 OVERFLOW LEVEL. THE BAROMETRIC HEAD REQUIREMENT SHALL BE CONTAINED IN R5 AREAS. STEAM SUPPLY ACTUATED VALVES SHALL BE LOCATED AT THE HIGH POINT IN THE STEAM RACK.
10. HSH-DRUM-00001 AND RLD-PJOG-00206 SHALL BE LOCATED ABOVE THE FLOOD LEVEL FOR HSH-TK-00001.
11. PENETRATION TO BE 3" SS SCHEDULE 40S JOGGLE PIPE TO ALLOW THREAD THROUGH HOSE.
12. HSH-PJOG-00070 IS RESERVED FOR CHEMICAL INJECTION PIPING FROM OUT CAVE INTO PARTS WASHER HSH-MHAN-00041 (IN CAVE).
13. HSH-PJOG-00070 SHALL BE LOCATED ABOVE FLOOD LEVEL OF PARTS WASHER HSH-MHAN-00041.
14. TO START THE TRANSFER, THE OPERATOR PLACES THE ICN/HMI EJECTOR STEAM SUPPLY HANDSWITCH RLD-HS-3334A IN THE START POSITION. HIGH LEVEL IN HSH-TK-00001 OR ISA-YV-3066 AND HPS-YV-3127 NOT AUTO/NOT CLOSED INHIBITS THE START OF TRANSFER. THE VALVES SEQUENCE AS FOLLOWS: ISA-YV-3066 OPENS, THE EJECTOR STEAM SUPPLY VALVE RLD-YV-3334 OPENS, ISA-YV-3066 CLOSES AND HPS-YV-3127 OPENS. THE TRANSFER IS TERMINATED BY OPERATOR ACTION OR BY PROCESS CONDITIONS (HI HI LEVEL IN HSH-TK-00001, HI HI TEMPERATURE IN HSH-TK-00001, OR STEAM RACK ERROR). THE VALVES SEQUENCE AS FOLLOWS: ISA-YV-3066 OPENS, HPS-YV-3127 CLOSES, RLD-YV-3334 CLOSES, ISA-YV-3066 CLOSES.
15. VALVE TO BE SLOW CLOSING.
16. THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-HLW-M6-HSH-00004 REV 2. THIS DRAWING INCLUDES INFORMATION FROM 24590-HLW-M6N-HSH-00002, -00003, -00010, -00012, -00013, -00016, -00020, -00021, -00023, -00026, 24590-HLW-M6LN-HSH-00001, -00002, -00010, 24590-HLW-M6N-30-00016, AND -00034.
17. REVISION 1: ADDED VALVE CONTROL TC, PIPELINE AREA BREAK, AND LINE SIZES. REVISED NOZZLES NUMBER, OFFSHEET DIRECTION, AND DELETED SLOPE. ADDED/MODIFIED NOTES AND REFERENCES.

HOLD/OPEN ITEMS:

NONE

REFERENCES:

1. 24590-HLW-3YD-HSH-00001, SYSTEM DESCRIPTION FOR THE SYSTEM HSH-HLW MELTER CAVE SUPPORT HANDLING.
2. 24590-WTP-3PS-HD00-T0001, ENGINEERING SPECIFICATION FOR MAINTENANCE DECONTAMINATION EQUIPMENT.
3. 24590-HLW-M0-HSH-00071, HLW VITRIFICATION SYSTEM HSH MELTER CAVES 1 & 2 DESIGN PROPOSAL DRAWING DECONTAMINATION TANK ASSEMBLY.
4. 24590-HLW-M0-HSH-00040001, HLW VITRIFICATION SYSTEM HSH DESIGN PROPOSAL DRAWING CRANE DECON AREA PARTS WASHER.
5. 24590-CM-POA-HDYR-00001-01-00231, P&ID HSH DECON TANK 24590-HLW-MT-HSH-TK-00001.
6. 24590-HLW-M0-HSH-00073, HLW VITRIFICATION SYSTEM HSH DESIGN PROPOSAL DRAWING DECONTAMINATION TANK SPRAY AND SPARGE SYSTEM.
7. 24590-HLW-M0-HSH-00075, HLW VITRIFICATION SYSTEM DESIGN PROPOSAL DRAWING DECONTAMINATION TANK PROCESS FLOW DIAGRAM.
8. 24590-HLW-M0D-HSH-00150, 24590-HLW-HSH-MHAN-00041-PART WASHING SYSTEM: TOP LOADING WITH CAPABILITY TO BE OPREATED BY ROBOTIC MANIPULATOR.
9. 24590-CM-POA-HDYR-00001-06-00050, DRAWING-HSH-PUMP SUPPORT PACKAGE DETAILS.
10. 24590-CM-POA-HDYR-00001-06-00070, DRAWING-HSH-CHEMICAL INJECTION ASSEMBLY.
11. 24590-CM-POA-HDYR-00001-06-00079, DRAWING-HSH-PUMP SUPPORT PACKAGE DETAILS.

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 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.

DRAWING INDEX

DWG NO	TITLE
24590-HLW-M6-HSH-00004001	SUP HANDLING SYSTEM DECON SYS MELTER CAVE 1
24590-HLW-M6-HSH-00004002	SUP HANDLING SYSTEM DECON SYS MELTER CAVE 1

REVISION HISTORY

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
1	REVISED PER NOTE 17	SA	AM	RP/SS	SPK	2/24/12
0	ISSUED FOR CONSTRUCTION, SEE NOTE 16	BSA	RM	RP/SS	SK/CM	9/12/11

Q QUALITY DESIGNATOR

ISSUED BY RPP-WTP PDC
INIT DATE ISSUE STAMP

PROJECT No.	24590
SITE	HANFORD
AREA	200E
BUILDING No.	30

	BY	DATE
ORIGINATOR	B. SERENA AUSTEN	9/7/11
CHECKER	ROBIE MACKAY	9/7/11
APPROVER	KRETZSCHMAR S/MUSICK	9/12/11
REVIEWER	SMITH, S/ PETERS, R	9/9/11

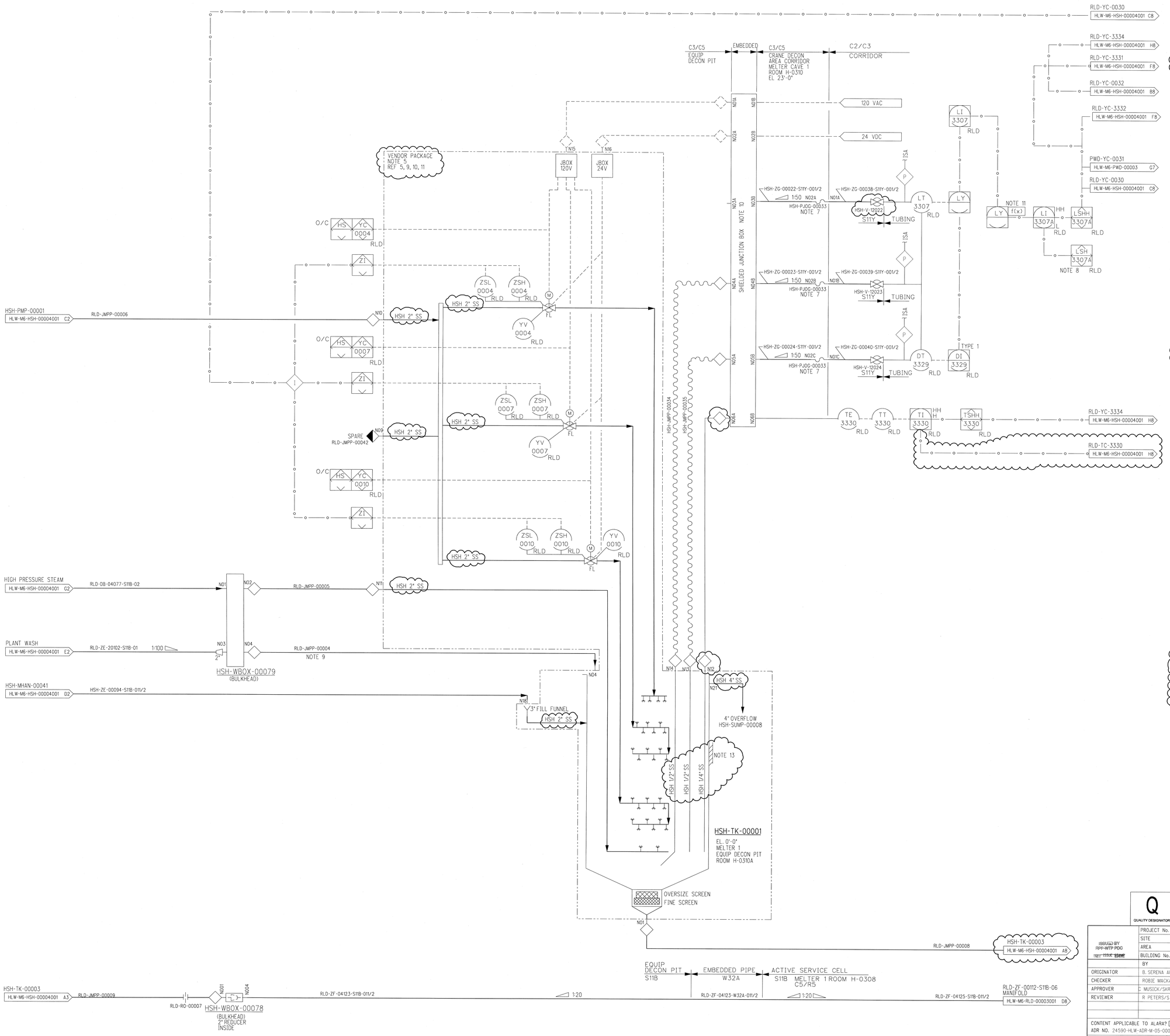
CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. 24590-HLW-ADR-M-05-0001 REV: 0
E&NS SCREENING REQUIRED? [X] YES [ ] NO E&NS INITIAL IF YES

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

P&ID - HLW HLW MELTER CAVE SUPPORT HANDLING SYSTEM DECONTAMINATION SYSTEM MELTER CAVE 1

SCALE: NONE
24590-HLW-M6-HSH-00004001 REV 1



NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
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7. THE GEOMETRY OF JOGGLED (OFFSET) PENETRATION IS QUALITY LEVEL Q FOR RADIATION PROTECTION. THE QUALITY LEVEL AND SEISMIC CATEGORY DESIGNATIONS OF PIPING WITHIN JOGGLES ARE THE SAME AS CONNECTING PIPING UNLESS OTHERWISE NOTED. PIPING WITHIN SPARE JOGGLES IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I. JOGGLED PENETRATIONS FOR THREAD THROUGH HOSES ARE DESIGNATED AS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I.
8. TO START THE TRANSFER, THE OPERATOR PLACES THE ICN/HMI EJECTOR STEAM SUPPLY HANDSWITCH RLD-HS-3334A IN THE START POSITION. HIGH LEVEL IN HSH-TK-00001 OR ISA-YV-3066 AND HPS-YV-3127 NOT AUTO/ NOT CLOSED INHIBITS THE START OF TRANSFER. THE VALVE SEQUENCE AS FOLLOWS: ISA-YV-3066 OPENS, THE EJECTOR STEAM SUPPLY VALVE RLD-YV-3334 OPENS, ISA-YV-3066 CLOSES AND HPS-YV-3127 OPENS. THE TRANSFER IS TERMINATED BY OPERATOR ACTION OR BY PROCESS CONDITIONS (HI HI LEVEL IN HSH-TK-00001, HI HI TEMPERATURE IN HSH-TK-00001, OR STEAM RACK ERROR). THE VALVES SEQUENCE AS FOLLOWS: ISA-YV-3066 OPENS, HPS-YV-3127 CLOSES, RLD-YV-3127 CLOSES, HPS-YV-3127 CLOSES, RLD-YV-3334 CLOSES, ISA-YV-3066 CLOSES.
9. ENTRY ELEVATION OF PLANT WASH ADDITION JUMPER RLD-JMPP-00004 TO HSH-TANK-00001 SHALL BE ABOVE TANK OVERFLOW LEVEL.
10. 12" X 18" SHIELDED JUNCTION BOX (NUMBER H-0310AS-EL0001) IS REQUIRED FOR ACCESS TO FLEXIBLE HOSES.
11. FUNCTION CONVERTS TANK LEVEL IN INCHES TO GALLONS.
12. THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWING AND, IN PART, SUPERSEDES 24590-HLW-M6-HSH-00004 REV 2. THIS DRAWING INCLUDES INFORMATION FROM 24590-HLW-M6N-HSH-00002, -00006, -00012, -00020, -00021, 24590-HLW-M6LN-HSH-00010, AND -00011.
13. SUBCONTRACTOR TO SUPPLY AND INSTALL 4 INCH THICK CELLULAR GLASS THERMAL INSULATION.
14. REVISION 1: ADDED INSULATION TO HSH-TK-00001, ADDED LINE SIZE. ADDED/MODIFIED NOTES AND REFERENCES.

HOLD/OPEN ITEMS:

NONE

REFERENCES:

1. 24590-HLW-3YD-HSH-00001, SYSTEM DESCRIPTION FOR THE SYSTEM HSH-HLW MELTER CAVE SUPPORT HANDLING.
2. 24590-WTP-3PS-HD00-T0001, ENGINEERING SPECIFICATION FOR MAINTENANCE DECONTAMINATION EQUIPMENT.
3. 24590-HLW-M0-HSH-00071, HLW VITRIFICATION SYSTEM HSH MELTER CAVES 1 & 2 DESIGN PROPOSAL DRAWING DECONTAMINATION TANK ASSEMBLY.
4. 24590-HLW-M0-HSH-00040001, HLW VITRIFICATION SYSTEM HSH DESIGN PROPOSAL DRAWING CRANE DECON AREA PARTS WASHER.
5. 24590-CM-POA-HDYR-00001-01-00231, P&ID HSH DECON TANK 24590-HLW-MT-HSH-TK-00001.
6. 24590-HLW-M0-HSH-00073, HLW VITRIFICATION SYSTEM HSH DESIGN PROPOSAL DRAWING DECONTAMINATION TANK SPRAY AND SPARGE SYSTEM.
7. 24590-HLW-M0-HSH-00075, HLW VITRIFICATION SYSTEM DESIGN PROPOSAL DRAWING DECONTAMINATION TANK PROCESS FLOW DIAGRAM.
8. 24590-HLW-M0D-HSH-00150, 24590-HLW-HSH-MHAN-00041-PART WASHING SYSTEM: TOP LOADING WITH CAPABILITY TO BE OPERATED BY ROBOTIC MANIPULATOR.
9. 24590-CM-POA-HDYR-00001-06-00040, DRAWING-HSH INTERNAL SPRAY RING ASSEMBLY.
10. 24590-CM-POA-HDYR-00001-06-00041, DRAWING-HSH INTERNAL SPRAY RING WELDMENTS AND DETAILS.
11. 24590-CM-POA-HDYR-00001-06-00045, DRAWING-HSH INTERNAL SPRAY RING DETAILS.

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 under its AEA authority. DOE asserts that regulation of the AEA, to the sole and exclusive authority 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.

Q
QUALITY DESIGNATOR

REVISION HISTORY

REV	DESCRIPTION	ORG	CHKD	RV WD	APVD	DATE
1	REVISED PER NOTE 14	BSA	AM	RP/SS	RP/SS	2/24/12
0	ISSUED FOR CONSTRUCTION, SEE NOTE 12	BSA	RM	CM/SK	RP/SS	9/12/11

ISSUED BY RPP-WTP PDC
~~RPP-ISSUE STAMP~~

PROJECT No.	24590	
SITE	HANFORD	
AREA	200E	
BUILDING No.	30	
	BY	DATE
ORIGINATOR	B. SERENA AUSTEN	9/12/11
CHECKER	ROBIE MACKAY	9/12/11
APPROVER	C MUSICK/SKRETZSCHMAR	9/12/11
REVIEWER	R PETERS/S SMITH	9/12/11

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. 24590-HLW-ADR-M-05-0001 REV: 0
EMS SCREENING REQUIRED? [X] YES [ ] NO EMS INITIAL IF YES

BECHTEL

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

P&ID - HLW HLW MELTER CAVE SUPPORT HANDLING SYSTEM DECONTAMINATION SYSTEM MELTER CAVE 1

SCALE: NONE

24590-HLW-M6-HSH-00004002

REV 1

SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREQ-002

24" SIZE - 44x34
COMPUTER GENERATED - MANUAL DESIGN CHANGES NOT PERMITTED

R11478534

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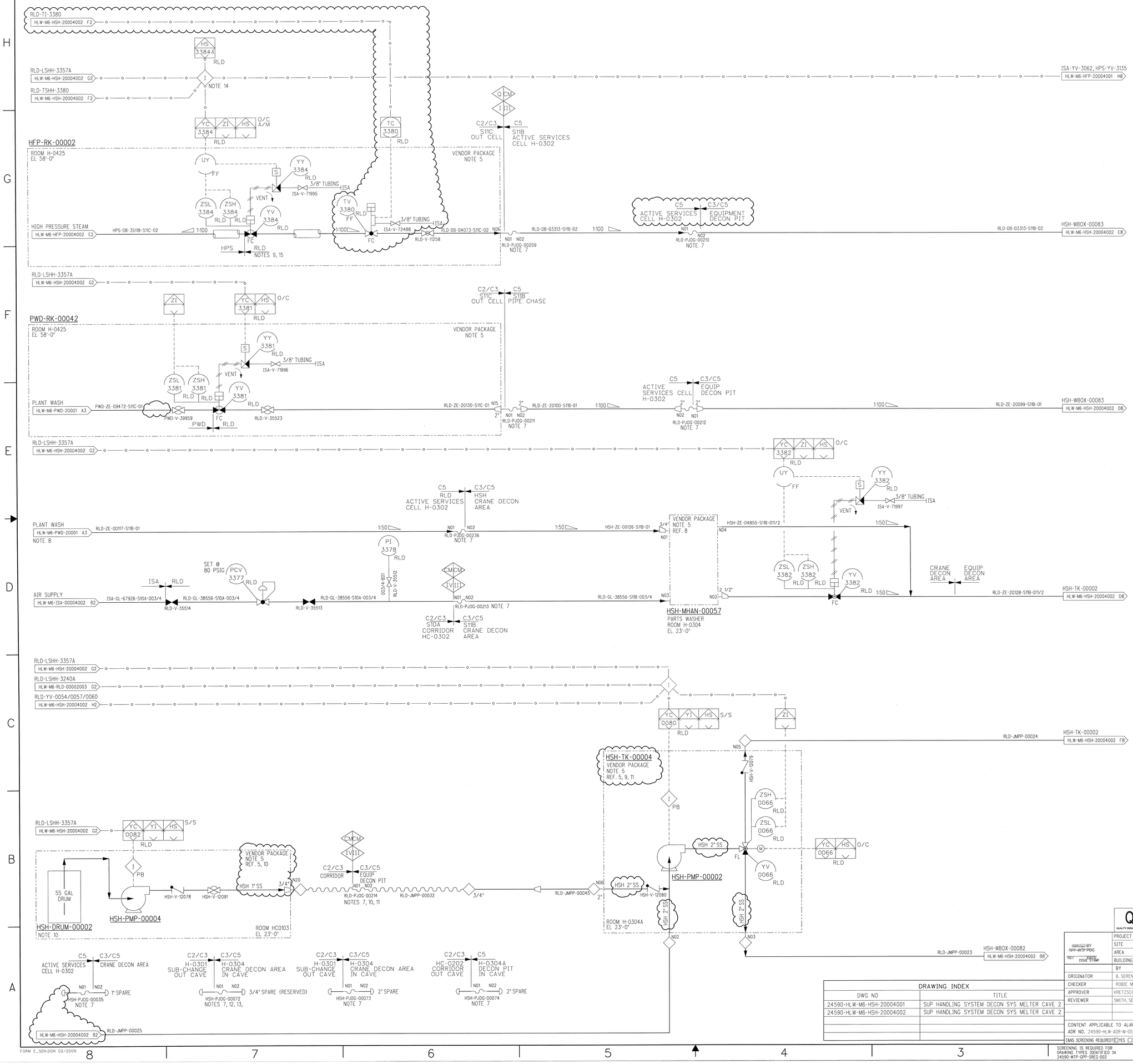
PLOTTED BY: gpockes C:\Work\gpockes\dms03839\HLWHSH00004002.dgn

FORM E_SDN.DGN 02/2009



NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
2. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
3. THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-III, UNLESS OTHERWISE NOTED.
4. ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, UNLESS OTHERWISE NOTED.
5. THIS DRAWING CONTAINS INFORMATION FROM SUPPLIER SUBMITTAL 24590-CM-POA-HDYR-00001-01-00231.
6. INSTRUMENTS ARE QUALITY LEVEL CM UNLESS DESIGNATED BY A "Z" OR ARE AIR PERMIT AFFECTING. INSTRUMENT, ROOT VALVES AND TUBING CONFINEMENT REQUIREMENTS ARE THE SAME AS THE CONNECTING PROCESS PIPE, UNLESS OTHERWISE NOTED.
7. THE GEOMETRY OF JOGGLED (OFFSET) PENETRATION IS QUALITY LEVEL Q FOR RADIATION PROTECTION. THE QUALITY LEVEL AND SEISMIC CATEGORY DESIGNATIONS OF PIPING WITHIN JOGGLES ARE THE SAME AS CONNECTING PIPING UNLESS OTHERWISE SHOWN OR NOTED. PIPING WITHIN SPARE JOGGLES IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I. JOGGLED PENETRATIONS FOR THREAD THROUGH HOSES ARE DESIGNATED AS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I.
8. PLANT WASH SUPPLY LINE TO PARTS WASHER HSH-MHAN-00057 SHALL BE LOCATED ABOVE OVERFLOW LEVEL OF PARTS WASHER.
9. STEAM SUPPLY LINES REQUIRE A MINIMUM OF 34 FEET OF BAROMETRIC HEAD ABOVE THE HSH-TK-00002 OVERFLOW LEVEL. THE BAROMETRIC HEAD REQUIREMENT SHALL BE CONTAINED IN R5 AREAS. STEAM SUPPLY ACTUATED VALVES SHALL BE LOCATED AT THE HIGH POINT IN THE STEAM RACK.
10. HSH-DRUM-00002 AND RLD-PJOG-00214 SHALL BE LOCATED ABOVE THE FLOOD LEVEL FOR HSH-TK-00002.
11. PENETRATION TO BE 3" SS SCHEDULE 40S JOGGLE PIPE TO ALLOW THREAD THROUGH HOSE.
12. HSH-PJOG-00072 IS RESERVED FOR CHEMICAL INJECTION PIPING FROM OUT CAVE INTO PARTS WASHER HSH-MHAN-00057 (IN CAVE).
13. HSH-PJOG-00072 SHALL BE LOCATED ABOVE FLOOD LEVEL OF PARTS WASHER HSH-MHAN-00057.
14. TO START THE TRANSFER, THE OPERATOR PLACES THE ICN/HMI EJECTOR STEAM SUPPLY HANDSWITCH RLD-HS-3384A IN THE START POSITION. HIGH LEVEL IN HSH-TK-00002 OR ISA-YV-3062 AND HPS-YV-3135 NOT AUTO/NOT CLOSED INHIBITS THE START OF TRANSFER. THE VALVES SEQUENCE AS FOLLOWS: ISA-YV-3062 OPENS, THE EJECTOR STEAM SUPPLY VALVE RLD-YV-3384 OPENS, ISA-YV-3062 CLOSES AND HPS-YV-3135 OPENS. THE TRANSFER IS TERMINATED BY OPERATOR ACTION OR BY PROCESS CONDITIONS (HI HI LEVEL IN HSH-TK-00002, HI HI TEMPERATURE IN HSH-TK-00002, OR STEAM RACK ERROR). THE VALVES SEQUENCE AS FOLLOWS: ISA-YV-3062 OPENS, HPS-YV-3135 CLOSES, RLD-YV-3384 CLOSES, ISA-YV-3062 CLOSES.
15. VALVE TO BE SLOW CLOSING.
16. THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-HLW-M6-HSH-20004 REV 2. THIS DRAWING INCLUDES INFORMATION FROM 24590-HLW-M6N-HSH-00001, -00002, -00010, 24590-HLW-M6N-HSH-00002, -00003, -00014, -00017, -00020, -00022, -00023, -00026, 24590-HLW-M6N-30-00016, AND -00034.
17. REVISION 1: ADDED VALVE CONTROL TC, PIPELINE AREA BREAK, AND LINE SIZES, OFFSHEET DIRECTION, AND DELETED SLOPE. ADDED/MODIFIED NOTES AND REFERENCES

HOLD/OPEN ITEMS:

NONE

REFERENCES:

1. 24590-HLW-3YD-HSH-00001, SYSTEM DESCRIPTION FOR THE SYSTEM HSH-HLW MELTER CAVE SUPPORT HANDLING.
2. 24590-WTP-3PS-HD00-T0001, ENGINEERING SPECIFICATION FOR MAINTENANCE DECONTAMINATION EQUIPMENT.
3. 24590-HLW-M0-HSH-00071, HLW VITRIFICATION SYSTEM HSH MELTER CAVES 1 & 2 DESIGN PROPOSAL DRAWING DECONTAMINATION TANK ASSEMBLY.
4. 24590-HLW-M0-HSH-00040001, HLW VITRIFICATION SYSTEM HSH DESIGN PROPOSAL DRAWING CRANE DECON AREA PARTS WASHER.
5. 24590-CM-POA-HDYR-00001-01-00252, P&ID HSH DECON TANK 24590-HLW-MT-HSH-TK-00002.
6. 24590-HLW-M0-HSH-00073, HLW VITRIFICATION SYSTEM HSH DESIGN PROPOSAL DRAWING DECONTAMINATION TANK SPRAY AND SPARGE SYSTEM.
7. 24590-HLW-M0-HSH-00075, HLW VITRIFICATION SYSTEM DESIGN PROPOSAL DRAWING DECONTAMINATION TANK PROCESS FLOW DIAGRAM.
8. 24590-HLW-M0D-HSH-00212, 24590-HLW-HSH-MHAN-00057-PART WASHING SYSTEM: TOP LOADING WITH CAPABILITY TO BE OPERATED BY ROBOTIC MANIPULATOR.
9. 24590-CM-POA-HDYR-00001-06-00050, DRAWING HSH-PUMP SUPPORT PACKAGE DETAILS.
10. 24590-CM-POA-HDYR-00001-06-00070, DRAWING HSH-CHEMICAL INJECTION ASSEMBLY.
11. 24590-CM-POA-HDYR-00001-06-00079, DRAWING HSH-PUMP SUPPORT PACKAGE DETAILS.

Please note that source, special nuclear, and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA) are regulated by the U.S. Nuclear Regulatory Commission (or agreement state) or DOE acting pursuant to its AEA authority. DOE asserts that, pursuant to 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.

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
1	REVISED PER NOTE 17	BSA	AM	RP/SS	CM/SK	2/24/12
0	ISSUED FOR CONSTRUCTION, SEE NOTE 16	BSA	RM	RP/SS	CM/SK	9/12/11

Q QUALITY DESIGNATOR

REVISION HISTORY

ISSUED BY RPP-WTP PDC
INIT ISSUE 3/14/09

PROJECT No.	24590	
SITE	HANFORD	
AREA	200E	
BUILDING No.	30	

	BY	DATE
ORIGINATOR	B. SERENA AUSTEN	9/7/11
CHECKER	ROBIE MACKAY	9/7/11
APPROVER	KRETZSCHMAR S/MUSICK	9/12/11
REVIEWER	SMITH, SEAN/R PETERS	9/9/11

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. 24590-HLW-ADR-M-05-0001 REV: 0
EMS SCREENING REQUIRED? [X] YES [ ] NO EMS INITIAL IF YES

BECHTEL

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

P&ID - HLW
HLW MELTER CAVE SUPPORT HANDLING SYSTEM DECONTAMINATION SYSTEM MELTER CAVE 2

SCALE: NONE

24590-HLW-M6-HSH-20004001

REV 1

DRAWING INDEX

DWG NO	TITLE
24590-HLW-M6-HSH-20004001	SUP HANDLING SYSTEM DECON SYS MELTER CAVE 2
24590-HLW-M6-HSH-20004002	SUP HANDLING SYSTEM DECON SYS MELTER CAVE 2

SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREG-002

SIZE - 44x34
COMPUTER GENERATED - MANUAL DESIGN CHANGES NOT PERMITTED

R11478535

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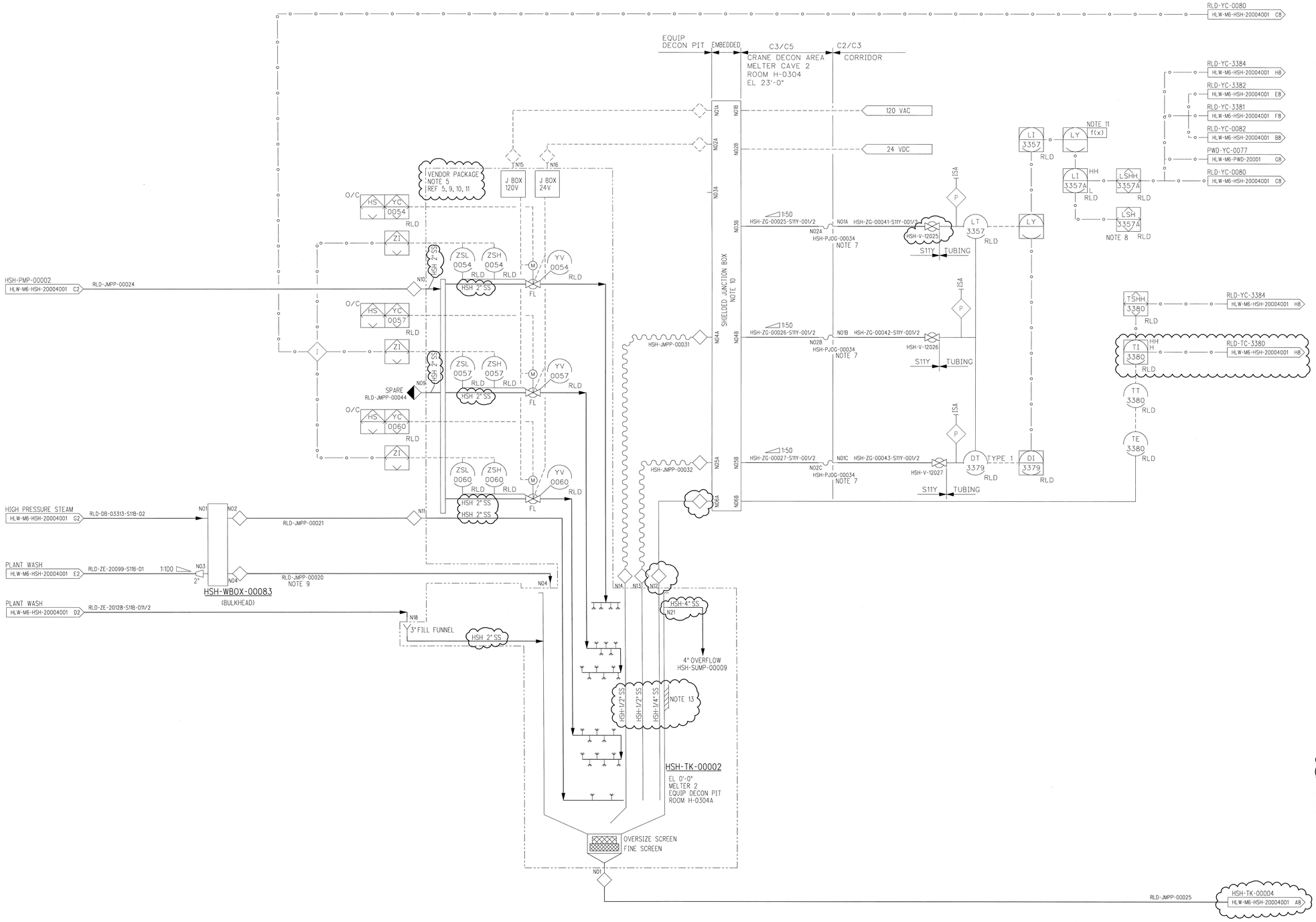
PLOTTED BY: gpookes

FORM E_SDN.DGN 02/2009



NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
2. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
3. THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-III, UNLESS OTHERWISE NOTED.
4. ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, UNLESS OTHERWISE NOTED.
5. THIS DRAWING CONTAINS INFORMATION FROM SUPPLIER SUBMITTAL 24590-CM-POA-HDYR-00001-01-00231.
6. INSTRUMENTS ARE QUALITY LEVEL CM UNLESS DESIGNATED BY A 'Z' OR ARE AIR PERMIT AFFECTING. INSTRUMENT ROOT VALVES AND TUBING CONFINEMENT REQUIREMENT ARE THE SAME AS THE CONNECTING PROCESS PIPE, UNLESS OTHERWISE NOTED.
7. THE GEOMETRY OF JOGGLED (OFFSET) PENETRATION IS QUALITY LEVEL Q FOR RADIATION PROTECTION. THE QUALITY LEVEL AND SEISMIC CATEGORY DESIGNATIONS OF PIPING WITHIN JOGGLES ARE THE SAME CONNECTING PIPING UNLESS OTHERWISE NOTED. PIPING WITHIN SPARE JOGGLES IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I. JOGGLED PENETRATIONS FOR THREAD THROUGH HOSES ARE DESIGNATED AS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I.
8. TO START THE TRANSFER, THE OPERATOR PLACES THE ICN/HMI EJECTOR STEAM STEAM SUPPLY HANDSWITCH RLD-HS-3384A IN THE START POSITION. HIGH LEVEL IN HSH-TK-00002 OR ISA-YV-3062 AND HPS-YV-3135 NOT AUTO/NOT CLOSED INHIBITS THE START OF TRANSFER. THE VALVES SEQUENCE AS FOLLOWS: ISA-YV-3062 OPENS, THE EJECTOR STEAM SUPPLY VALVE RLD-YV-3384 OPENS, ISA-YV-3062 CLOSES AND HPS-YV-3135 OPENS. THE TRANSFER IS TERMINATED BY OPERATOR ACTION OR BY PROCESS CONDITIONS (HI HI LEVEL IN HSH-TK-00002. HI HI TEMPERATURE IN HSH-TK-00002, OR STEAM RACK ERROR). THE VALVES SEQUENCE AS FOLLOWS: ISA-YV-3062 OPENS, HPS-YV-3135 CLOSES, RLD-YV-3384 CLOSES, ISA-YV-3062 CLOSES.
9. ENTRY ELEVATION OF PLANT WASH ADDITION JUMPER RLD-JMPP-00020 TO HSH-TANK-00002 SHALL BE ABOVE TANK OVERFLOW LEVEL.
10. 12" X 18" SHIELDED JUNCTION BOX (NUMBER H-0310AS-ELOD1) IS REQUIRED FOR ACCESS TO FLEXIBLE HOES.
11. FUNCTION CONVERTS TANK LEVEL IN INCHES TO GALLONS.
12. THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND, IN PART SUPERSEDES 24590-HLW-M6-HSH-20004 REV 2. THIS DRAWING INCLUDES INFORMATION FROM 24590-HLW-M6LN-HSH-00010, -00011, 24590-HLW-M6N-HSH-00002, -00003, -00006, -00014, -00017, -00020, -00022, -00023, AND 24590-HLW-M6N-30-00016.
13. SUBCONTRACTOR TO SUPPLY AND INSTALL 4 INCH THICK CELLULAR GLASS THERMAL INSULATION.
14. REVISION 1: ADDED INSULATION TO HSH-TK-00002, ADDED LINE SIZE. ADDED/MODIFIED NOTES AND REFERENCES.

HOLD/OPEN ITEMS:

NONE

REFERENCES:

1. 24590-HLW-3YD-HSH-00001, SYSTEM DESCRIPTION FOR THE SYSTEM HSH-HLW MELTER CAVE SUPPORT HANDLING.
2. 24590-WTP-3PS-HD00-T0001, ENGINEERING SPECIFICATION FOR MAINTENANCE DECONTAMINATION EQUIPMENT.
3. 24590-HLW-M0-HSH-00071, HLW VITRIFICATION SYSTEM HSH MELTER CAVES 1 & 2 DESIGN PROPOSAL DRAWING DECONTAMINATION TANK ASSEMBLY.
4. 24590-HLW-M0-HSH-00040001, HLW VITRIFICATION SYSTEM HSH DESIGN PROPOSAL DRAWING CRANE DECON AREA PARTS WASHER.
5. 24590-CM-POA-HDYR-00001-01-00252, P&ID HSH DECON TANK 24590-HLW-MT-HSH-TK-00002.
6. 24590-HLW-M0-HSH-00073, HLW VITRIFICATION SYSTEM HSH DESIGN PROPOSAL DRAWING DECONTAMINATION TANK SPRAY AND SPARGE SYSTEM.
7. 24590-HLW-M0-HSH-00075, HLW VITRIFICATION SYSTEM DESIGN PROPOSAL DRAWING DECONTAMINATION TANK PROCESS FLOW DIAGRAM.
8. 24590-HLW-M0D-HSH-00212, 24590-HLW-HSH-MHAN-00057-PART WASHING SYSTEM: TOP LOADING WITH CAPABILITY TO BE OPERATED BY ROBOTIC MANIPULATOR.
9. 24590-CM-POA-HDYR-00001-06-00040, DRAWING-HSH INTERNAL SPRAY RING ASSEMBLY.
10. 24590-CM-POA-HDYR-00001-06-00041, DRAWING-HSH INTERNAL SPRAY RING WELDMENTS AND DETAILS.
11. 24590-CM-POA-HDYR-00001-06-00045, DRAWING HSH INTERNAL SPRAY RING DETAILS.

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 assems that pursuant to 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.

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
1	REVISED PER NOTE 14	SA	AM	RP/SS	SK/CM	2/24/12
0	ISSUED FOR CONSTRUCTION, SEE NOTE 12	BSA	RM	RP/SS	SK/CM	9/12/11

Q QUALITY DESIGNATOR

REVISION HISTORY

ISSUED BY RPP-WTP PDC
FIRST ISSUE STAMP

PROJECT No.	24590	
SITE	HANFORD	
AREA	200E	
BUILDING No.	30	
	BY	DATE
ORIGINATOR	B. SERENA AUSTEN	9/12/11
CHECKER	ROBIE MACKAY	9/12/11
APPROVER	KRETZSCHMAR, S MUSICH	9/12/11
REVIEWER	RICH PETERS/S SMITH	9/12/11

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. 24590-HLW-ADR-M-05-0001 REV: 0
EMS SCREENING REQUIRED? [X] YES [ ] NO EMS INITIAL IF YES

BECHTEL

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

P&ID - HLW HLW MELTER CAVE SUPPORT HANDLING SYSTEM DECONTAMINATION SYSTEM MELTER CAVE 2

SCALE: NONE

24590-HLW-M6-HSH-20004002

REV 1

SIZE - 44x34
COMPUTER GENERATED - MANUAL DESIGN CHANGES NOT PERMITTED

SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREQ-002

R11478536

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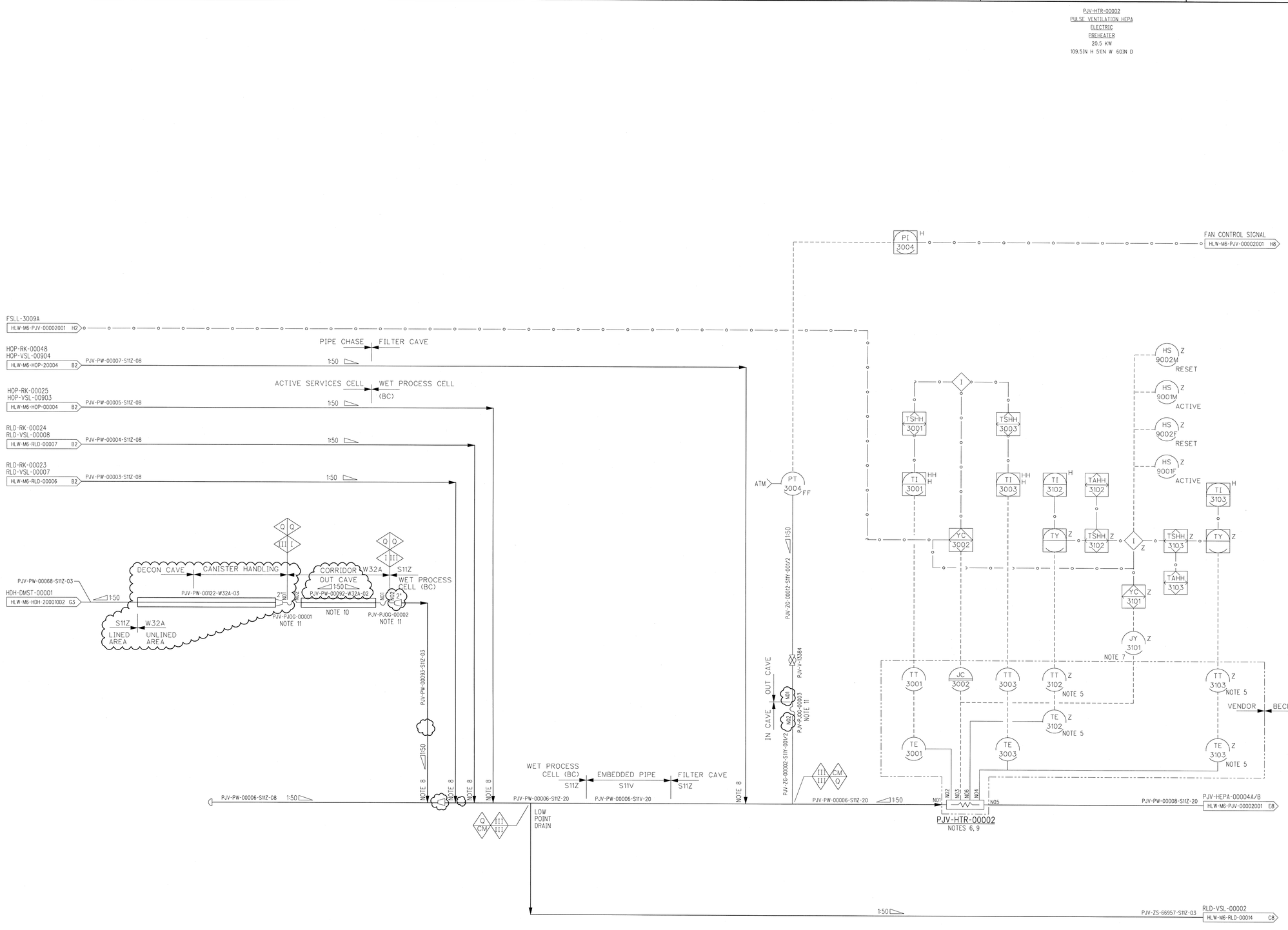
PLOTTED BY: serewsb

FORM E_SDN.DGN 02/2009



NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS, AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
2. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
3. THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-III, UNLESS OTHERWISE NOTED.
4. THE MINIMUM SLOPE FOR PIPELINES LOCATED UPSTREAM OF PREHEATER PJV-HTR-00002 SHOULD BE AS SHOWN ON THE DRAWING, UNLESS PRECLUDED BY LAYOUT RESTRAINTS. HOWEVER, IN NO CASE SHOULD THE SLOPES BE LESS THAN 1% OR POCKETED.
5. INSTRUMENT PERFORMS AN AIR PERMIT FUNCTION. INDICATION IS DISPLAYED AT ICN.
6. HEPA PRE-HEATER IN-CAST LINER, MOUNTING FRAME, R5/C5 TO R2/C2 RADIATION SHIELDING ARE PART OF THE FILTER CAVE C5 CELL CONFINEMENT BOUNDARY. THESE PRE-HEATER COMPONENTS ARE DESIGNATED QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I.
7. ISOLATING CONTACTOR (JY) PROVIDES INTERRUPTION OF THE 480V POWER TO THE HEPA PREHEATER.
8. A LATERAL FITTING SHALL BE USED TO CONNECT THE BRANCH LINE TO THE COLLECTION HEADER.
9. HEPA PRE-HEATER (PJV-HTR-00002) IS A MULTI-ELEMENT UNIT WITH STANDBY ELEMENTS. THE HEATER ASSEMBLY IS INSET IN THE FILTER CAVE WALL AND THE TEMPERATURE ELEMENTS AND HEATER CONTROLLER PENETRATE THROUGH A STEEL SHIELDING PLATE. HEATER UNIT SHALL BE EQUIPPED WITH OVER-TEMPERATURE PROTECTION (SUPPLIED BY VENDOR).
10. OUTER SHELL OF COAXIAL PIPE SHALL DRAIN TO A LINED CELL.
11. THE GEOMETRY OF JOGGLED (OFFSET) PENETRATIONS ARE QUALITY LEVEL Q FOR RADIATION PROTECTION. THE QUALITY LEVEL AND SEISMIC CATEGORY DESIGNATIONS OF PIPING WITHIN JOGGLES ARE THE SAME AS CONNECTION PIPING WITHIN JOGGLES ARE THE SAME AS CONNECTING PIPING, UNLESS OTHERWISE SHOWN OR NOTED.
12. THIS DRAWING SUPERSEDES 24590-HLW-M6-PJV-00001 REV 5. THIS DRAWING INCLUDES INFORMATION FROM 24590-HLW-M6N-PJV-00002, -00010, -00011, -00024, -00025, AND 24590-HLW-M6PR-PJV-00001.

HOLD/OPEN ITEMS:

NONE

REFERENCE:

1. 24590-HLW-3YD-PJV-00001, SYSTEM DESCRIPTION FOR THE HLW PULSE JET VENTILATION SYSTEM (SYSTEM PJV).

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 Section 11e(2) of the AEA is the exclusive governmental 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.

DRAWING INDEX

DWG NO	TITLE
24590-HLW-M6-PJV-00001001	PJV SYS COLLECTION AND CONDITIONING

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR CONSTRUCTION, SEE NOTE 12	VC	TC	RBP	JSS APPR. Cam.	10/7/11

REVISION HISTORY

Q
QUALITY DESIGNATOR

ISSUED BY RPP-WTP PDC
INIT DATE
ISSUE STAMP

	BY	DATE
ORIGINATOR		10-5-11
CHECKER		10-5-11
APPROVER		10-7-11
REVIEWER		10-5-11 10-7-11

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. 24590-HLW-ADR-M-02-041 REV: 2
EMS SCREENING REQUIRED? [X] YES [ ] NO EMS INITIAL IF YES

PROJECT No.	24590
SITE	HANFORD
AREA	200E
BUILDING No.	30

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

P&ID - HLW PULSE JET VENTILATION SYSTEM COLLECTION AND CONDITIONING

SCALE: NONE

24590-HLW-M6-PJV-00001001

REV 0

R11431662

SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREQ-002

'E' SIZE - 44x34
COMPUTER GENERATED - MANUAL DESIGN CHANGES NOT PERMITTED

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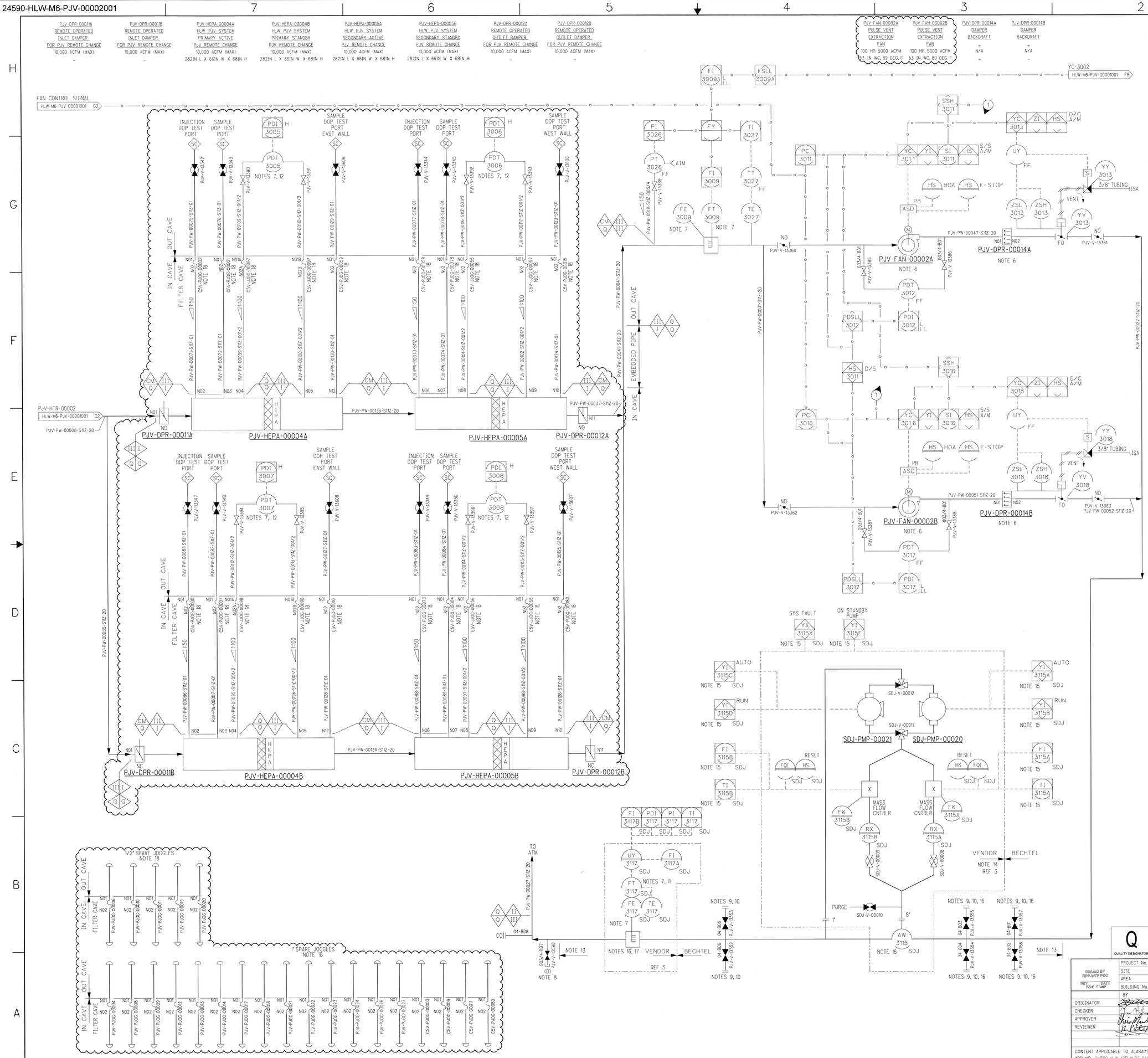
PLOTTED BY: mcritter C:\Work\mcritter\dms03839\HLW6PJV0000001.dgn

FORM E_SDN.DGN 02/2009

24590-HLW-M6-PJV-00002001



NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
2. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
3. THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-III, UNLESS OTHERWISE NOTED.
4. ALL SERVICE PIPING IN CAVE SHALL BE SELF DRAINING, UNLESS OTHERWISE NOTED.
5. RECORD SAMPLER FOR RETROSPECTIVE ANALYSIS SHALL BE PROVIDED. RECORD SAMPLER SHALL ALSO PROVIDE CARTRIDGE FOR IODINE-129 SAMPLING.
6. THE PJV FANS ARE 100% CAPACITY UNITS AND WILL BE OPERATED ON A ROTATING BASIS, ONE OPERATING AND ONE STANDBY. THE ACTUATED DISCHARGE DAMPER WILL BE CLOSED WHEN THE ASSOCIATED FAN IS IN STANDBY MODE.
7. INSTRUMENT PERFORMS AN AIR PERMIT FUNCTION. INDICATION IS DISPLAYED AT PCJ.
8. LOCATE STACK DRAIN TO ALLOW PLACEMENT OF 55 GALLON DRUM ON TROLLEY UNDERNEATH.
9. TWO CO-LOCATED TEST/INSPECTION PORTS PLACED 90° APART. SAMPLING.
10. LOCATE INJECTION PORT IN COMMON HEADER AFTER THE EXTRACTION FANS. (NO MINIMUM STRAIGHT PIPE RUN FROM INJECTION PORT TO LAST BEND REQUIRED).
11. MULTIVARIABLE FLOW TRANSMITTER INTEGRALLY MOUNTED TO FLOW ELEMENT.
12. TRANSMITTER WILL BE SUPPLIED WITH LOCAL INDICATION.
13. INSTRUMENTATION AND TEST PORTS ARE SDJ SYSTEM: 20" DIAMETER HEADER REMAINS PJV SYSTEM.
14. VENDOR'S SUBSTITUTION WITH ALTERNATIVE DESIGN IS ALLOWED WITH BNI REVIEW.
15. SIGNALS TO PCJ (IN FINAL DESIGN) TO BE DETERMINED BY C&I WHEN VENDOR INFORMATION BECOMES AVAILABLE.
16. EXACT LOCATIONS OF SAMPLING PROBE, FLOW ELEMENT AND TEST AND INJECTION PORTS WILL BE DETERMINED BY C&I AND PLACED IN 3D MODEL BY PLANT DESIGN.
17. INSTALLED WITH SINGLE-END SUPPORT: DRILLED HOLE FOR PITOT SHALL BE 1 INCH, FLANGE SIZE SHALL BE 1 1/2 INCH.
18. THE GEOMETRY OF JOGGLED (OFFSET) PENETRATIONS ARE QUALITY LEVEL Q FOR RADIATION PROTECTION. THE QUALITY LEVEL AND SEISMIC CATEGORY DESIGNATIONS OF PIPING WITHIN JOGGLES ARE THE SAME AS CONNECTING PIPING, UNLESS OTHERWISE SHOWN OR NOTED. PIPING WITHIN SPARE JOGGLES IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I.
19. THIS DRAWING SUPERSEDES 24590-HLW-M6-PJV-00002 REV 5. THIS DRAWING INCLUDES INFORMATION FROM 24590-HLW-M6LN-PJV-00001, 24590-HLW-M6N-PJV-00001, -00011, -00013, -00014, -00015, -00028, AND 24590-WTP-FC-P-11-0212.

HOLD/OPEN ITEMS:

NONE

REFERENCES:

1. 24590-HLW-3YD-PJV-00001, SYSTEM DESCRIPTION FOR THE HLW PULSE JET VENTILATION SYSTEM (SYSTEM PJV).
2. 24590-WTP-3YD-SDJ-00001, SYSTEM DESCRIPTION FOR STACK DISCHARGE MONITORING.
3. 24590-QL-MRA-JA03-00001, STACK DISCHARGE MONITORING INSTRUMENTS RADIOLOGICAL (JCL1).

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DRAWING INDEX

DWG NO	TITLE
24590-HLW-M6-PJV-00002001	PJV SYSTEM FILTRATION AND MONITORING

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR CONSTRUCTION, SEE NOTE 19	VC	TJ	RDP	MK	10-7-11

REVISION HISTORY

Q QUALITY DESIGNATOR

ISSUED BY PPP-WTP PDC

	BY	DATE
ORIGINATOR		10-7-11
CHECKER		10/7/11
APPROVER		10/7/11
REVIEWER		10-7-11
		10-7-11

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. 24590-HLW-ADR-M-02-041 REV: 2
E&NS SCREENING REQUIRED? [X] YES [ ] NO E&NS INITIAL IF YES

SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREG-002

PROJECT No. 24590
SITE HANFORD
AREA 200E
BUILDING No. 30

BECHTEL
RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

P&ID - HLW PULSE JET VENTILATION SYSTEM FILTRATION AND MONITORING

SCALE: NONE

24590-HLW-M6-PJV-00002001 REV 0

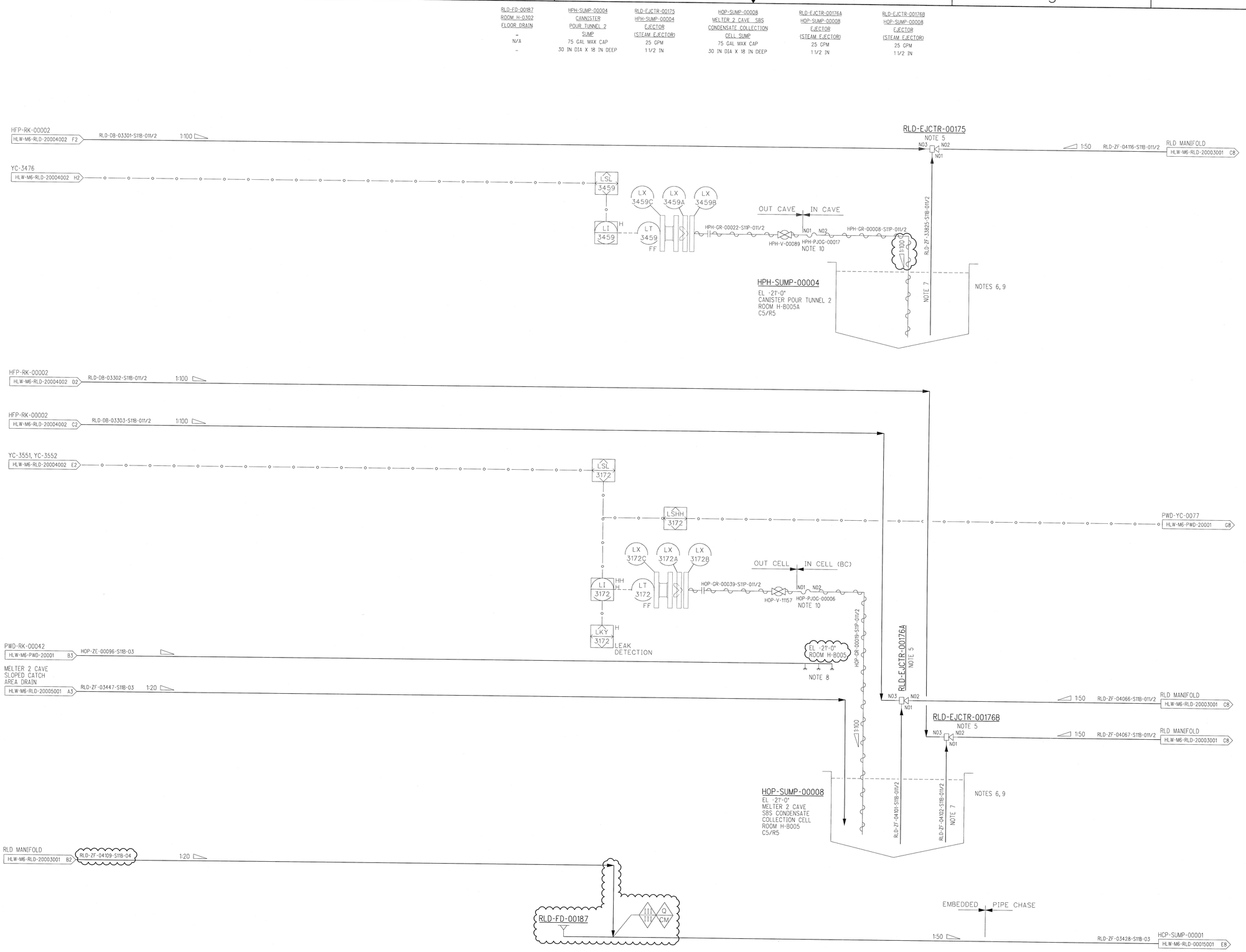
SIZE - 44x34
COMPUTER GENERATED - MANUAL DESIGN CHANGES NOT PERMITTED

R11431664

FORM E_SDN.DGN 02/2009

PLOTTED BY: rpooke1 C:\Work\rpooke1\sm0339\hlw\WBS-PJV\00002001.dgn 10/7/2011 7:41:54 AM

24590-HLW-M6-RLD-20004001



NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS, AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
2. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
3. THE PRESSURE BOUNDARY FOR ALL SYSTEMS, STRUCTURES, AND COMPONENTS ON THIS DRAWING IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-III, UNLESS OTHERWISE NOTED.
4. ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING UNLESS OTHERWISE NOTED.
5. EJECTOR DISCHARGE PIPING TO HAVE A MINIMUM LENGTH OF 24 INCHES OF STRAIGHT PIPE BEFORE FIRST BEND.
6. ALL SUMPS ARE QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I.
7. PROVIDE 5/8"±1/8" CLEARANCE BETWEEN BOTTOM OF EJECTOR SUCTION PIPE AND SUMP BASE.
8. SPRAY NOZZLES ARE PROVIDED FOR WASHING DOWN CELL AND CAVE LINERS. INSTALL NOZZLES ON BOTTOM OF SPRAY HEADER, AIMED TOWARDS LINER. LOCATE BOTTOM OF NOZZLE 4 INCHES ABOVE THE LINER UPPER EDGE. NOZZLE STANDOFF FROM VERTICAL PLANE OF LINER IS 12 INCHES. NOZZLE SPACING ON HEADER IS ONE PER 5 FOOT. SPRAY NOZZLE TYPE IS LECHLER 140° FLAT FAN NOZZLE NUMBER 686.868 OR EQUIVALENT.
9. SUMP COVERED WITH A STAINLESS STEEL SCREEN PLATE TO PROTECT PIPING SYSTEM FROM DEBRIS. MAXIMUM SCREEN SIZE IS 1/4" DIAMETER HOLE. SUMP COVERS ARE PROVIDED BY CIVIL/STRUCTURAL.
10. THE GEOMETRY OF JOGGLED (OFFSET) PENETRATION IS QUALITY LEVEL Q FOR RADIATION PROTECTION. THE QUALITY LEVEL AND SEISMIC CATEGORY DESIGNATIONS OF PIPING WITHIN JOGGLES ARE THE SAME AS CONNECTING PIPING, UNLESS OTHERWISE SHOWN OR NOTED. PIPING WITHIN SPARE JOGGLES IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I.
11. THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO A MULTI-SHEET DRAWING AND, IN PART, SUPERSEDES 24590-HLW-M6-RLD-20004, REV 7. THIS DRAWING INCLUDES INFORMATION FROM: 24590-HLW-M6LN-RLD-00008, 24590-HLW-M6N-RLD-00241, -00249, -00250 AND 24590-HLW-M6N-30-00007.

HOLD/OPEN ITEMS:

NONE

REFERENCES:

1. 24590-HLW-3YD-RLD-00001, REV 3 SYSTEM DESCRIPTION FOR THE HLW RADIOACTIVE LIQUID WASTE DISPOSAL SYSTEM (RLD).
2. 24590-HLW-M5-V17T-00007001, PROCESS FLOW DIAGRAM, "HLW VITRIFICATION LIQUID WASTE EFFLUENT (SYSTEM RLD) (SHEET 1)".
3. 24590-HLW-M5-V17T-00007002, PROCESS FLOW DIAGRAM, "HLW VITRIFICATION LIQUID WASTE EFFLUENT (SYSTEM RLD) (SHEET 2)."
4. FOR RADAR INSTALLATION SEE DRAWINGS 24590-WTP-J8-50-00001 AND 24590-WTP-J8-50-00004.

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 pursuant to the AEA. Bechtel National, Inc. (BNI), pursuant to 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.

DRAWING INDEX

DWG NO	TITLE
24590-HLW-M6-RLD-20004001	RLD SYS-HPH-SUMP-00004/HOP-SUMP-00008
24590-HLW-M6-RLD-20004002	HFP-RK-00002 LINES FOR SUMPS

REVISION HISTORY

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR CONSTRUCTION, SEE NOTE 11	RJ	RM	JOP	DAR SPK	10/20/11

Q
QUALITY DESIGNATOR

ISSUED BY RPP-WTP PDC
BY DATE
ISSUE STAMP

PROJECT No.	24590	
SITE	HANFORD	
AREA	200E	
BUILDING No.	30	

	BY	DATE
ORIGINATOR		10/20/11
CHECKER		10/20/11
APPROVER		10/20/11
REVIEWER		10-20-11
		10-20-11

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. 24590-HLW-ADR-M-02-016 REV: 4
EANS SCREENING REQUIRED? [X] YES [ ] NO EANS INITIAL IF YES SPK

SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREQ-002

BECHTEL

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

P&ID - HLW RADIOACTIVE LIQUID WASTE DISPOSAL SYSTEM HPH-SUMP-00004 AND HOP-SUMP-00008

SCALE: NONE

24590-HLW-M6-RLD-20004001

REV 0

"E" SIZE - 44x34
COMPUTER GENERATED - MANUAL DESIGN CHANGES NOT PERMITTED

R11433711

10/20/2011 6:55:58 AM

PLOTTED BY: gaokes C:\Work\gaokes\dms03839\HLW\M6RLD20004001.dgn

FORM E_SDN.DGN 02/2009

Table III.10.E.C – HLW Vitrification Plant Tank Systems Description

Mixed Waste Tank Systems Name	Unit Designation	Engineering Description (Drawing Nos, Specification Nos, etc.)	Narrative Description, Tables & Figures	Maximum Capacity (gallons)
1) HDH-VSL-00003 (Waste Neutralization Vessel) HDH-VSL-00004 (Canister Decon Vessel 2)		-M6-HDH-20001001, Rev 0 -M6-HDH-20001002, Rev 0 -M0-HDH-P0012001, Rev 1 -M0-HDH-P0012002, Rev 1 -MV-HDH-P0003, Rev 1 -MVD-HDH-P0003, Rev 2 -MVD-HDH-00006, Rev 5 -MVD-HDH-P0009, Rev 0 -N1D-HDH-P0003, Rev 1 -N1D-HDH-P0005, Rev 1 -N1D-HDH-P0007, Rev 1 -P1-P01T-00001, Rev 9 -P1-P01T-00002, Rev 7 -3YD-HDH-00002[a] **24590-WTP** -3PS-G000-T0002, Rev 8 -3PS-MV00-T0001, Rev4 -3PS-MV00-T0002, Rev 3 -3PS-MV00-T0003, Rev 3		HDH-VSL-00004 = 630
HLW Melter Cave Support Handling System HSH-TK-00001 (Decontamination Tank Melter Cave 1) HSH-TK-00002 (Decontamination Tank Melter Cave 2)	HSH	**24590-HLW** ~~-M6-HSH-P0004, Rev 0~~ -M6-HSH-00004001, Rev 1 -M6-HSH-00004002, Rev 1 ~~-M6-HSH-P20004, Rev 0~~ -M6-HSH-20004001, Rev 1 -M6-HSH-20004002, Rev 1 -M0-HSH-P0072, Rev 1 -N1D-HSH-P0001, Rev 1 -P1-P01T-00002, Rev 7	Section 4.1.4.7; Tables 4-4 and 4-6; Figures C1-1 and C1-4 of Operating Unit Group 10, Addendum C of this Permit.	HSH-TK-00001 = 4,000 HSH-TK-00002 = 4,000

Quarter Ending June 30, 2012 24590-HLW-PCN-ENV-11-010

Hanford Facility RCRA Permit Modification Notification Form
Part III, Operating Unit 10
Waste Treatment and Immobilization Plant

Index

Page 2 of 4: Hanford Facility RCRA Permit, Part III, Operating Unit 10, Waste Treatment and Immobilization Plant
Update Piping and Instrumentation Diagrams (P&ID) for the HLW Melter Offgas Treatment Process System (HOP) in Appendix 10.2.

Submitted by Co-Operator:

Donna Busche 5/14/12
D. M. Busche Date

Reviewed by ORP Program Office:

6/6/12
D. L. Noyes Date

Quarter Ending June 30, 2012

24590-HLW-PCN-ENV-11-010

Hanford Facility RCRA Permit Modification Notification Form

Unit:	Permit Part:
Waste Treatment and Immobilization Plant	**Part III, Operating Unit 10**

Description of Modification:

The purpose of this Class 1 prime modification is to update the P&IDs for the HLW HOP in Appendix 10.2 of the Dangerous Waste Permit (DWP). This PCN will replace eight (8) source P&IDs incorporated into the DWP with 20 source P&IDs as indicated in the Table below. The additional drawings are the result of converting source drawings into multiple sheets (i.e., split/expanded) in an effort to provide clearer representation of the HOP system, including additional details for instrumentation.

The following source P&IDs are submitted to replace the source P&IDs currently in Appendix 10.2:

Appendix 10.2			
Replace:		With:	
	24590-HLW-M6-HOP-00001 Rev. 5		24590-HLW-M6-HOP-00001001 Rev. 0
			24590-HLW-M6-HOP-00001002 Rev. 0
			24590-HLW-M6-HOP-00001003 Rev. 0
	24590-HLW-M6-HOP-00003 Rev. 2		24590-HLW-M6-HOP-00003001 Rev. 0
			24590-HLW-M6-HOP-00003002 Rev. 0
	24590-HLW-M6-HOP-00008 Rev. 2		24590-HLW-M6-HOP-00008001 Rev. 0
			24590-HLW-M6-HOP-00008002 Rev. 0
			24590-HLW-M6-HOP-00008003 Rev. 0
	24590-HLW-M6-HOP-00009 Rev. 5		24590-HLW-M6-HOP-00009001 Rev. 0
			24590-HLW-M6-HOP-00009002 Rev. 0
	24590-HLW-M6-HOP-20001 Rev. 6		24590-HLW-M6-HOP-20001001 Rev. 0
			24590-HLW-M6-HOP-20001002 Rev. 0
			24590-HLW-M6-HOP-20001003 Rev. 0
	24590-HLW-M6-HOP-20003 Rev. 2		24590-HLW-M6-HOP-20003001 Rev. 0
			24590-HLW-M6-HOP-20003002 Rev. 0
	24590-HLW-M6-HOP-20008 Rev. 2		24590-HLW-M6-HOP-20008001 Rev. 0
			24590-HLW-M6-HOP-20008002 Rev. 0
			24590-HLW-M6-HOP-20008003 Rev. 0
	24590-HLW-M6-HOP-20009 Rev. 6		24590-HLW-M6-HOP-20009001 Rev. 0
			24590-HLW-M6-HOP-20009002 Rev. 0

This modification requests Ecology approval and incorporation into the permit the specific changes to these P&IDs that are indicated by revision notes and clouds. The referenced P&IDs incorporate changes provided in applicable document change forms (e.g., DCN, SCN, SDDR, FCN, FCR, etc.) since the issuance of the last revision of the permitted drawing. All change documents were provided to Ecology in accordance with Condition III.10.C.9.h.

The following types of changes apply to the HOP P&IDs:

- Drawings converted from a single sheet to multi-sheet drawings
- Modified, deleted, and added notes and references
- Expanded instruments and logic controls information
- Adjusted numbering and incorporated additional detail on some nozzles
- Modified, deleted, and added some jumpers
- Incorporated change notices as specified in Revision History
- Replaced Backflow Preventers with check valves and additional lines (24590-HLW-M6-HOP-00003002,

24590-HLW-M6-HOP-00008001, and 24590-HLW-M6-HOP-20003002)

- Updated names of Wall Boxes (24590-HLW-M6-HOP-20001002)

This modification requests Ecology approval and incorporation of the following outstanding change document(s) into the permit. Although not yet incorporated into the revised documents included in this PCN, the listed outstanding change document(s) are intended to be incorporated into the permit:

24590-HLW-M6-HOP-00001001 and 24590-HLW-M6-HOP-20001001

- 24590-HLW-M6N-30-00039
- 24590-HLW-M6N-HOP-00127
- 24590-HLW-M6N-HOP-00178

24590-HLW-M6-HOP-00001002 and 24590-HLW-M6-HOP-20001002

- 24590-HLW-M6LN-HOP-00007

24590-HLW-M6-HOP-00001003, and 24590-HLW-M6-HOP-20001003

- 24590-HLW-M6N-HOP-00158

24590-HLW-M6-HOP-00003001, 24590-HLW-M6-HOP-00008002, 24590-HLW-M6-HOP-00008003, 24590-HLW-M6-HOP-20003001, 24590-HLW-M6-HOP-20008002, and 24590-HLW-M6-HOP-20008003

- 24590-HLW-M6N-HOP-00178

24590-HLW-M6-HOP-00003002 and 24590-HLW-M6-HOP-20003002

- 24590-HLW-M6N-HOP-00076

24590-HLW-M6-HOP-00008001

- 24590-HLW-M6LN-HOP-00016
- 24590-HLW-M6N-HOP-00078
- 24590-HLW-M6N-HOP-00203

24590-HLW-M6-HOP-20008001

- 24590-HLW-M6LN-HOP-00016
- 24590-HLW-M6N-HOP-00203

24590-HLW-M6-HOP-00009001, 24590-HLW-M6-HOP-00009002, 24590-HLW-M6-HOP-20009001, and 24590-HLW-M6-HOP-20009002

- 24590-HLW-M6N-30-00023
- 24590-HLW-M6N-HOP-00178

In accordance with Permit Condition III.10.C.2.e, this permit modification may include page changes to the Permit, attachments, and permit application supporting documentation. Necessary permit changes are attached to this PCN. Ecology is requested to approve the attached permit changes and incorporate the changes in the next revision of the WTP Dangerous Waste Permit.

See Attached.

Quarter Ending June 30, 2012 24590-HLW-PCN-ENV-11-010

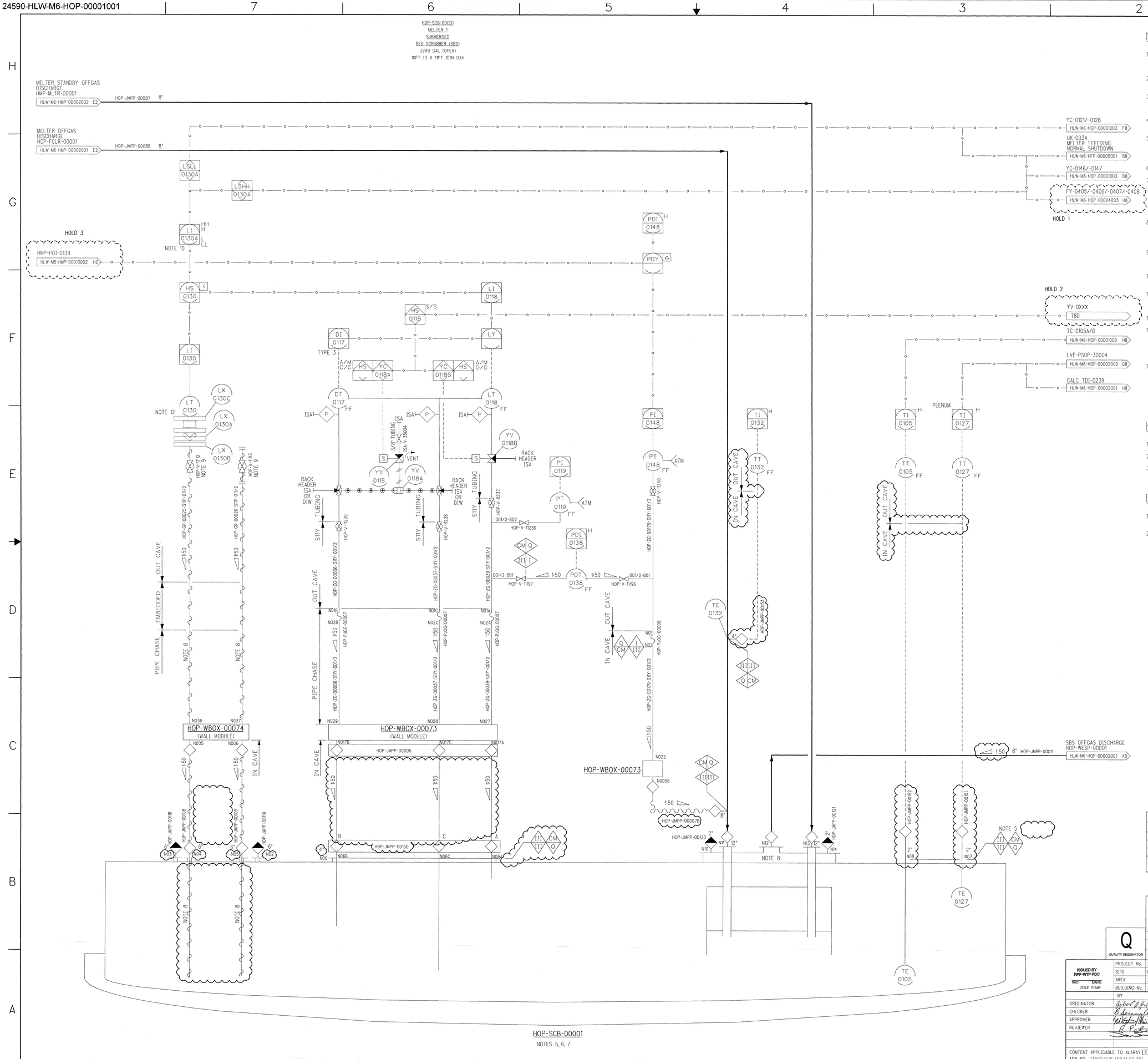
WAC 173-303-830 Modification Class:	Class 1	Class [1]1	Class 2	Class 3
Please mark the Modification Class:		X		

Enter relevant WAC 173-303-830, Appendix I Modification citation number: NA

Enter wording of WAC 173-303-830, Appendix I Modification citation:

In accordance with WAC 173-303-830(4)(d)(i), this modification notification is requested to be reviewed and approved as a Class [1]1 modification. WAC 173-303-830(4)(d)(ii)(A) states, "Class 1 modifications apply to minor changes that keep the permit current with routine changes to the facility or its operation. These changes do not substantially alter the permit conditions or reduce the capacity of the facility to protect human health or the environment. In the case of Class 1 modifications, the director may require prior approval."

Modification Approved/Concur: ☑ Yes ☐ Denied (state reason below) Reason for denial:	Reviewed by Ecology:
	A. Carlson — Date: 7/24/12



NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
2. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
3. THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY III, UNLESS OTHERWISE NOTED.
4. ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, UNLESS OTHERWISE NOTED.
5. VESSEL HOP-SCB-00001 IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I FOR LIQUID CONFINEMENT BELOW THE VESSEL OVERFLOW AND SEISMIC CATEGORY SC-III FOR OFFGAS CONFINEMENT. THIS IS AIR PERMIT EQUIPMENT.
6. IN VESSEL PIPE CLASS CHANGE TO N13A, HASTELLOY C-22.
7. REFER TO ENGINEERING SPECIFICATION 24590-WTP-3PS-MV00-T0001 FOR VESSEL NOZZLE LOADS, EXCEPTIONS PER 24590-WTP-SDDR-MS-10-00073 ARE AS FOLLOWS:
   A. FOR NOZZLES N02, N03, N04, AND N05 USE 2" NOZZLE LOADS.
   B. FOR NOZZLE N06 USE 3" NOZZLE LOADS.
   C. FOR NOZZLES N11 AND N13 USE 8" NOZZLE LOADS.
8. MELTER AND SBS OFFGAS LINES ARE DESIGNATED QUALITY LEVEL Q AND SEISMIC CATEGORY SC-III. RADAR GUIDE TUBES ARE DESIGNATED QUALITY LEVEL Q AND SEISMIC CATEGORY SC-III.
9. RADAR GUIDE TUBE IS TO BE ROUTED TO TRANSMITTER. A FULL PORT BALL VALVE IS REQUIRED FOR ISOLATION PUPOSES AT TRANSMITTER END OF GUIDE TUBE.
10. INSTRUMENT PERFORMS AN AIR PERMIT FUNCTION. INSTRUMENT INCLUDES INTEGRAL DISPLAY WITH TRANSMITTER.
11. ICN LOGIC WILL BE IMPLEMENTED TO USE THE RADAR LEVEL AS THE PRIMARY MEASUREMENT WITH THE BUBBLER LEVEL AS A MAINTENANCE BACK UP.
12. TRANSMITTER WILL BE SUPPLIED WITH LOCAL INDICATION.
13. THE GEOMETRY OF JOGGLED (OFFSET) PENETRATION IS QUALITY LEVEL Q FOR RADIATION PROTECTION. THE QUALITY LEVEL AND SEISMIC CATEGORY DESIGNATIONS OF PIPING WITHIN JOGGLES ARE THE SAME AS CONNECTING PIPING, UNLESS OTHERWISE SHOWN OR NOTED.
14. THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-HLW-M6-HOP-00001 REV 6. THIS DRAWING INCLUDES INFORMATION FROM 24590-HLW-M6LN-HOP-00001, 24590-HLW-M6N-30-00007, 24590-HLW-M6N-HOP-00144, -00155, -00162, -00163, -00175 AND -00184.

HOLD/OPEN ITEMS:

1. PENDING PJM/RFD DESIGN.
2. PENDING RACK HEADER VALVE.
3. PENDING HLW- HMP ENHANCEMENTS.

REFERENCES:

1. 24590-HLW-M5-V17T-00003, PROCESS FLOW DIAGRAM, HLW VIT MELTER 1 PRIMARY OFFGAS TREATMENT (SYSTEM HOP).
2. 24590-HLW-3YD-HOP-00001, SYSTEM DESCRIPTION FOR THE MELTER OFFGAS TREATMENT PROCESS AND PROCESS VESSEL VENT EXHAUST (HOP AND PVV SYSTEMS).

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 OR LEASED FACILITIES. INFORMATION CONTAINED HEREIN ON RADIO NUCLIDES IS PROVIDED FOR PROCESS DESCRIPTION PURPOSES ONLY.

DRAWING INDEX

DWG NO	TITLE
24590-HLW-M6-HOP-00001001	HOP SYSTEM MELTER 1 HOP-SCB-00001
24590-HLW-M6-HOP-00001002	HOP SYSTEM MELTER 1 HOP-SCB-00001
24590-HLW-M6-HOP-00001003	HOP SYSTEM MELTER 1 HOP-SCB-00001

Q
QUALITY DESIGNATOR

REVISION HISTORY

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR CONSTRUCTION, SEE NOTE 14	HK	BDA	SBS	CMM	7-20-11

ISSUED BY RIPP-WTP PDC
INIT DATE
ISSUE STAMP

PROJECT No.	24590
SITE	HANFORD
AREA	200E
BUILDING No.	30

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

	BY	DATE
ORIGINATOR	Robert Hook	7/20/11
CHECKER	Bruce Clutter	7/20/11
APPROVER	Bill Mauck	7/20/11
REVIEWER	B. Patterson	7-20-11

P&ID - HLW
MELTER OFFGAS TREATMENT PROCESS SYSTEM MELTER 1 PRIMARY OFFGAS SCRUBBER HOP-SCB-00001

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. 24590-HLW-ADR-M-03-001 REV: 3
SAFETY SCREEN REQUIRED? [X] YES [ ] NO EMS INITIAL IF YES: CMM

SCALE: NONE
24590-HLW-M6-HOP-00001001
REV 0

SAFETY SCREEN IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREG-002

1" SIZE = 44x34
COMPUTER GENERATED - MANUAL CHANGES NOT PERMITTED

R11387152

7/20/2011 10:30:15 AM

PLOTTED BY: gpookes
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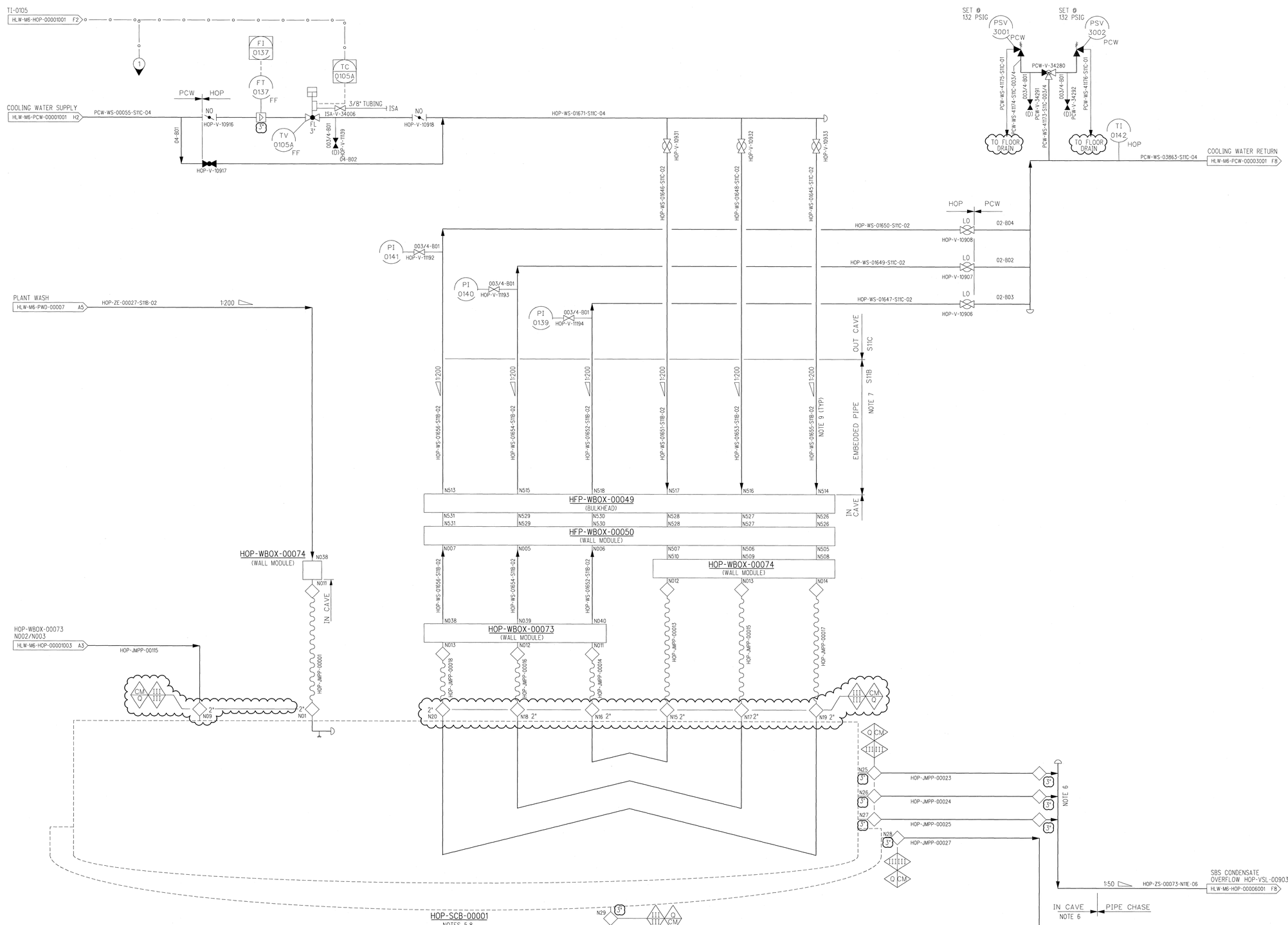
FORM E_SDN.DGN 02/2003



NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
2. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
3. THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY III, UNLESS OTHERWISE NOTED.
4. ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, UNLESS OTHERWISE NOTED.
5. VESSEL HOP-SCB-00001 IS QUALITY LEVEL Q. IT IS SEISMIC CATEGORY SC-I FOR LIQUID CONFINEMENT BELOW THE VESSEL OVERFLOW AND SEISMIC CATEGORY SC-III FOR OFFGAS CONFINEMENT. THIS IS AIR PERMIT EQUIPMENT.
6. DUE TO SPACE CONSTRAINTS, THE IN CAVE PORTION OF THE OVERFLOW COLLECTION HEADER REQUIRES A MINIMUM SLOPE OF 1:50. THE PIPING CONNECTING TO THE JUMPERS CAN BE HORIZONTAL JUST PRIOR TO THE CONNECTION AS REQUIRED TO FACILITATE THE JUMPERS CONNECTION. THE 1:50 SLOPE SHALL BE ACHIEVED AS SOON AS PRACTICAL AFTER THE CONNECTIONS.
7. MAIN HEADER REQUIRES 34 FT OF BAROMETRIC HEAD ABOVE SUBMERGED BED SCRUBBER OVERFLOW.
8. IN VESSEL PIPE CLASS CHANGE TO N13A, HASTELLOY C-22.
9. COOLING WATER SUPPLY AND RETURN PIPES TO BE FREE DRAINING FROM OUT CAVE TO IN CAVE.
10. THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-HLW-M6-HOP-00001 REV 6. THIS DRAWING INCLUDES INFORMATION FROM 24590-HLW-M6LN-HOP-00001, 24590-HLW-M6N-HOP-00168, -00184 AND 24590-HLW-M6PR-HOP-00011.

HOLD/OPEN ITEMS:

NONE

REFERENCES:

1. 24590-HLW-M5-V17T-00003, PROCESS FLOW DIAGRAGM HLW VIT MELTER 1 PRIMARY OFFGAS TREATMENT (SYSTEM HOP).
2. 24590-HLW-3YD-HOP-00001, SYSTEM DESCRIPTION FOR THE MELTER OFFGAS TREATMENT PROCESS AND PROCESS VESSEL VENT EXHAUST (HOP AND PVV SYSTEMS).

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 JURISDICTION OVER THE SAFETY OF HAZARDOUS RADIATION WITHIN THE UNITED STATES PERTAINING TO DOE-OWNED NUCLEAR FACILITIES. INFORMATION CONTAINED HEREIN ON RADIO NUCLIDES IS PROVIDED FOR PROCESS DESCRIPTION PURPOSES ONLY.

Q
QUALITY DESIGNATOR

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR CONSTRUCTION, SEE NOTE 10	RLK	RLA	RDP	CMM PE	7-20-11

REVISION HISTORY

ISSUED BY RPP-WTP PDC
INIT DATE
ISSUE STAMP

PROJECT No.	24590	
SITE	HANFORD	
AREA	200E	
BUILDING No.	30	

	BY	DATE
ORIGINATOR	R. L. Kirk	7-20-11
CHECKER	R. A. Lewis	7/20/11
APPROVER	C. M. Miller	7/20/11
REVIEWER	R. Patterson	7-20-11

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. 24590-HLW-ADR-M-03-001 REV: 3
SAFETY SCREEN REQUIRED? [X] YES [ ] NO E&NS INITIAL IF YES

BECHTEL

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

P&ID - HLW
MELTER OFFGAS TREATMENT PROCESS SYSTEM MELTER 1 PRIMARY OFFGAS SCRUBBER HOP-SCB-00001

SCALE: NONE

24590-HLW-M6-HOP-00001002

REV 0

SAFETY SCREEN IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREQ-002

'E' SIZE - 44x34
COMPUTER GENERATED - MANUAL CHANGES NOT PERMITTED

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PLOTTED BY: gpockes
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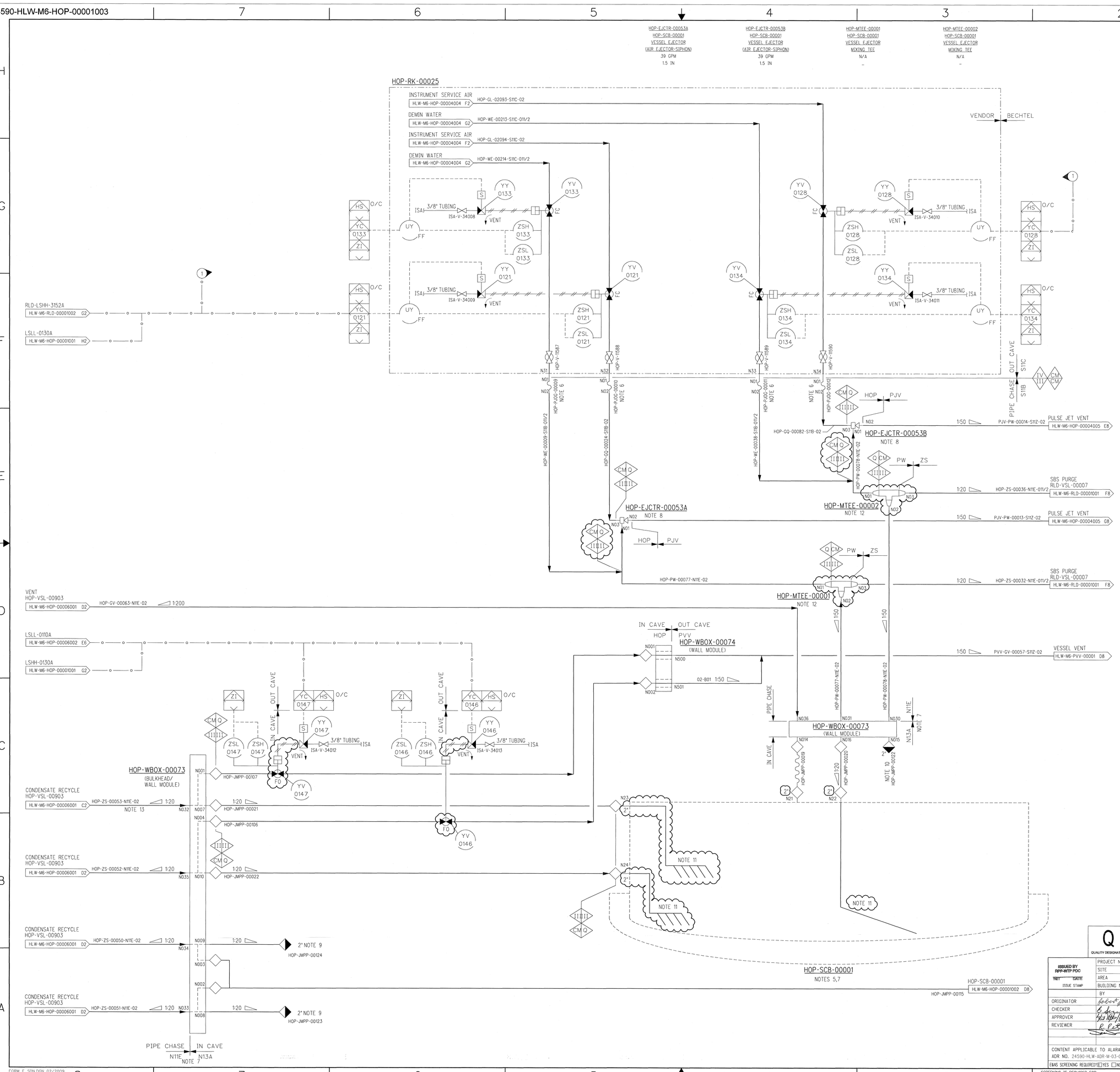
FORM E_SDN.DGN 02/2003



NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
2. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
3. THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY III, UNLESS OTHERWISE NOTED.
4. ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, UNLESS OTHERWISE NOTED.
5. VESSEL HOP-SCB-00001 IS QUALITY LEVEL Q. IT IS SEISMIC CATEGORY SC-I FOR LIQUID CONFINEMENT BELOW THE VESSEL OVERFLOW AND SEISMIC CATEGORY SC-III FOR OFFGAS CONFINEMENT. THIS IS AIR PERMIT EQUIPMENT.
6. THE GEOMETRY OF JOGGLED (OFFSET) PENETRATION IS QUALITY LEVEL Q FOR RADIATION PROTECTION. THE QUALITY LEVEL AND SEISMIC CATEGORY DESIGNATIONS OF PIPING WITHIN JOGGLES ARE THE SAME AS CONNECTING PIPING, UNLESS OTHERWISE SHOWN OR NOTED.
7. IN VESSEL PIPE CLASS CHANGE TO N13A, HASTELLOY C-22.
8. EJECTOR TO BE LOCATED MINIMUM 34 FT ABOVE SUBMERGED BED SCRUBBER OVERFLOW.
9. SPARE JUMPER CONNECTION TO HOP-SCB-00001, NOZZLE N23 OR N24.
10. SPARE JUMPER CONNECTION FOR HOP-SCB-00001, N22.
11. INDICATED SBS INTERNAL PIPING SHALL HAVE 1/2" HOLE AT ELEVATION OF 12" BELOW CENTER LINE OF N25.
12. THE SBS SIPHON TRANSFER CONNECTION TEE SHOULD BE LOCATED AT AN ELEVATION THAT IS NO MORE THAN 14 FT ABOVE THE BOTTOM OF THE SBS OVERFLOW NOZZLE. THE TEE WILL BE MOUNTED WITH THE STRAIGHT RUN IN THE VERTICLE POSITION.
13. THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-HLW-M6-HOP-00001 REV 6. THIS DRAWING INCLUDES INFORMATION FROM 24590-HLW-M6LN-HOP-00001, 24590-HLW-M6N-HOP-00160, -00163, -00171, -00184 AND 24590-HLW-M6PR-HOP-00001.

HOLD/OPEN ITEMS:

NONE

REFERENCES:

1. 24590-HLW-M5-V17T-00003, PROCESS FLOW DIAGRAGM HLW VIT MELTER 1 PRIMARY OFFGAS TREATMENT (SYSTEM HOP).
2. 24590-HLW-3YD-HOP-00001, SYSTEM DESCRIPTION FOR THE HLW MELTER OFFGAS TREATMENT PROCESS AND PROCESS VESSEL VENT EXHAUST (HOP AND PVV SYSTEMS).

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 THROUGH ITS CONTRACTORS. THE AEA DOES NOT GIVE THE NUCLEAR REGULATORY COMMISSION (NRC) REGULATORY RESPONSIBILITY AND AUTHORITY TO REGULATE SOURCE, SPECIAL NUCLEAR AND BYPRODUCT MATERIALS AT DOE-OWNED NUCLEAR FACILITIES. INFORMATION CONTAINED HEREIN ON RADIO NUCLIDES IS PROVIDED FOR PROCESS DESCRIPTION PURPOSES ONLY.

Q
QUALITY DESIGNATOR

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR CONSTRUCTION, SEE NOTE 13					7-20-11

REVISION HISTORY

ISSUED BY RPP-WTP PDC
INIT DATE
ISSUE STAMP

PROJECT No.	24590	
SITE	HANFORD	
AREA	200E	
BUILDING No.	30	

	BY	DATE
ORIGINATOR		7-20-11
CHECKER		7/20/11
APPROVER		7/20/11
REVIEWER		7-20-11
		7/20/11

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. 24590-HLW-ADR-M-03-001 REV: 3
EMS SCREENING REQUIRED? [X] YES [ ] NO | EMS INITIAL IF YES

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

P&ID - HLW
MELTER OFFGAS TREATMENT PROCESS SYSTEM MELTER 1 PRIMARY OFFGAS SCRUBBER HOP-SCB-00001

SCALE: NONE
24590-HLW-M6-HOP-00001003
REV 0

SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-QSR-QA-00003
"E" SIZE - 44x34
COMPUTER GENERATED - MANUAL REVISIONS ARE NOT PERMITTED

FORM E_SDN.DGN 02/2009

PLOTTED BY: gpoakes 7/20/2011 10:28:49 AM
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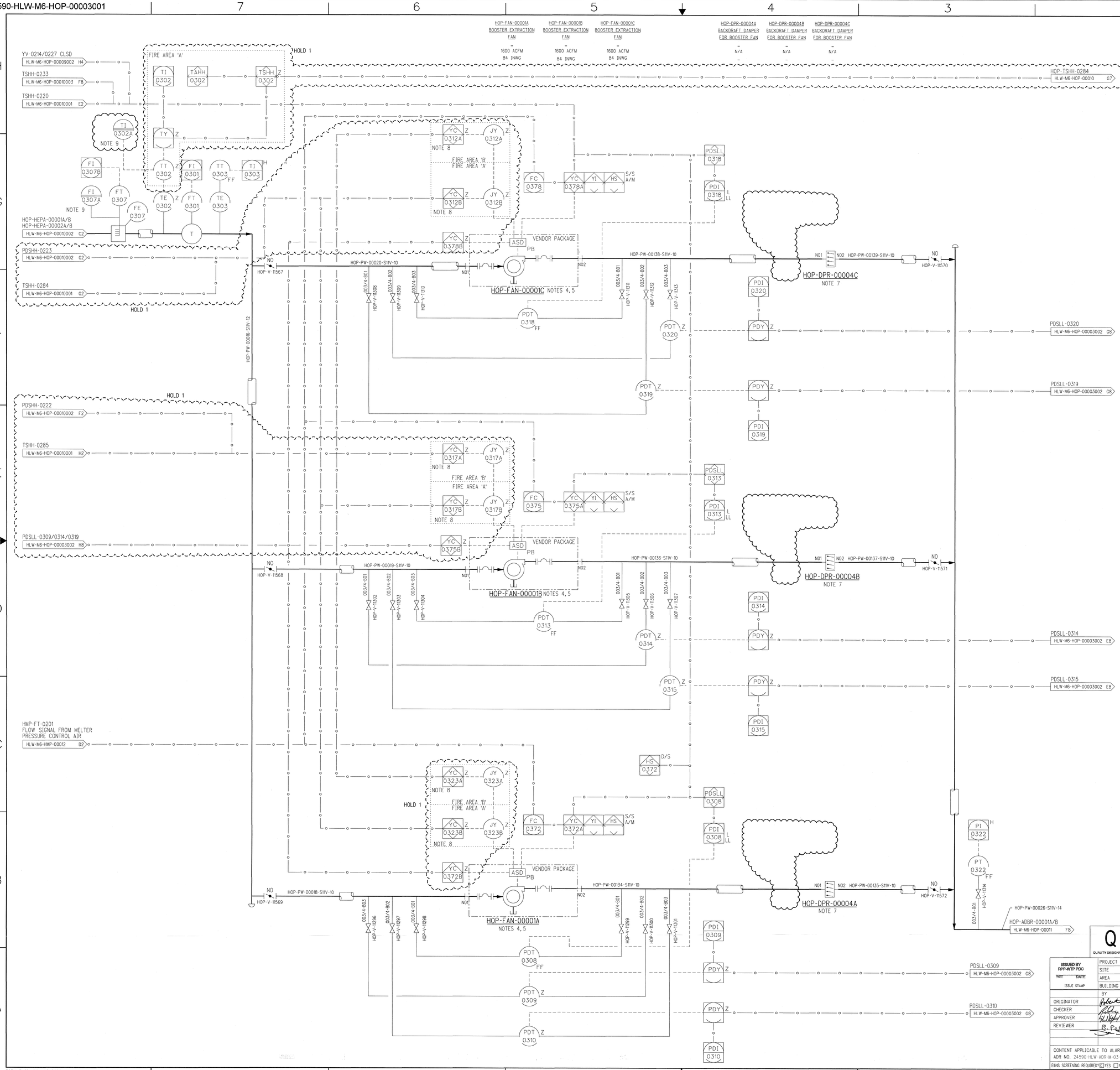

NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
2. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
3. PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING ARE QUALITY LEVEL Q AND SEISMIC CATEGORY SC-III UNLESS OTHERWISE NOTED .
4. FAN-00001A/B/C ARE 50% CAPACITY EACH, AND WILL BE OPERATED ON A ROTATING BASIS, 2 OPERATING AND 1 IN STAND-BY.
5. HOP FANS ARE TO BE FED BY EMERGENCY DIESEL GENERATOR (EDG) ON LOSS OF OFFSITE POWER. FANS SHALL HAVE HEAT TRACE TO PREVENT CONDENSATION.
6. INSTRUMENTS ARE COMMERCIAL GRADE CM UNLESS DESIGNATED BY A "Z" OR ARE AIR PERMIT AFFECTING. INSTRUMENT, ROOT VALVE AND TUBING CONFINEMENT REQUIREMENTS ARE THE SAME AS THE CONNECTING PROCESS PIPE UNLESS NOTED OTHERWISE.
7. THIS IS A LOUVER DAMPER SYMBOL.
8. ISOLATING CONTACTOR OR (JY) PROVIDES ITS INTERRUPTION OF THE 480V POWER TO THE ADJUST SPEED DRIVE.
9. INSTRUMENT PERFORMS AN AIR PERMIT FUNCTION.
10. THIS DRAWING SUPERSEDES 24590-HLW-M6-HOP-00003 REV 3. THIS DRAWING INCLUDES INFORMATION FROM 24590-HLW-M6N-HOP-00013, -00162, -00186, 24590-HLW-M6LN-HOP-00010, AND 24590-HLW-M6N-M80T-00004.

HOLD/OPEN ITEMS:

1. PENDING PDSA AND PPJ CONTROL STRATEGY CLARIFICATIONS.

REFERENCES:

1. 24590-HLW-3YD-HOP-00001, SYSTEM DESCRIPTION FOR THE HLW MELTER OFFGAS TREATMENT PROCESS AND PROCESS VESSEL VENT EXHAUST (HOP AND PVV SYSTEMS).
2. 24590-HLW-M5-V17T-00004, PROCESS FLOW DIAGRAM HLW VITRIFICATION MELTER 1 SECONDARY OFFGAS TREATMENT (SYSTEM HOP).
3. ITS PERMISSIVES AND INTERLOCKS, REFER TO SAFETY SYSTEM REQUIREMENTS SPECIFICATION, 24590-HLW-3PS-PPJ-T0008 (TO BE ISSUED).

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 JURISDICTION OVER THE PRODUCTION, USE, AND DISPOSAL OF SOURCE, SPECIAL NUCLEAR AND BYPRODUCT MATERIAL AT DOE-OWNED NUCLEAR FACILITIES. INFORMATION CONTAINED HEREON ON RADIO NUCLIDES IS PROVIDED FOR PROCESS DESCRIPTION PURPOSES ONLY.

DRAWING INDEX

DWG NO	TITLE
24590-HLW-M6-HOP-00003001	HOP SYS MELTER 1 SEC OFFGAS TREATMENT
24590-HLW-M6-HOP-00003002	HOP SYS MELTER 1 SEC OFFGAS TREATMENT

REVISION HISTORY

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR CONSTRUCTION, SEE NOTE 11		RM	RM		7-20-11

Q QUALITY DESIGNATOR

ISSUED BY RPP-WTP PDC

	BY	DATE
ORIGINATOR		07/19/11
CHECKER		7/19/11
APPROVER		7/20/11
REVIEWER		7-26-11 7/26/11

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. 24590-HLW-ADR-M-03-001 REV: 1.3
EMS SCREENING REQUIRED? [X] YES [ ] NO EMS INITIAL IF YES

BECHTEL
RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

P&ID - HLW MELTER OFFGAS TREATMENT PROCESS SYSTEM MELTER 1 SECONDARY OFFGAS TREATMENT

SCALE: NONE
24590-HLW-M6-HOP-00003001
REV 0

SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-RPP-SREQ-002

'E' SIZE - 44x34 COMPUTER GENERATED - MANUAL DESIGN CHANGES NOT PERMITTED

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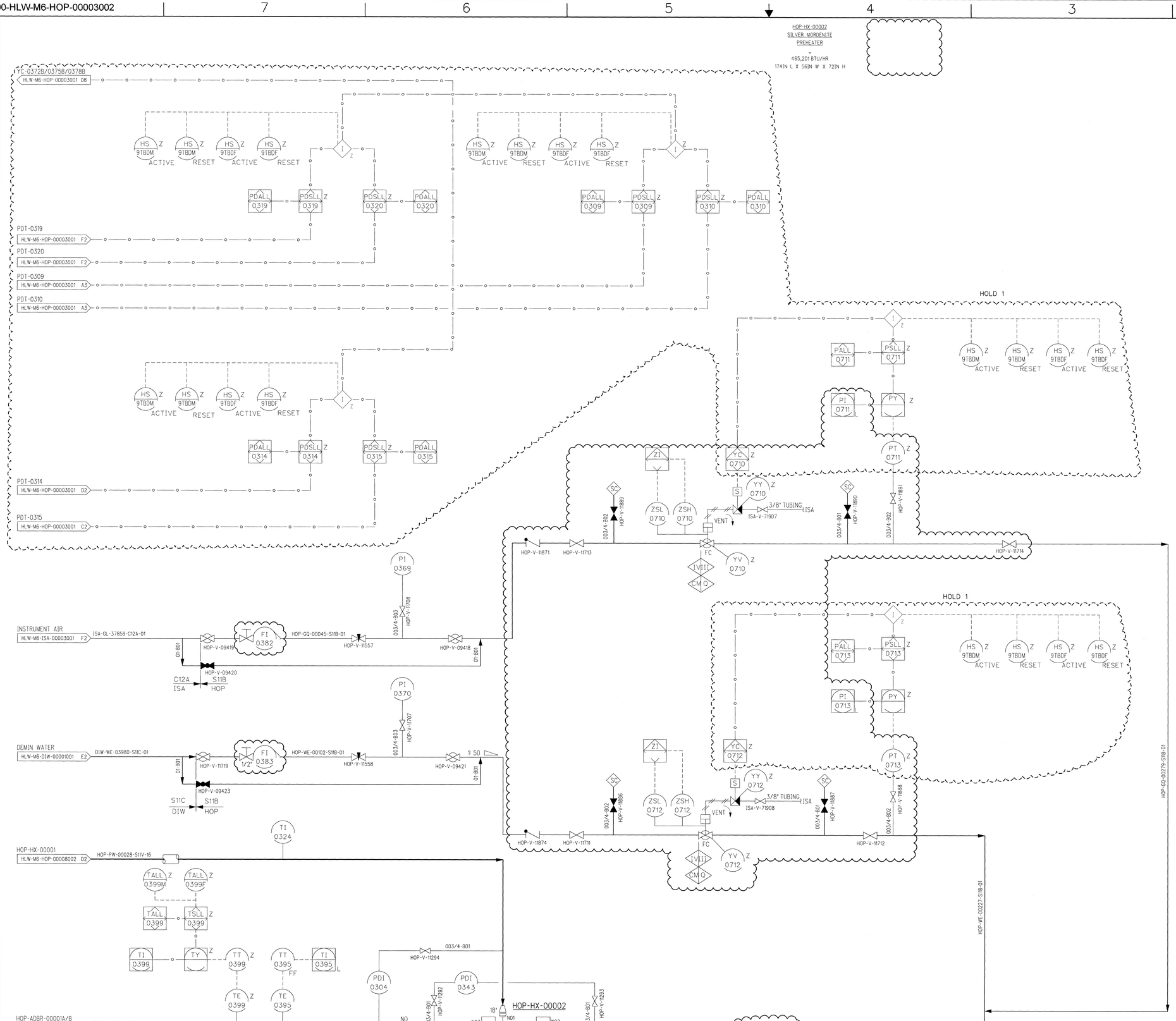
FORM E_SDN.DGN 02/2009



NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
2. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
3. PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-III, UNLESS OTHERWISE NOTED.
4. LOCATE MISTER ON COLD DISCHARGE OF HOP-HX-00002. ATOMIZING SPRAY NOZZLE SHALL BE MOUNTED ON A MINIMUM 15 FT. STRAIGHT SECTION OF PIPE. SPRAY SHALL BE AIMED PARALLEL TO DIRECTION OF FLOW.
5. INSTRUMENTS ARE COMMERCIAL GRADE CM UNLESS DESIGNATED BY A "Z" OR ARE AIR PERMIT AFFECTING. INSTRUMENT, ROOT VALVE AND TUBING CONFINEMENT REQUIREMENTS ARE THE SAME AS THE CONNECTING PROCESS PIPE UNLESS NOTED OTHERWISE.
6. THIS DRAWING SUPERSEDES 24590-HLW-M6-HOP-00003 REV 3. THIS DRAWING INCLUDES INFORMATION FROM 24590-HLW-M6N-HOP-00142, -00186, -00201, 24590-HLW-M6PR-HOP-00011, AND 24590-HLW-M6N-M80T-00004, 24590-HLW-M6LN-HOP-00010, AND 24590-WTP-SDDR-M-06-00186.

HOLD/OPEN ITEMS:

1. PENDING PDSA AND PPJ CONTROL STRATEGY CLARIFICATIONS.

REFERENCES:

1. 24590-HLW-3YD-HOP-00001, SYSTEM DESCRIPTION FOR THE HLW MELTER OFFGAS TREATMENT PROCESS AND PROCESS VESSEL VENT EXHAUST (HOP AND PVV SYSTEMS).
2. 24590-HLW-M5-V17T-00004 "PROCESS FLOW DIAGRAM HLW VITRIFICATION MELTER 1 SECONDARY OFFGAS TREATMENT (SYSTEM HOP)".
3. FOR ITS PERMISSIVES AND INTERLOCKS, REFER TO SAFETY SYSTEM REQUIREMENTS SPECIFICATION, 24590-HLW-3PS-PPJ-T0008 (TO BE ISSUED).

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 AS SOLE AND EXCLUSIVE REGULATOR, DOE HAS SOLE AUTHORITY TO DETERMINE WHAT MATERIALS ARE SPECIAL NUCLEAR OR BYPRODUCT MATERIALS AT DOE-OWNED NUCLEAR FACILITIES. INFORMATION CONTAINED HEREIN ON RADIO NUCLIDES IS PROVIDED FOR PROCESS DESCRIPTION PURPOSES ONLY.

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR CONSTRUCTION, SEE NOTE 6	RJL	RM	SCB ORP RPP-PPL	RK	7-20-11

Q QUALITY DESIGNATOR

REVISION HISTORY

ISSUED BY RPP-WTP PDC — INIT / DATE — ISSUE STAMP

PROJECT No.	24590	
SITE	HANFORD	
AREA	200E	
BUILDING No.	30	
	BY	DATE
ORIGINATOR	Robert L. Jones	7-20-11
CHECKER	Rolfy Manlay	7-20-11
APPROVER	Chris Mark	7-20-11
REVIEWER	R. Peterson	7-20-11

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO ROP
ADR NO. 24590-HLW-ADR-M-03-001 REV: 13 7-20-11
EMS SCREENING REQUIRED? [X] YES [ ] NO EMS INITIAL IF YES

BECHTEL

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

P&ID - HLW MELTER OFFGAS SYSTEM MELTER 1 SECONDARY OFFGAS TREATMENT

SCALE: NONE

24590-HLW-M6-HOP-00003002 REV 0

E SIZE - 44x34
COMPUTER GENERATED - MANUAL DESIGN CHANGES NOT PERMITTED

SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREG-002

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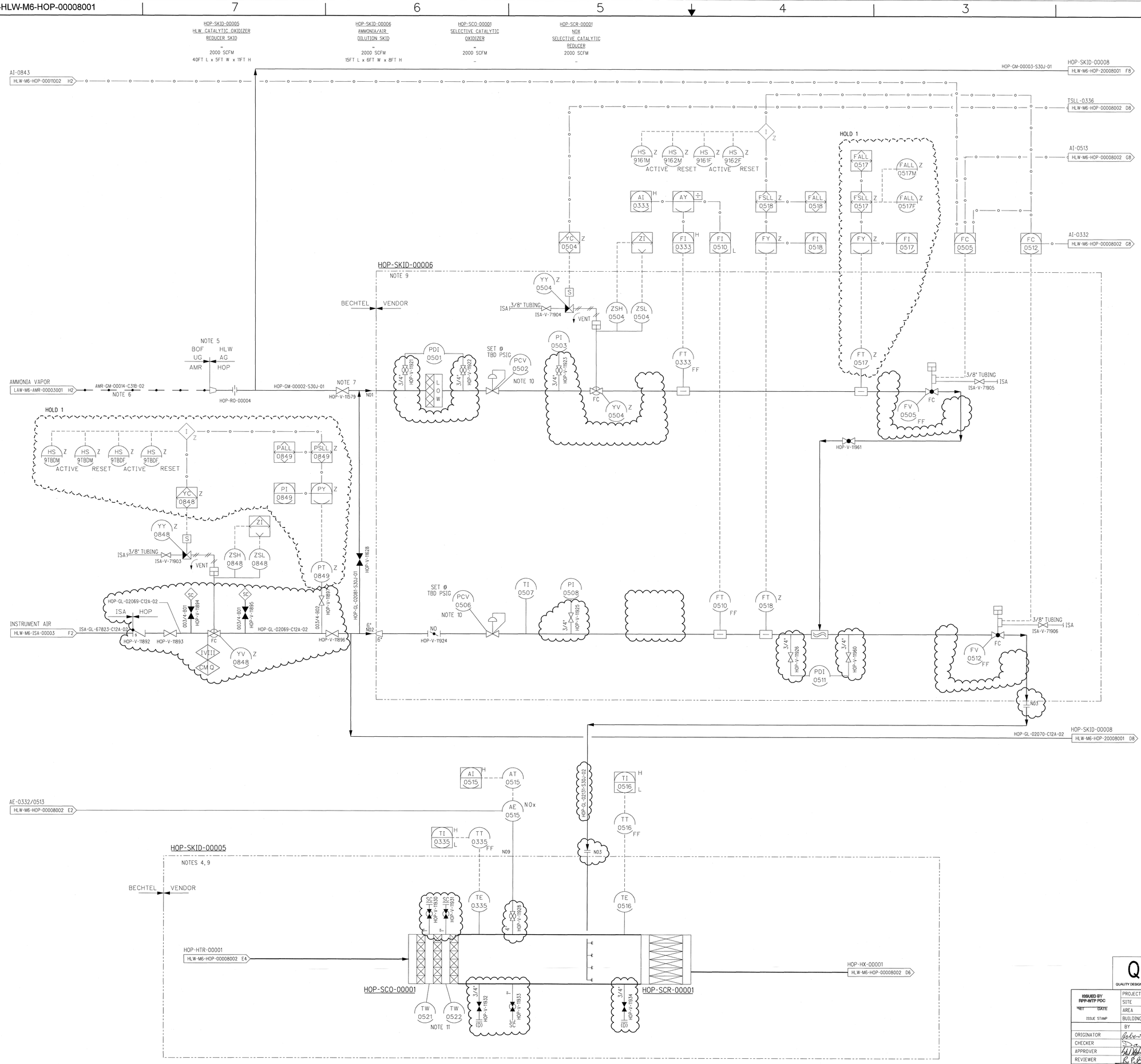

NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
2. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
3. THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-III, UNLESS OTHERWISE NOTED.
4. CATALYTIC OXIDIZER SKID (HOP-SKID-00005) HOUSES THE PREHEATER (HOP-HX-00001) ELECTRIC HEATER (HOP-HTR-00001), NOX SELECTIVE CATALYTIC REDUCER (HOP-SCR-00001) AND THE THERMAL CATALYTIC OXIDIZER (HOP-SCO-00001).
5. BOF/HLW BOUNDARY IS AT THE HLW FACILITY FLOOR (AT TOP OF SLAB).
6. CATHODIC PROTECTION SHALL BE PROVIDED FOR ALL BURIED ANHYDROUS AMMONIA PIPING.
7. VALVE SHALL BE ACCESSIBLE TO THE OPERATOR.
8. INSTRUMENT PERFORMS AN AIR PERMIT FUNCTION.
9. PIPE MATERIAL AND SIZE TO BE ADDED ON FINAL VENDOR SUBMITTAL.
10. PCV SET PRESSURE TO BE ADDED ON FINAL VENDOR SUBMITTAL.
11. THERMOWELLS REQUIRED TO FACILITATE PROCESS TROUBLESHOOTING AND OBTAIN ADDITIONAL DATA DURING TESTING AND OPERATIONS.
12. HOP-RO-00004 ORIFICE LIMITS AMMONIA FLOW RATE INTO HLW FACILITY.
13. THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO A MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-HLW-M6-HOP-00008 REV 3. THIS DRAWING INCLUDES INFORMATION FROM 24590-HLW-M6N-HOP-00118, -00123, -00142, -00166, -00189, 24590-HLW-M6N-M8OT-00004, AND 24590-WTP-SDDR-MS-11-00051.

HOLD/OPEN ITEMS:

1. PENDING PRELIMINARY DOCUMENTED SAFETY ANALYSIS (PDSA), AND PROGRAMABLE PROTECTION SYSTEM (PPJ CONTROL STRATEGY CLARIFICATIONS.

REFERENCES:

1. 24590-HLW-3YD-HOP-00001, SYSTEM DESCRIPTION FOR THE HLW MELTER OFFGAS TREATMENT PROCESS AND PROCESS VESSEL VENT EXHAUST (HOP AND PVV SYSTEMS).

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 RADIO NUCLIDES IS PROVIDED FOR PROCESS DESCRIPTION PURPOSES ONLY.

DRAWING INDEX

DWG NO	TITLE
24590-HLW-M6-HOP-00008001	HOP SYS MELTER 1 SECONDARY OFFGAS TREATMENT
24590-HLW-M6-HOP-00008002	HOP SYS MELTER 1 SECONDARY OFFGAS TREATMENT
24590-HLW-M6-HOP-00008003	HOP SYS MELTER 1 SECONDARY OFFGAS TREATMENT

Q
QUALITY DESIGNATOR

REVISION HISTORY

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR CONSTRUCTION, SEE NOTE 13		DCS	DCS	DCS	7-20-11

ISSUED BY RPP-WTP PDC
INIT DATE
ISSUE STAMP

	BY	DATE
PROJECT No.	24590	
SITE	HANFORD	
AREA	200E	
BUILDING No.	30	
ORIGINATOR	Robert A. Bell	7-20-11
CHECKER	David Sharp	07/20/11
APPROVER	Phillip Mink	7-20-11
REVIEWER	R. Peterson	7-20-11

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. 24590-HLW-ADR-M-03-001 REV: 3
EMS SCREENING REQUIRED? [X] YES [ ] NO EMS INITIAL IF YES

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

P&ID - HLW MELTER OFFGAS TREATMENT PROCESS SYSTEM MELTER 1 SECONDARY OFFGAS TREATMENT

SCALE: NONE
24590-HLW-M6-HOP-00008001
REV 0

SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREG-002

"E" SIZE - 44x34
COMPUTER GENERATED - MANUAL DESIGN CHANGES NOT PERMITTED

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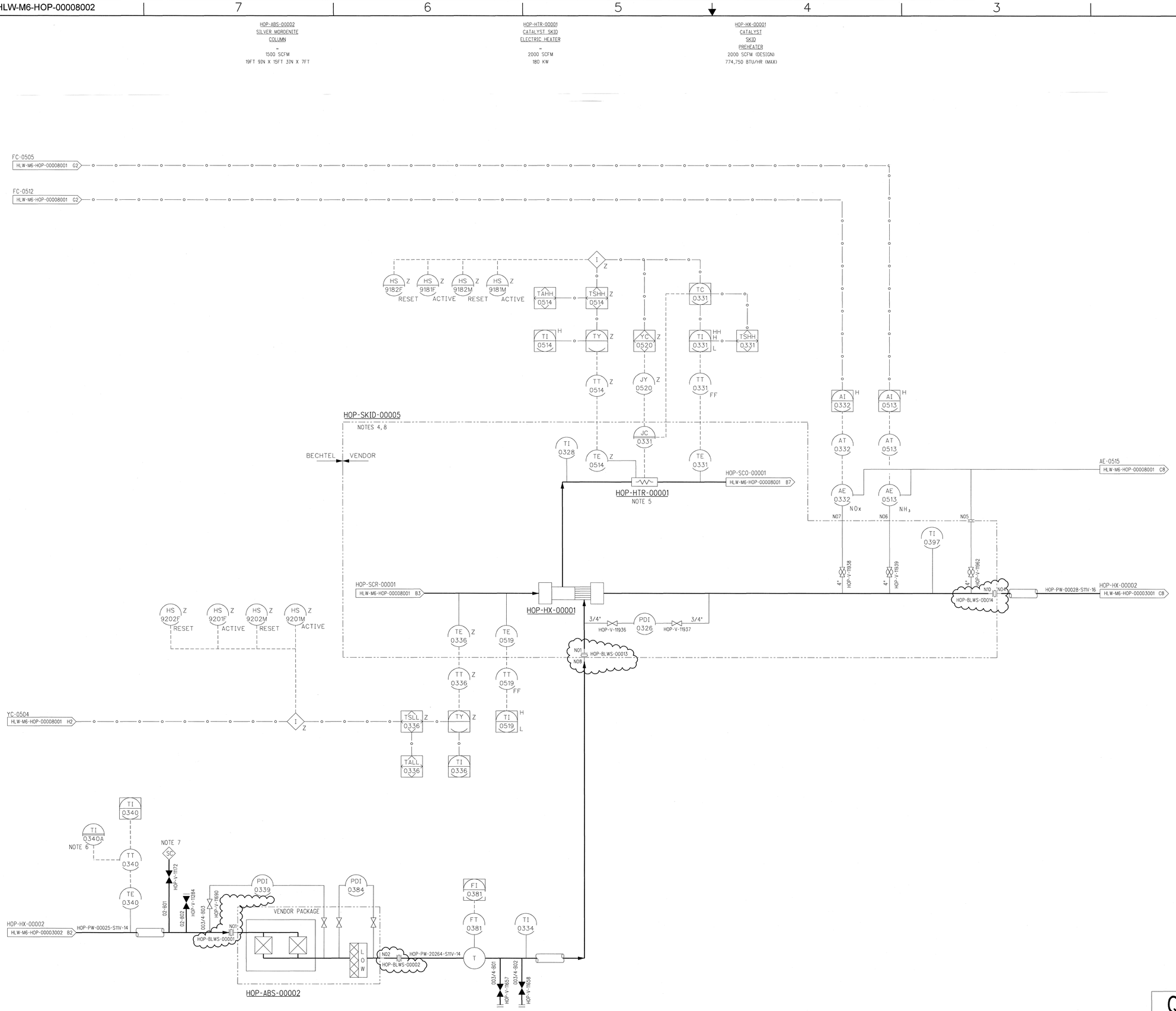

NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
2. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
3. THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-III, UNLESS OTHERWISE NOTED.
4. CATALYTIC OXIDIZER SKID (HOP-SKID-00005) HOUSES THE PREHEATER (HOP-HX-00001) ELECTRIC HEATER (HOP-HTR-00001).
5. HEATER UNIT SHALL BE EQUIPPED WITH OVER-TEMPERATURE PROTECTION (SUPPLIED BY VENDOR).
6. INSTRUMENT PERFORMS AN AIR PERMIT FUNCTION.
7. LOCATE CHALLENGE GAS INJECTION PORT AT A MINIMUM OF 10 PIPE DIAMETERS, INCLUDING ELBOWS, UP STREAM OF THE INLET OF THE SILVER MORDENITE COLUMN.
8. PIPE MATERIAL AND SIZE TO BE ADDED ON FINAL VENDOR SUBMITTAL.
9. THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-HLW-M6-HOP-00008 REV 3. THIS DRAWING INCLUDES INFORMATION FROM 24590-HLW-M6N-HOP-00013, -00118, -00123, -00166, -00189, 24590-HLW-M6LN-HOP-00002, AND 24590-HLW-M6N-M8OT-00004.

HOLD/OPEN ITEMS:

NONE

REFERENCES:

1. 24590-HLW-3YD-HOP-00001, SYSTEM DESCRIPTION FOR THE HLW MELTER OFFGAS TREATMENT PROCESS AND PROCESS VESSEL VENT EXHAUST (HOP AND PVV SYSTEMS).

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 JURISDICTION OVER IT AND AUTHORITY TO REGULATE SOURCE, SPECIAL NUCLEAR AND BYPRODUCT MATERIALS AT DOE-OWNED NUCLEAR FACILITIES. INFORMATION CONTAINED HEREIN ON RADIO NUCLIDES IS PROVIDED FOR PROCESS DESCRIPTION PURPOSES ONLY.

Q
QUALITY DESIGNATOR

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR CONSTRUCTION, SEE NOTE 9					7-20-11

REVISION HISTORY

ISSUED BY RPP-WTP PDC		
INIT	DATE	
ISSUE STAMP		

PROJECT No.	24590	
SITE	HANFORD	
AREA	200E	
BUILDING No.	30	

	BY	DATE
ORIGINATOR		07/19/11
CHECKER		07/19/11
APPROVER		7/20/11
REVIEWER		7-19-11

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. 24590-HLW-ADR-M-03-001 REV: 3
EMS SCREENING REQUIRED? [X] YES [ ] NO | EMS INITIAL IF YES

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

P&ID - HLW MELTER OFFGAS TREATMENT PROCESS SYSTEM MELTER 2 SECONDARY OFFGAS TREATMENT

SCALE: NONE

24590-HLW-M6-HOP-00008002

REV 0

SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREG-002

"E" SIZE - 44x34
COMPUTER GENERATED - MANUAL DESIGN CHANGES NOT PERMITTED

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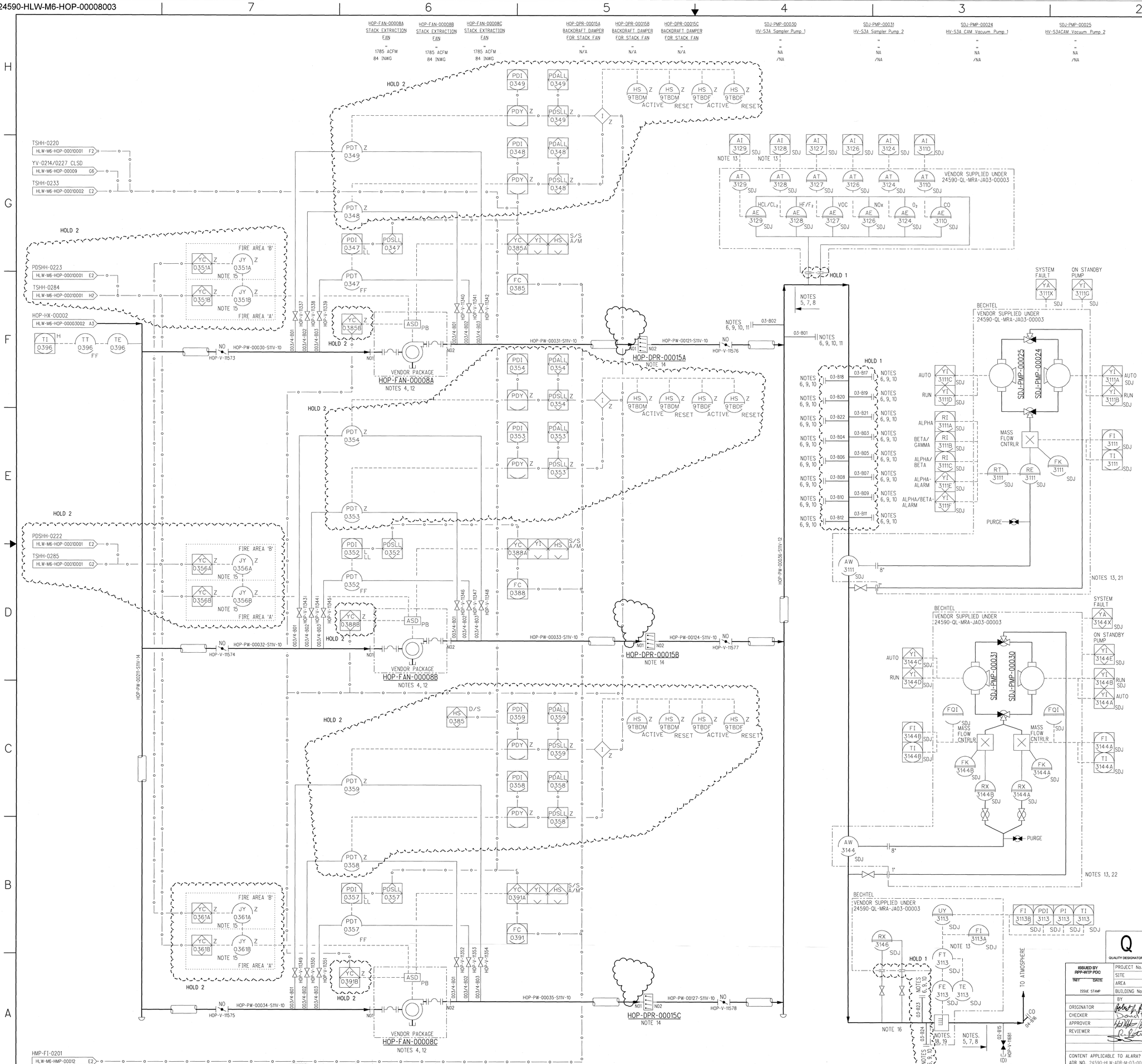
PLOTTED BY: mdritter

FORM E_SDN.DGN 02/2009



NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
2. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
3. THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-III, UNLESS OTHERWISE NOTED.
4. FAN-00008A/B/C ARE 50% CAPACITY EACH, AND WILL BE OPERATED ON A ROTATING BASIS, 2 OPERATING AND 1 IN STAND-BY.
5. GAS ANALYZERS SHALL BE PROVIDED FOR MONITORING: CO, O2, AND VOC FOR DANGEROUS WASTE PERMIT NOX FOR PREVENTION OF SIGNIFICANT DETERIORATION AND HF, F2, HCL, CL2 FOR RADIATION AIR PERMIT. FT-IR TECHNOLOGY SHALL BE UTILIZED AS BARCT INDICATOR FOR SILVER MODERNITE.
6. TEST PORT PAIRS PLACED AT 90° ORIENTATION TO EACH OTHER.
7. THE 3000 SERIES INSTRUMENTS ARE SDJ SYSTEM, AND THE 0300 SERIES INSTRUMENTS AND PIPE REMAIN HOP SYSTEM. THE 3000 (SDJ) INSTRUMENTS ARE AIR PERMIT AFFECTING.
8. REQUIRED RUN OF STRAIGHT PIPE FOR THE SDJ SYSTEM TEST AND INSTRUMENT TAPS (REF LINE HOP-PW-00036-S11V-12): LAST BEND TO 03-B03/B04- 10D, 03-B03/B04 TO 03-B05/B06- 8D, 03-B05/B06 TO 03-B07/B08- 2D, 03-B07/B08 TO 03-B09/B10- 2D, 03-B09/B10 TO UPSTREAM AE TAP- 2D, AE TAP TO RE TAP- 8D, 03-B11/B12 TO UPSTREAM RE TAP- 2 FT, UPSTREAM RE TAP TO FE-3113 - 8D, AND 03-B13/B14 TO FE-3113- 4 IN.
9. ALLOW 1 DIA +36" CLEARANCE FROM TEST PORTS OUTWARD FOR PROBE INSERTION AND EXTRACTION.
10. INSTALL BLIND FLANGE AS CLOSE AS POSSIBLE TO MAIN LINE.
11. LOCATE INJECTION PORT AFTER STACK FANS, AND BEFORE LAST BEND TO SDJ SAMPLE PORTS (NO MINIMUM STRAIGHT PIPE RUN FROM INJECTION PORT TO LAST BEND REQUIRED).
12. HOP FANS ARE TO BE FED BY EMERGENCY DIESEL GENERATOR (EDG) ON LOSS OF OFFSITE POWER. FANS SHALL HAVE HEAT TRACE TO PREVENT CONDENSATION.
13. INSTRUMENT PERFORMS AN AIR PERMIT FUNCTION.
14. THIS IS A LOUVER DAMPER SYMBOL.
15. ISOLATING CONTACT OR (JY) PROVIDES ITS INTERRUPTION OF 480V POWER TO THE ADJUSTABLE SPEED DRIVE.
16. CARBON-14 SAMPLER SHALL BE PROVIDED.
17. LOCATE STACK DRAIN AT HEIGHT TO ALLOW PLACEMENT OF 55 GAL DRUM ON TROLLY UNDERNEATH.
18. AVERAGING PITOT INSTALLED WITH SINGLE-END SUPPORT; DRILLED HOLE SIZE IS 1".
19. INSTRUMENT IS BARCT INDICATOR FOR BOOSTER AND EXHAUST FANS.
20. THE STACK DISCHARGE SYSTEM (SDJ) INSTRUMENTS, EQUIPMENT, SAMPLING PROBES AND SAMPLE LINES ASSOCIATED WITH THIS DRAWING ARE SEISMIC CATEGORY SC-III FOR BOUNDARY, AND SC-IV FOR FUNCTION (ISM CCN 226891).
21. CONTINUOUS AIR MONITOR (CAM) SHALL BE PROVIDED TO MONITOR GROSS ALPHA AND GROSS BETA/GAMMA RADIATION.
22. RECORD SAMPLER FOR RETROSPECTIVE ANALYSIS SHALL BE PROVIDED. IODINE-129 SAMPLING SHALL ALSO BE PERFORMED BY THIS SAMPLER.
23. THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-HLW-M6-HOP-00008 REV 3. THIS DRAWING INCLUDES INFORMATION FROM 24590-HLW-M6N-HOP-00013, -00118, -00123, -00142, -00166, -00174, -00189, -00202, 24590-HLW-M6LN-HOP-00002, 24590-HLW-M6N-M80T-00004, AND 24590-WTP-SDDR-MS-11-00051.

HOLD/OPEN ITEMS:

1. PENDING PORT DESIGN INFORMATION FROM C&I.
2. PENDING PRELIMINARY DOCUMENTED SAFETY ANALYSIS (PDSA) AND PROGRAMMABLE PROTECTION SYSTEM (PPJ) CONTROL STRATEGY CLARIFICATIONS.

REFERENCES:

1. 24590-HLW-3YD-HOP-00001, SYSTEM DESCRIPTION FOR THE HLW MELTER OFFGAS TREATMENT PROCESS AND PROCESS VESSEL VENT EXHAUST (HOP AND PVV SYSTEMS).

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 RADIO NUCLIDES IS PROVIDED FOR PROCESS DESCRIPTION PURPOSES ONLY.

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR CONSTRUCTION, SEE NOTE 23		DCS			7-20-11

REVISION HISTORY

Q QUALITY DESIGNATOR

ISSUED BY RPP-WTP PDC

	BY	DATE
ORIGINATOR	Robert J. Fowler	7/19/11
CHECKER	David Corson	07/19/11
APPROVER	Chris Mark	7-20-11
REVIEWER		7-19-11
		7/20/11

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. 24590-HLW-ADR-M-03-001 REV: 3
EMS SCREENING REQUIRED? [X] YES [ ] NO EMS INITIAL IF YES

PROJECT No.	24590
SITE	HANFORD
AREA	200E
BUILDING No.	30

BECHTEL
RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

P&ID - HLW MELTER OFFGAS TREATMENT PROCESS SYSTEM MELTER 1 SECONDARY OFFGAS TREATMENT

SCALE: NONE

24590-HLW-M6-HOP-00008003 REV 0

SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREQ-002

"E" SIZE - 44x34
COMPUTER GENERATED - MANUAL DESIGN CHANGES NOT PERMITTED

R11387161

7/19/2011 3:29:06 PM

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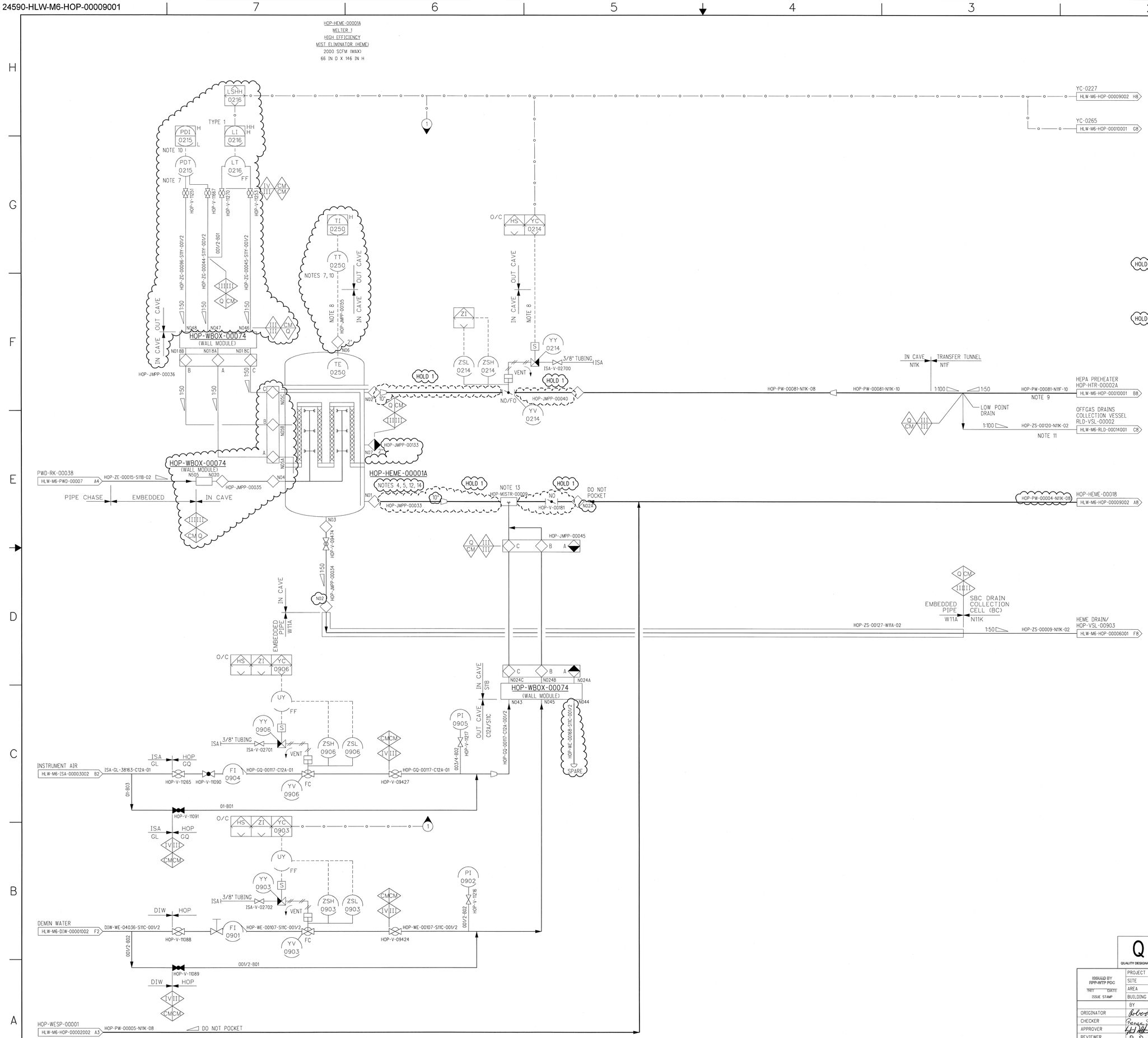
PLOTTED BY: mdritter

FORM E_SDN.DGN 02/2009



NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
2. CONTENTS OF THIS DRAWING ARE DANGEROUS WASTE PERMIT AFFECTING.
3. THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY III, UNLESS OTHERWISE NOTED.
4. HEME CONTAINS FIVE (5) MULTI-SECTION FILTER ASSEMBLIES DESIGNED FOR REMOTE REPLACEMENT.
5. REFER TO ENGINEERING SPECIFICATION 24590-WTP-3PS-MV00-T0001 FOR VESSEL NOZZLE LOADS WITH THE EXCEPTION OF NOZZLES N01 AND N02 AS DESCRIBED IN 24590-WTP-SDDR-PROC-05-00235.
6. INSTRUMENTS ARE QUALITY LEVEL CM UNLESS OTHERWISE NOTED OR ARE AIR PERMIT AFFECTING. INSTRUMENT, ROOT VALVE AND TUBING CONFINEMENT REQUIREMENTS ARE THE SAME AS THE CONNECTING PROCESS PIPE UNLESS NOTED OTHERWISE.
7. TRANSMITTER WILL BE SUPPLIED WITH LOCAL INDICATION.
8. FOR INSTRUMENTATION JUMPERS REFER TO 24590-HLW-M6-ISA-00008.
9. PIPING IN THE TRANSFER TUNNEL WILL HAVE WELDED CONNECTIONS ONLY.
10. INSTRUMENT PERFORMS AN AIR PERMIT FUNCTION.
11. DRIP PAN PROVIDED BELOW DRAIN LINES FOR SECONDARY CONTAINMENT.
12. THE HEME INTERNAL WASHDOWN PIPING THAT DOES NOT PENETRATE THE VESSEL SHELL, THE FILTER CAGES, AND THE WASHDOWN SPRAY NOZZLES ARE QUALITY LEVEL CM. (HOLD 1)
13. THE TAG HOP-MISTR-00009 REFERS TO A COMMERCIALLY AVAILABLE MISTING NOZZLE AND IS QUALITY LEVEL CM, SEISMIC CATEGORY SC-III. THE MISTING NOZZLE IS LOCATED INSIDE THE JUMPER PRESSURE BOUNDARY.
14. HEME REMOVAL EFFICIENCY IS SAFETY SIGNIFICANT. (HOLD 1)
15. THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-HLW-M6-HOP-00009 REV ~~2~~ 1. THIS DRAWING INCLUDES INFORMATION FROM 24590-HLW-M6LN-HOP-00017, 24590-HLW-M6N-HOP-00073, -00078, J-00145, -00153, -00155, -00162, -00163, -00175, -00190, AND 24590-HLW-M6PR-HOP-00006. SPK 10/6/11

HOLD/OPEN ITEMS:

1. PENDING DETERMINATION OF HEME FUNCTIONAL SAFETY REQUIREMENTS.

REFERENCES:

1. 24590-HLW-3YD-HOP-00001, SYSTEM DESCRIPTION FOR THE HLW MELTER OFFGAS TREATMENT PROCESS AND PROCESS VESSEL VENT EXHAUST (HOP AND PVV SYSTEMS).

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 RADIO NUCLIDES IS PROVIDED FOR PROCESS DESCRIPTION PURPOSES ONLY.

DRAWING INDEX

DWG NO	TITLE
24590-HLW-M6-HOP-00009001	HOP SYSTEM HOP-HEME-00001A
24590-HLW-M6-HOP-00009002	HOP SYSTEM HOP-HEME-00001B

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR CONSTRUCTION, SEE NOTE 15	RGR	RCS	RGR	RGR	9-29-11

REVISION HISTORY

Q
QUALITY DESIGNATOR

ISSUED BY RPP-WTP PDC
TNT DATE
ISSUE STAMP

PROJECT No.	24590	
SITE	HANFORD	
AREA	200E	
BUILDING No.	30	

	BY	DATE
ORIGINATOR	Robert H. Fisher	09/29/11
CHECKER	Renee Stoessinger	09/29/11
APPROVER	Scott Hill / Mike Martin	9/29/11
REVIEWER	R. Schum	9-29-11
		9/29/11

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. 24590-HLW-ADR-M-03-001 REV: 3
EMS SCREENING REQUIRED? [X] YES [ ] NO EMS INITIAL IF YES

BECHTEL
RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

P&ID - HLW
MELTER OFFGAS TREATMENT PROCESS SYSTEM MELTER 1 PRIMARY OFFGAS HEME HOP-HEME-00001A

SCALE: NONE
24590-HLW-M6-HOP-00009001
REV 0

SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREQ-002

'E' SIZE - 44x34
COMPUTER GENERATED - MANUAL DESIGN CHANGES NOT PERMITTED

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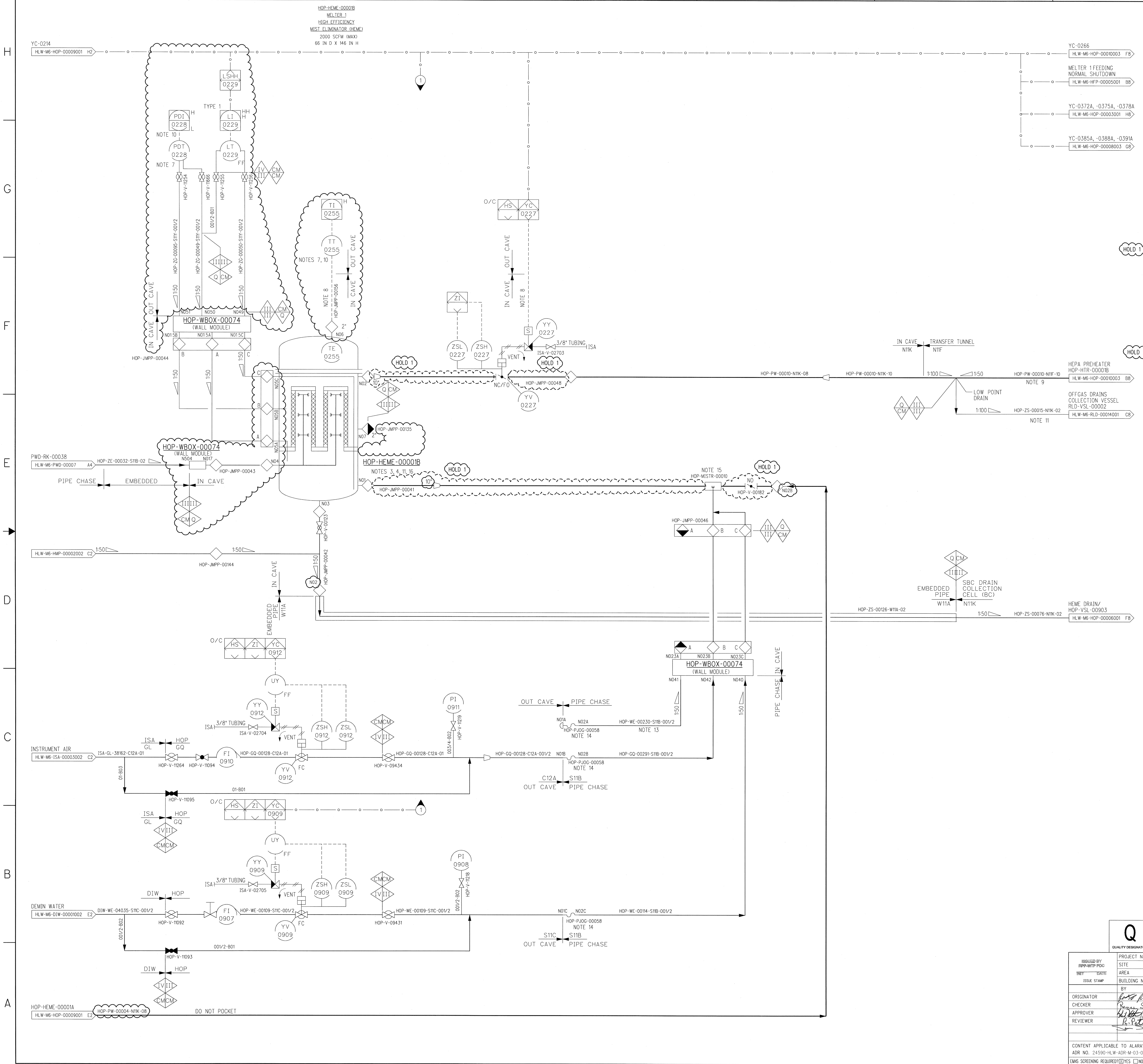
PLOTTED BY: mdmiller

FORM E_SDN.DGN 02/2009



NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
2. CONTENTS OF THIS DRAWING ARE DANGEROUS WASTE PERMIT AFFECTING.
3. THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-III, UNLESS OTHERWISE NOTED.
4. HEME CONTAINS FIVE (5) MULTI-SECTION FILTER ASSEMBLIES DESIGNED FOR REMOTE REPLACEMENT.
5. REFER TO ENGINEERING SPECIFICATION 24590-WTP-3PS-MV00-T0001 FOR VESSEL NOZZLE LOADS WITH THE EXCEPTION OF NOZZLES N01 AND N02 AS DESCRIBED IN 24590-WTP-SDDR-PROC-05-00235.
6. INSTRUMENTS ARE QUALITY LEVEL CM UNLESS OTHERWISE NOTED OR ARE AIR PERMIT AFFECTING. INSTRUMENT, ROOT VALVE AND TUBING CONFINEMENT REQUIREMENTS ARE THE SAME AS THE CONNECTING PROCESS PIPE UNLESS NOTED OTHERWISE.
7. TRANSMITTER WILL BE SUPPLIED WITH LOCAL INDICATION.
8. FOR INSTRUMENTATION JUMPERS REFER TO 24590-HLW-M6-ISA-00008.
9. PIPING IN THE TRANSFER TUNNEL WILL HAVE WELDED CONNECTIONS ONLY.
10. INSTRUMENT PERFORMS AN AIR PERMIT FUNCTION.
11. DRIP PAN PROVIDED BELOW DRAIN LINES FOR SECONDARY CONTAINMENT.
12. (HOLD 1) THE HEME INTERNAL WASHDOWN PIPING THAT DOES NOT PENETRATE THE VESSEL SHELL, THE FILTER CAGES, AND THE WASHDOWN SPRAY NOZZLES ARE QUALITY LEVEL CM.
13. PIPING REFERENCED TO THIS NOTE SHALL BE QUALITY LEVEL CM AND SEISMIC CATEGORY SC-III.
14. THE GEOMETRY OF JOGGLED (OFFSET) PENETRATIONS IS QUALITY LEVEL Q FOR RADIATION PROTECTION. THE QUALITY LEVEL AND SEISMIC CATEGORY DESIGNATIONS OF PIPING WITHIN JOGGLES ARE THE SAME AS CONNECTING PIPING.
15. THE TAG HOP-MISTR-00010 REFERS TO A COMMERCIALLY AVAILABLE MISTING NOZZLE AND IS QUALITY LEVEL CM, SEISMIC CATEGORY SC-III. THE MISTING NOZZLE IS LOCATED INSIDE THE JUMPER PRESSURE BOUNDARY.
16. (HOLD 1) HEME REMOVAL EFFICIENCY IS SAFETY SIGINIFICANT.
17. THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-HLW-M6-HOP-20009 REV 6. THIS DRAWING INCLUDES INFORMATION FROM 24590-HLW-M6LN-HOP-00017, 24590-HLW-M6N-HOP-00073, -00078, -00145, -00153, -00155, -00162, -00163, -00175, -00190, AND 24590-HLW-M6PR-HOP-00006. SPK 10/6/11

HOLD/OPEN ITEMS:

1. PENDING DETERMINATION OF HEME FUNCTIONAL SAFETY REQUIREMENTS.

REFERENCES:

1. 24590-HLW-3YD-HOP-00001, SYSTEM DESCRIPTION FOR THE HLW MELTER OFFGAS TREATMENT PROCESS AND PROCESS VESSEL VENT EXHAUST (HOP AND PVV SYSTEMS).

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 RADIO NUCLIDES IS PROVIDED FOR PROCESS DESCRIPTION PURPOSES ONLY.

Q — QUALITY DESIGNATOR

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR CONSTRUCTION, SEE NOTE 17	[signature]	RCS	[signature]	[signature]	9-29-11

REVISION HISTORY

ISSUED BY RPP-WTP PDC — INIT DATE — ISSUE STAMP

PROJECT No.	24590
SITE	HANFORD
AREA	200E
BUILDING No.	30

	BY	DATE
ORIGINATOR	[signature]	9/27/11
CHECKER	Renee Slocumb	09/27/11
APPROVER	[signature]	9/29/11
REVIEWER	R. Peterson	9-27-11
	[signature]	9/27/11

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. 24590-HLW-ADR-M-03-001 REV: 3
E&NS SCREENING REQUIRED? [X] YES [ ] NO E&NS INITIAL IF YES [initials]

BECHTEL — RIVER PROTECTION PROJECT, WASTE TREATMENT PLANT, 2435 STEVENS CENTER PLACE, RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

P&ID - HLW MELTER OFFGAS TREATMENT PROCESS SYSTEM MELTER 1 PRIMARY OFFGAS HEME HOP-HEME-00001B

SCALE: NONE — 24590-HLW-M6-HOP-00009002 — REV 0

SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREG-002

'E' SIZE - 44x34 COMPUTER GENERATED - MANUAL DESIGN CHANGES NOT PERMITTED

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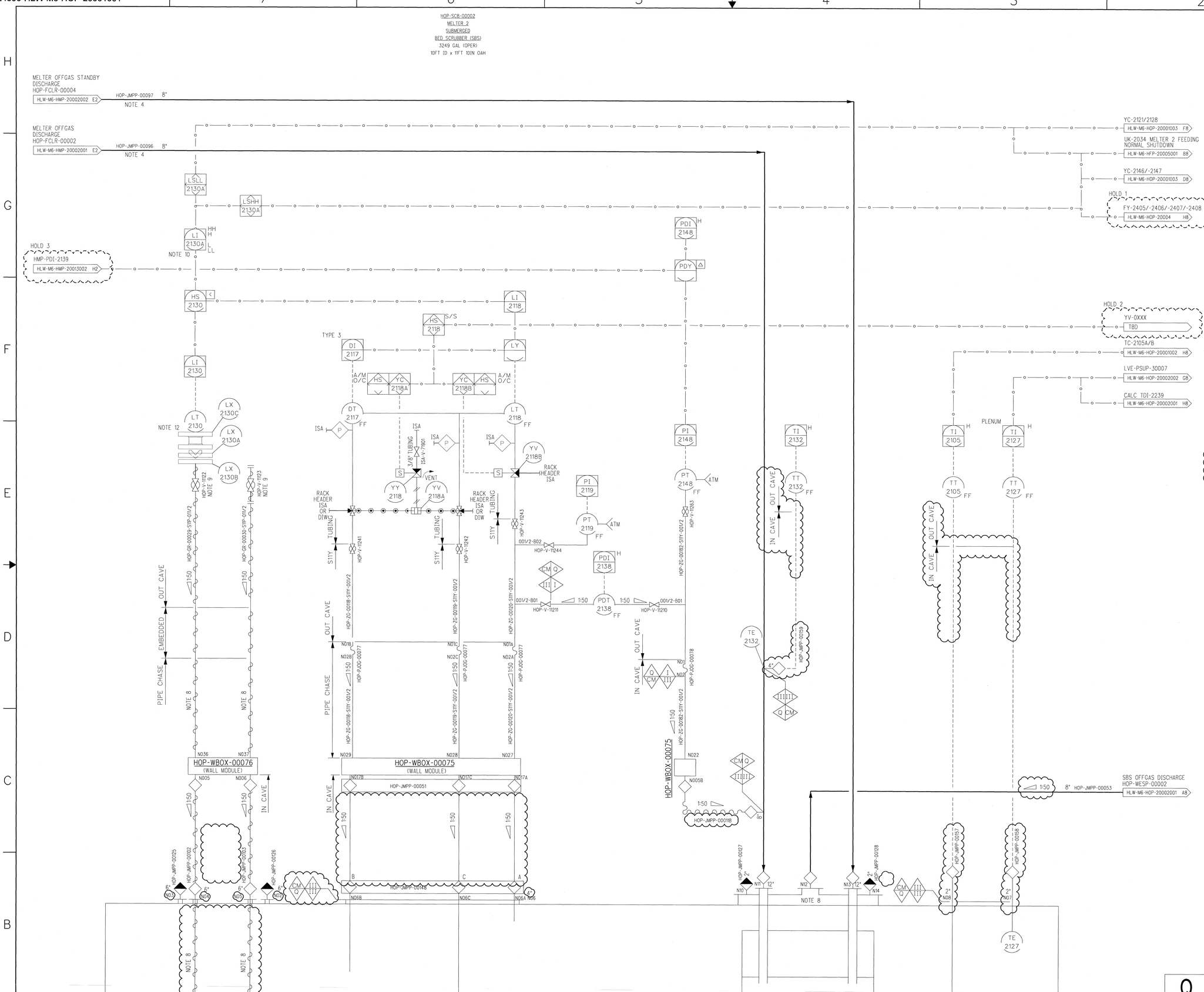
PLOTTED BY: mdritter C:\Work\mdritter\dms03839\HLWM6HOP00009002.dgn

FORM E_SDN.DGN 02/2009



NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
2. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
3. THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-III, UNLESS OTHERWISE NOTED.
4. ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, UNLESS OTHERWISE NOTED.
5. VESSEL HOP-SCB-00002 IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I FOR LIQUID CONFINEMENT BELOW THE VESSEL OVERFLOW AND SEISMIC CATEGORY SC-III FOR OFFGAS CONFINEMENT. THIS IS AIR PERMIT EQUIPMENT.
6. IN VESSEL PIPE CLASS CHANGE TO N13A, HASTELLOY C-22.
7. REFER TO ENGINEERING SPECIFICATION 24590-WTP-3PS-MV00-T0001 FOR VESSEL NOZZLE LOADS, EXCEPTIONS PER 24590-WTP-SDDR-MS-10-00073 ARE AS FOLLOWS:
   A. FOR NOZZLES N02, N03, N04, AND N05 USE 2" NOZZLE LOADS.
   B. FOR NOZZLE N06 USE 3" NOZZLE LOADS.
   C. FOR NOZZLES N11 AND N13 USE 8" NOZZLE LOADS.
8. MELTER AND SBS OFFGAS LINES ARE QUALIYT LEVEL Q AND SEISMIC CATEGORY SC-III. RAAR GUIDE TUBES ARE DESIGNATED QUALITY LEVEL Q AND SEISMIC CATEGORY SC-III.
9. RADAR GUIDE TUBE IS TO BE ROUTED TO TRANSMITTER. A FULL PORT VALVE IS REQUIRED FOR ISOLATION PURPOSES AT TRANSMITTER END OF GUIDE TUBE.
10. INSTRUMENT PERFORMS AN AIR PERMIT FUNCTION. INSTRUMENT INCLUDES INTEGRAL DISPLAY WITH TRANSMITTER.
11. ICN LOGIC WILL BE IMPLEMENTED TO USE THE RADAR LEVEL AS THE PRIMARY MEASUREMENT WITH THE BUBBLER LEVEL AS A MAINTENANCE BACK UP.
12. TRANSMITTER WILL BE SUPPLIED WITH LOCAL INDICATION.
13. THE GEOMETRY OF JOGGLED (OFFSET) PENETRATION IS QUALITY LEVEL Q FOR RADIATION PROTECTION. THE QUALITY LEVEL AND SEISMIC CATEGORY DESIGNATIONS OF PIPING WITHIN JOGGLES ARE THE SAME AS CONNECTING PIPING, UNLESS OTHERWISE SHOWN OR NOTED.
14. THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-HLW-M6-HOP-20001 REV 7. THIS DRAWING INCLUDES INFORMATION FROM 24590-HLW-M6LN-HOP-00001, 24590-HLW-M6N-30-00007, 24590-HLW-M6N-HOP-00144, -00155, -00162, -00163, -00175, AND -00193.

HOLD/OPEN ITEMS:

1. PENDING PJM/RFD DESIGN.
2. PENDING RACK HEADER VALVE.
3. PENDING HLW- HMP ENHANCEMENTS.

REFERENCES:

1. 24590-HLW-M5-V17T-00003, PROCESS FLOW DIAGRAM, HLW VIT MELTER 1 PRIMARY OFFGAS TREATMENT (SYSTEM HOP).
2. 24590-HLW-3YD-HOP-00001, SYSTEM DESCRIPTION FOR THE HLW MELTER OFFGAS TREATMENT PROCESS AND PROCESS VESSEL VENT EXHAUST (HOP AND PVV SYSTEMS).

PLEASE NOTE THAT SOURCE, SPECIAL NUCLEAR AND BYPRODUCT MATERIALS, AS DEFINED IN THE ATOMIC ENERGY ACT OF 1954 AND ACTS AMENDATORY THEREOF, ARE EXCLUDED FROM THE PROPOSED CONTRACTS BEING ISSUED PURSUANT TO STATE SALE AUTHORITY FOR ASSETS, ISSUED PURSUANT TO THE ALLIT DRA SALE AND LEASEBACK RESPONSIBILITY AND AUTHORITY TO REGULATE SOURCE, SPECIAL NUCLEAR AND BYPRODUCT MATERIALS AT DOE-OWNED NUCLEAR FACILITIES. INFORMATION CONTAINED HEREIN ON RADIO NUCLIDES IS PROVIDED FOR PROCESS DESCRIPTION PURPOSES ONLY.

DRAWING INDEX

DWG NO	TITLE
24590-HLW-M6-HOP-20001001	HOP SYSTEM MELTER 2 HOP-SCB-00002
24590-HLW-M6-HOP-20001002	HOP SYSTEM MELTER 2 HOP-SCB-00002
24590-HLW-M6-HOP-20001003	HOP SYSTEM MELTER 2 HOP-SCB-00002

Q
QUALITY DESIGNATOR

REVISION HISTORY

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR CONSTRUCTION, SEE NOTE 14	RRK	RRK	SSS RDP	MAW PDK	7/20/11

ISSUED BY RPP-WTP PDC
INIT DATE
ISSUE STAMP

PROJECT No.	24590
SITE	HANFORD
AREA	200E
BUILDING No.	30

BECHTEL
RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

	BY	DATE
ORIGINATOR	Robert R. Kirk	7-20-11
CHECKER	R. Scott Austin	7/20/11
APPROVER	W. Mark Mathis	7/20/11
REVIEWER	R. Peterson	7-20-11
		7/20/11

P&ID - HLW MELTER OFFGAS TREATMENT PROCESS SYSTEM MELTER 2 PRIMARY OFFGAS SCRUBBER HOP-SCB-00002

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. 24590-HLW-ADR-M-03-001 REV: 3
SAFETY SCREEN REQUIRED? [X] YES [ ] NO EMS INITIAL IF YES

SCALE: NONE
24590-HLW-M6-HOP-20001001
REV 0

SAFETY SCREEN IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREG-002

E-SIZE - 44x34
COMPUTER GENERATED - MANUAL CHANGES NOT PERMITTED

R11387163

7/20/2011 10:25:32 AM

PLOTTED BY: gpookes
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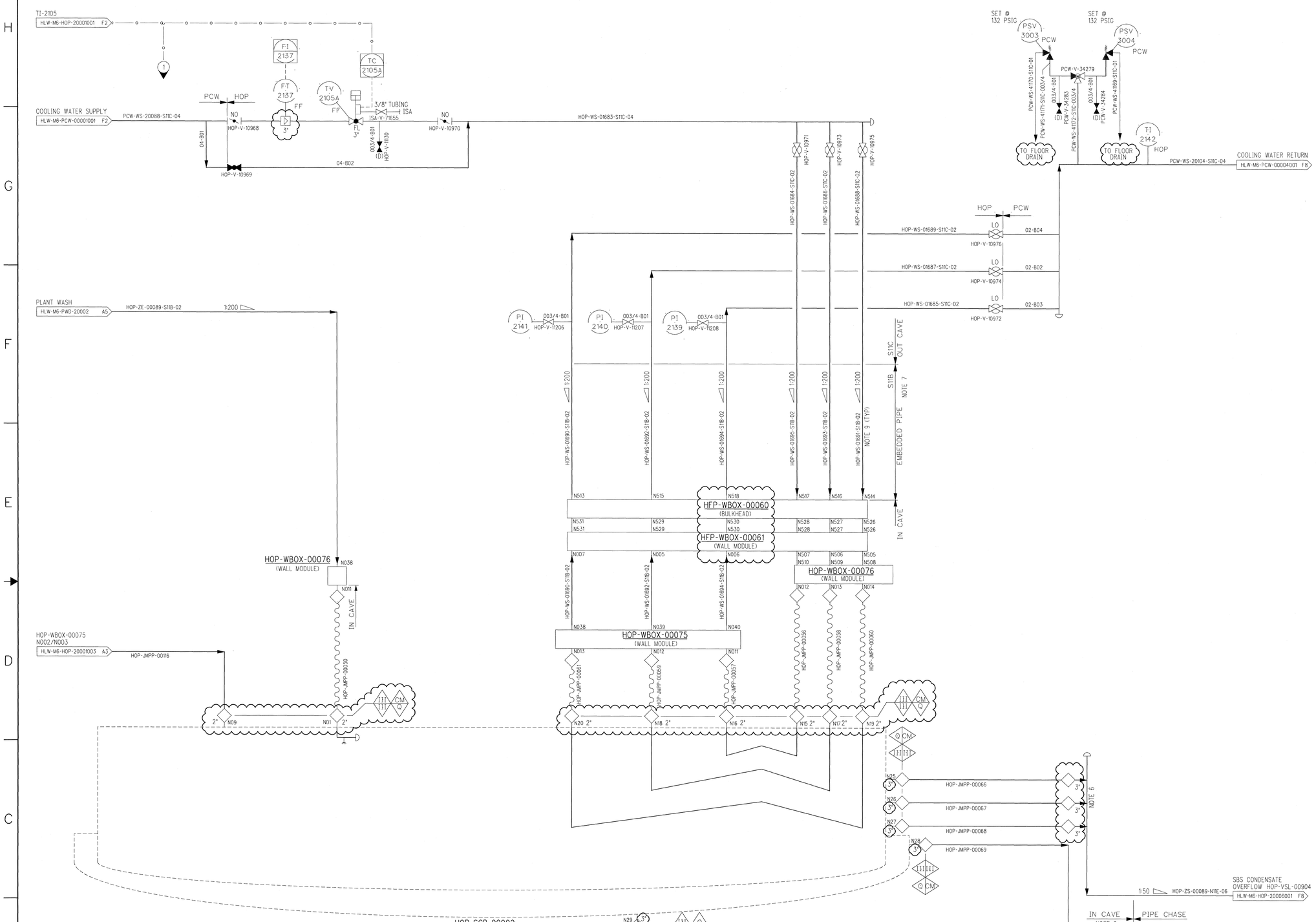
FORM E_SDN.DGN 02/2003



NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
2. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
3. THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-III, UNLESS OTHERWISE NOTED.
4. ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, UNLESS OTHERWISE NOTED.
5. VESSEL HOP-SCB-00002 IS QUALITY LEVEL Q. IT IS SEISMIC CATEGORY SC-I FOR LIQUID CONFINEMENT BELOW THE VESSEL OVERFLOW AND SEISMIC CATEGORY SC-III FOR OFFGAS CONFINEMENT. THIS IS AIR PERMIT EQUIPMENT.
6. DUE TO SPACE CONSTRAINTS, THE IN CAVE PORTION OF THE OVERFLOW COLLECTION HEADER REQUIRES A MINIMUM SLOPE OF 1:50. THE PIPING CONNECTING TO THE JUMPERS CAN BE HORIZONTAL JUST PRIOR TO THE CONNECTION AS REQUIRED TO FACILITATE THE JUMPERS CONNECTION. THE 1:50 SLOPE SHALL BE ACHIEVED AS SOON AS PRACTICAL AFTER THE CONNECTIONS.
7. MAIN HEADER REQUIRES 34 FT OF BAROMETRIC HEAD ABOVE SUBMERGED BED SCRUBBER OVERFLOW.
8. IN VESSEL PIPE CLASS CHANGE TO N13A, HASTELLOY C-22.
9. COOLING WATER SUPPLY AND RETURN PIPES TO BE FREE DRAINING FROM OUT CAVE TO IN CAVE.
10. THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-HLW-M6-HOP-20001 REV 7. THIS DRAWING INCLUDES INFORMATION FROM 24590-HLW-M6LN-HOP-00001, 24590-HLW-M6N-HOP-00168, -00193, 24590-HLW-M6PR-HOP-00007, AND -00011.

HOLD/OPEN ITEMS:

NONE

REFERENCES:

1. 24590-HLW-M5-V17T-00003, PROCESS FLOW DIAGRAM, HLW VIT MELTER 1 PRIMARY OFFGAS TREATMENT (SYSTEM HOP).
2. 24590-HLW-3YD-HOP-00001, SYSTEM DESCRIPTION FOR THE HLW MELTER OFFGAS TREATMENT PROCESS AND PROCESS VESSEL VENT EXHAUST (HOP AND PVV SYSTEMS).

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 RADIO NUCLIDES IS PROVIDED FOR PROCESS DESCRIPTION PURPOSES ONLY.

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR CONSTRUCTION, SEE NOTE 10	BOR	BLA	[illegible]	[illegible]	7-20-11

REVISION HISTORY

Q — QUALITY DESIGNATOR

ISSUED BY RPP-WTP PDC — INT DATE — ISSUE STAMP

PROJECT No.	24590	
SITE	HANFORD	
AREA	200E	
BUILDING No.	30	

BECHTEL

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

	BY	DATE
ORIGINATOR	[illegible]	7-20-11
CHECKER	[illegible]	7/20/11
APPROVER	[illegible]	7/20/11
REVIEWER	[illegible]	7-20-11
	[illegible]	7-20-11

P&ID - HLW MELTER OFFGAS TREATMENT PROCESS SYSTEM MELTER 2 PRIMARY OFFGAS SCRUBBER HOP-SCB-00002

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. 24590-HLW-ADR-M-03-001 REV: 3
SAFETY SCREEN REQUIRED? [X] YES [ ] NO E&NS INITIAL IF YES

SCALE: NONE

24590-HLW-M6-HOP-20001002 — REV 0

'E' SIZE - 44x34
COMPUTER GENERATED - MANUAL CHANGES NOT PERMITTED

SAFETY SCREEN IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREQ-002

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PLOTTED BY: gpockes
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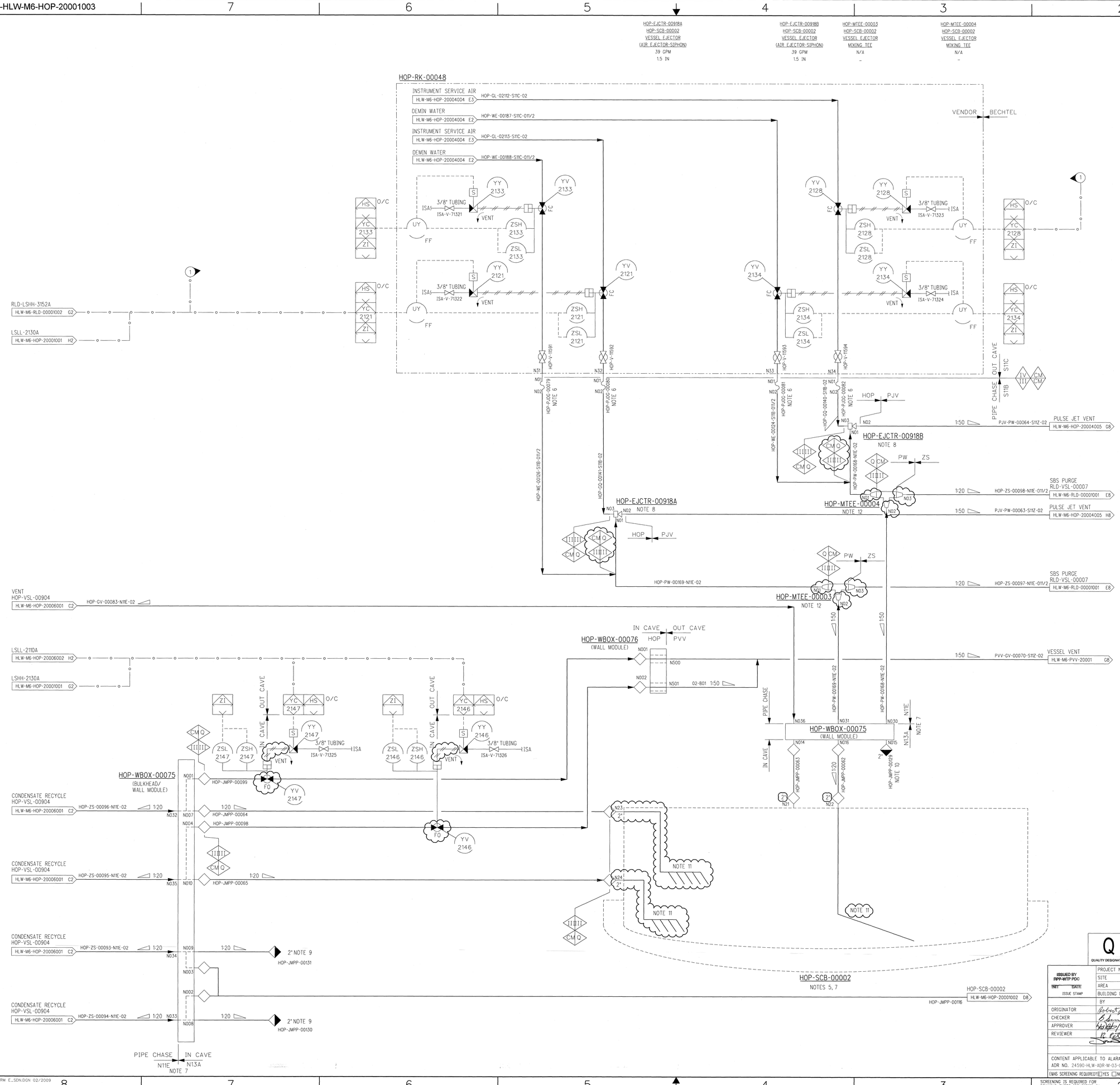

NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
2. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
3. THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY III, UNLESS OTHERWISE NOTED.
4. ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, UNLESS OTHERWISE NOTED.
5. VESSEL HOP-SCB-00002 IS QUALITY LEVEL Q. IT IS SEISMIC CATEGORY SC-I FOR LIQUID CONFINEMENT BELOW THE VESSEL OVERFLOW AND SEISMIC CATEGORY SC-III FOR OFFGAS CONFINEMENT. THIS IS AIR PERMIT EQUIPMENT.
6. THE GEOMETRY OF JOGGLED (OFFSET) PENETRATION IS QUALITY LEVEL Q FOR RADIATION PROTECTION. THE QUALITY LEVEL AND SEISMIC CATEGORY DESIGNATIONS OF PIPING WITHIN JOGGLES ARE THE SAME AS CONNECTING PIPING, UNLESS OTHERWISE SHOWN OR NOTED.
7. IN VESSEL PIPE CLASS CHANGE TO N13A, HASTELLOY C-22.
8. EJECTOR TO BE LOCATED MINIMUM 34 FT ABOVE SUBMERGED BED SCRUBBER OVERFLOW.
9. SPARE JUMPER CONNECTION TO HOP-SCB-00002, NOZZLE N23 OR N24.
10. SPARE JUMPER CONNECTION FOR HOP-SCB-00002, N22.
11. INDICATED SBS INTERNAL PIPING SHALL HAVE 1/2" HOLE AT ELEVATION OF 12" BELOW CENTER LINE OF N25.
12. THE SBS SIPHON TRANSFER CONNECTION TEE SHOULD BE LOCATED AT AN ELEVATION THAT IS NO MORE THAN 14 FT ABOVE THE BOTTOM OF THE SBS OVERFLOW NOZZLE. THE TEE WILL BE MOUNTED WITH THE STRAIGHT RUN IN THE VERTICLE POSITION.
13. THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-HLW-M6-HOP-20001 REV 7. THIS DRAWING INCLUDES INFORMATION FROM 24590-HLW-M6LN-HOP-00001, 24590-HLW-M6N-HOP-00160, -00163, -00171, -00193, AND 24590-HLW-M6PR-HOP-00001.

HOLD/OPEN ITEMS:

NONE

REFERENCES:

1. 24590-HLW-M5-V17T-00003, PROCESS FLOW DIAGRAM, HLW VIT MELTER 1 PRIMARY OFFGAS TREATMENT (SYSTEM HOP).
2. 24590-HLW-3YD-HOP-00001, SYSTEM DESCRIPTION FOR THE HLW MELTER OFFGAS TREATMENT PROCESS AND PROCESS VESSEL VENT EXHAUST (HOP AND PVV SYSTEMS).

PLEASE NOTE THAT SOURCE, SPECIAL NUCLEAR AND BYPRODUCT MATERIALS, AS DEFINED IN THE ATOMIC ENERGY ACT OF 1954(AEA) ARE REGULATED BY THE U.S. DEPARTMENT OF ENERGY (DOE) FACILITIES EXCLUSIVELY BY DOE ACTING THROUGH ITS CONTRACTORS. DOE MAY AUTHORIZE OTHER FEDERAL AGENCIES TO ACT AS THEIR CONTRACTORS RESPONSIBILITIES AND AUTHORITY TO REGULATE SOURCE, SPECIAL NUCLEAR AND BYPRODUCT MATERIALS AT DOE-OWNED NUCLEAR FACILITIES. INFORMATION CONTAINED HEREIN ON RADIO NUCLIDES IS PROVIDED FOR PROCESS DESCRIPTION PURPOSES ONLY.

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR CONSTRUCTION, SEE NOTE 13					7-20-11

REVISION HISTORY

Q
QUALITY DESIGNATOR

ISSUED BY RPP-WTP PDC
INIT DATE
ISSUE STAMP

PROJECT No.	24590	
SITE	HANWORD	
AREA	200E	
BUILDING No.	30	

	BY	DATE
ORIGINATOR	Robert A. Rohr	7-20-11
CHECKER	Brian Mantz	7/20/11
APPROVER	Brian Mantz	7/20/11
REVIEWER	R. Peterson	7-20-11
		7/20/11

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. 24590-HLW-ADR-M-03-001 REV: 3
EMS SCREENING REQUIRED? [X] YES [ ] NO EMS INITIAL IF YES

BECHTEL

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

P&ID - HLW MELTER OFFGAS TREATMENT PROCESS SYSTEM MELTER 2 PRIMARY OFFGAS SCRUBBER HOP-SCB-00002

SCALE: NONE

24590-HLW-M6-HOP-20001003

REV 0

SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREG-002

E SIZE - 44x34
COMPUTER GENERATED - MANUAL
DESIGN CHANGES NOT PERMITTED

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7/20/2011 10:23:56 AM

PLOTTED BY: gpockes

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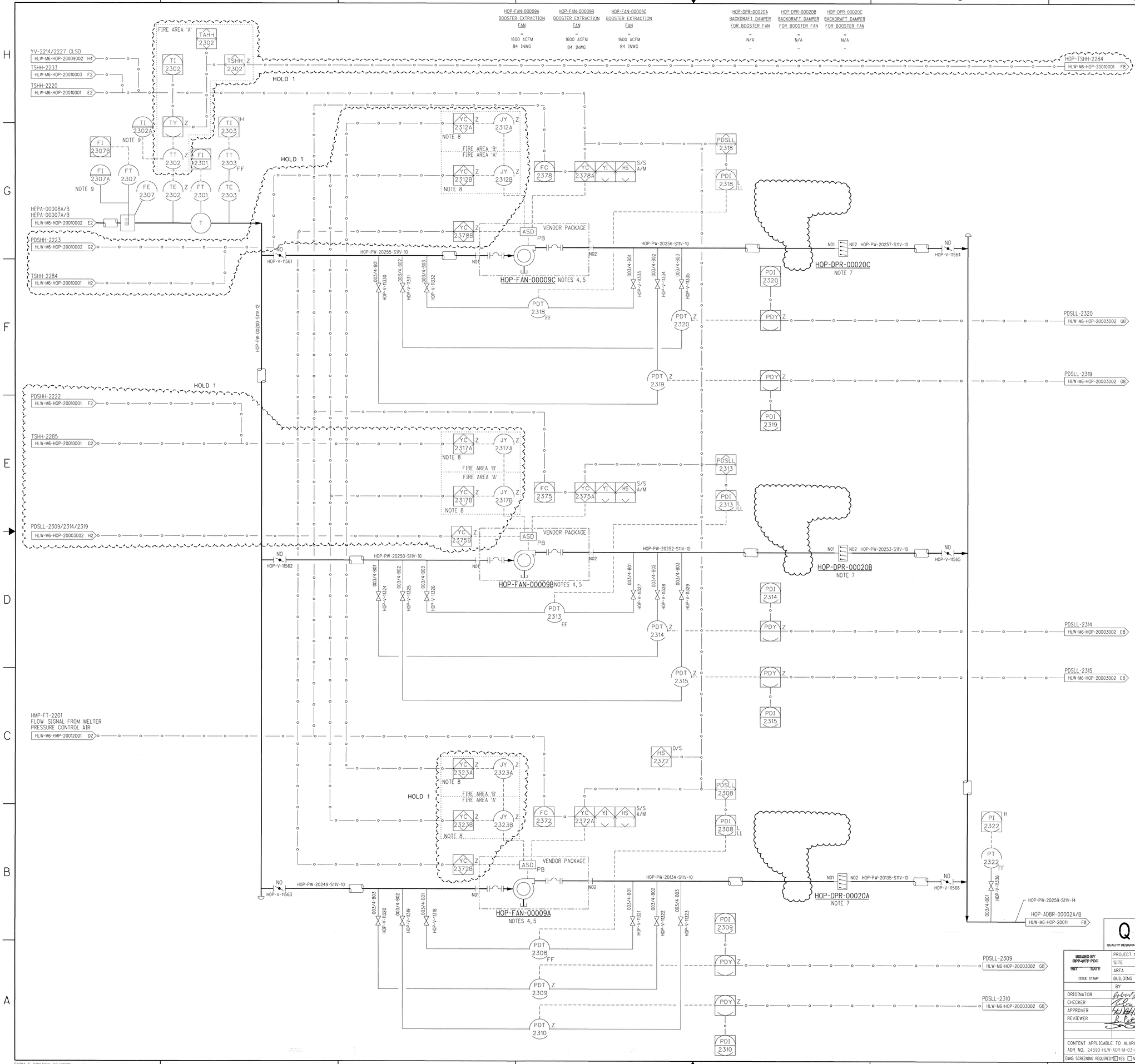
FORM E_SDN.DGN 02/2009



NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
2. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
3. PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-III, UNLESS OTHERWISE NOTED.
4. FAN-00009A/B/C ARE 50% CAPACITY EACH, AND WILL BE OPERATED ON A ROTATING BASIS, 2 OPERATING AND 1 IN STAND-BY.
5. HOP FANS ARE TO BE FED BY EMERGENCY DIESEL GENERATOR (EDG) ON LOSS OF OFFSITE POWER. FANS SHALL HAVE HEAT TRACE TO PREVENT CONDENSATION.
6. INSTRUMENTS ARE COMMERCIAL GRADE CM UNLESS DESIGNATED BY A "Z" OR ARE AIR PERMIT AFFECTING. INSTRUMENT, ROOT VALVE AND TUBING CONFINEMENT REQUIREMENTS ARE THE SAME AS THE CONNECTING PROCESS PIPE UNLESS NOTED OTHERWISE.
7. THIS IS A LOUVER DAMPER SYMBOL.
8. ISOLATING CONTACTOR OR (JY) PROVIDES ITS INTERRUPTION OF THE 480V POWER TO THE ADJUST SPEED DRIVE.
9. INSTRUMENT PERFORMS AN AIR PERMIT FUNCTION.
10. THIS DRAWING SUPERSEDES 24590-HLW-M6-HOP-20003 REV 3. THIS DRAWING INCLUDES INFORMATION FROM 24590-HLW-M6N-HOP-00013, -00162, -00195, 24590-HLW-M6LN-HOP-00008, AND 24590-HLW-M6N-M8OT-00004.

HOLD/OPEN ITEMS:

1. PENDING PDSA AND PPJ CONTROL STRATEGY CLARIFICATIONS.

REFERENCES:

1. 24590-HLW-3YD-HOP-00001, SYSTEM DESCRIPTION FOR THE HLW MELTER OFFGAS TREATMENT PROCESS, AND PROCESS VESSEL VENT EXHAUST (HOP AND PVV SYSTEMS).
2. 24590-HLW-M5-V17T-20004 PROCESS FLOW DIAGRAM HLW VITRIFICATION MELTER 2 SECONDARY OFFGAS TREATMENT (SYSTEM HOP).
3. FOR ITS PERMISSIVES AND INTERLOCKS, REFER TO SAFETY SYSTEM REQUIREMENTS SPECIFICATION, 24590-HLW-3PS-PPJ-T0008 (TO BE ISSUED).

PLEASE NOTE THAT SOURCE, SPECIAL NUCLEAR AND BYPRODUCT MATERIALS, AS DEFINED IN THE ATOMIC ENERGY ACT OF 1954(SNM), ARE REGULATED AT THE U.S. DEPARTMENT OF ENERGY (DOE) FACILITIES EXCLUSIVELY BY DOE ACTING THROUGH ITS CONTRACTORS. THE REGULATORY AUTHORITY OVER SNM, AS DEFINED IN THE ATOMIC ENERGY ACT, IS DOE'S RESPONSIBILITY AND AUTHORITY TO REGULATE SOURCE, SPECIAL NUCLEAR AND BYPRODUCT MATERIALS AT DOE-OWNED NUCLEAR FACILITIES. INFORMATION CONTAINED HEREIN ON RADIO NUCLIDES IS PROVIDED FOR PROCESS DESCRIPTION PURPOSES ONLY.

DRAWING INDEX

DWG NO	TITLE
24590-HLW-M6-HOP-20003001	HOP SYS MELTER 2 SEC OFFGAS TREATMENT
24590-HLW-M6-HOP-~~00003002~~ 20003002	HOP SYS MELTER 2 SEC OFFGAS TREATMENT

REVISION HISTORY

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR CONSTRUCTION, SEE NOTE 10		RM	RM		7-20-11

Q QUALITY DESIGNATOR

ISSUED BY RPP-WTP PDC INIT DATE ISSUE STAMP

PROJECT No.	24590
SITE	HANFORD
AREA	200E
BUILDING No.	30

	BY	DATE
ORIGINATOR		7-20-11
CHECKER		7-20-11
APPROVER		7-20-11
REVIEWER		7-20-11

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. 24590-HLW-ADR-M-03-001 REV: 13
EMS SCREENING REQUIRED? [X] YES [ ] NO EMS INITIAL IF YES

BECHTEL
RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

P&ID - HLW MELTER OFFGAS TREATMENT PROCESS SYSTEM MELTER 2 SECONDARY OFFGAS TREATMENT

SCALE: NONE

24590-HLW-M6-HOP-20003001 REV 0

SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREQ-002

E SIZE - 44x34
COMPUTER GENERATED - MANUAL DESIGN CHANGES NOT PERMITTED

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7/20/2011 10:23:01 AM

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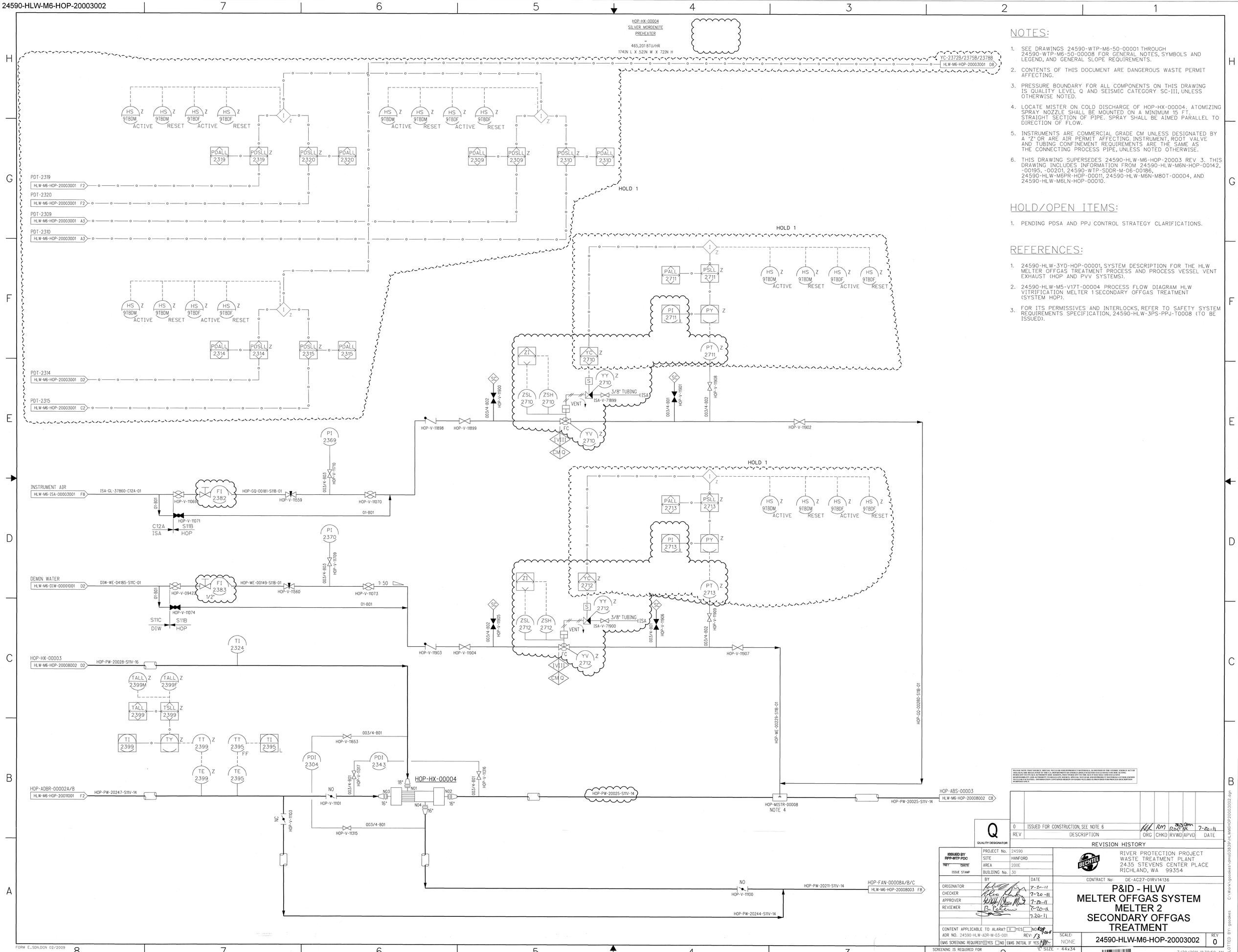
PLOTTED BY: gpodeks

FORM E_SDN.DGN 02/2009



NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
2. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
3. PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-III, UNLESS OTHERWISE NOTED.
4. LOCATE MISTER ON COLD DISCHARGE OF HOP-HX-00004. ATOMIZING SPRAY NOZZLE SHALL BE MOUNTED ON A MINIMUM 15 FT. STRAIGHT SECTION OF PIPE. SPRAY SHALL BE AIMED PARALLEL TO DIRECTION OF FLOW.
5. INSTRUMENTS ARE COMMERCIAL GRADE CM UNLESS DESIGNATED BY A "Z" OR ARE AIR PERMIT AFFECTING. INSTRUMENT, ROOT VALVE AND TUBING CONFINEMENT REQUIREMENTS ARE THE SAME AS THE CONNECTING PROCESS PIPE, UNLESS NOTED OTHERWISE.
6. THIS DRAWING SUPERSEDES 24590-HLW-M6-HOP-20003 REV 3. THIS DRAWING INCLUDES INFORMATION FROM 24590-HLW-M6N-HOP-00142, -00195, -00201, 24590-WTP-SDDR-M-06-00186, 24590-HLW-M6PR-HOP-00011, 24590-HLW-M6N-M80T-00004, AND 24590-HLW-M6LN-HOP-00010.

HOLD/OPEN ITEMS:

1. PENDING PDSA AND PPJ CONTROL STRATEGY CLARIFICATIONS.

REFERENCES:

1. 24590-HLW-3YD-HOP-00001, SYSTEM DESCRIPTION FOR THE HLW MELTER OFFGAS TREATMENT PROCESS AND PROCESS VESSEL VENT EXHAUST (HOP AND PVV SYSTEMS).
2. 24590-HLW-M5-V17T-00004 PROCESS FLOW DIAGRAM HLW VITRIFICATION MELTER 1 SECONDARY OFFGAS TREATMENT (SYSTEM HOP).
3. FOR ITS PERMISSIVES AND INTERLOCKS, REFER TO SAFETY SYSTEM REQUIREMENTS SPECIFICATION, 24590-HLW-3PS-PPJ-T0008 (TO BE ISSUED).

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 THROUGH ITS CONTRACTORS. THE REGULATORY AUTHORITY OF THE DOE, ACTING THROUGH ITS CONTRACTORS, RESPONSIBILITY AND AUTHORITY TO REGULATE SOURCE, SPECIAL NUCLEAR AND BYPRODUCT MATERIALS AT DOE-OWNED NUCLEAR FACILITIES. INFORMATION CONTAINED HEREIN ON RADIO NUCLIDES IS PROVIDED FOR PROCESS DESCRIPTION PURPOSES ONLY.

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR CONSTRUCTION, SEE NOTE 6		RM	RDP		7-20-11

Q
QUALITY DESIGNATOR

REVISION HISTORY

ISSUED BY RPP-WTP PDC
INIT DATE
ISSUE STAMP

PROJECT No.	24590	
SITE	HANFORD	
AREA	200E	
BUILDING No.	30	

	BY	DATE
ORIGINATOR		7-20-11
CHECKER		7-20-11
APPROVER		7-20-11
REVIEWER		7-20-11
		7-20-11

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. 24590-HLW-ADR-M-03-001 REV: 13
EMS SCREENING REQUIRED? [X] YES [ ] NO EMS INITIAL IF YES

BECHTEL
RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

P&ID - HLW MELTER OFFGAS SYSTEM MELTER 2 SECONDARY OFFGAS TREATMENT

SCALE: NONE
24590-HLW-M6-HOP-20003002
REV 0

SIZE - 44x34
COMPUTER GENERATED - MANUAL DESIGN CHANGES NOT PERMITTED

SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREG-002

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PLOTTED BY: gsoakes C:\Work\gsoakes\dms03839\HLW\M6\HOP20003002.dgn

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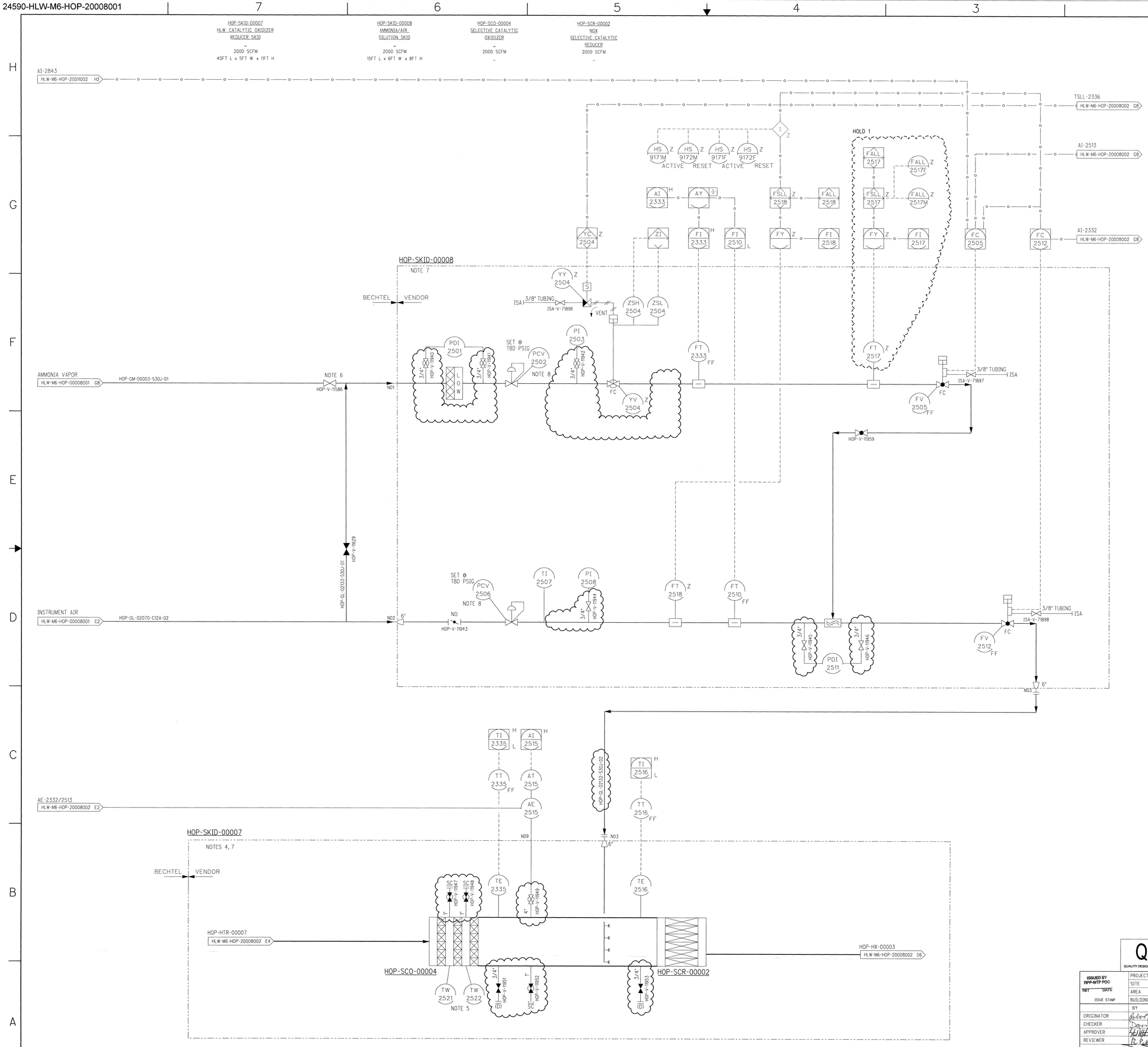

NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
2. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
3. THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-III, UNLESS OTHERWISE NOTED.
4. CATALYTIC OXIDIZER SKID (HOP-SKID-00007) HOUSES THE PREHEATER (HOP-HX-00003) ELECTRIC HEATER (HOP-HTR-00007), NOX SELECTIVE CATALYTIC REDUCER (HOP-SCR-00002) AND THE THERMAL CATALYTIC OXIDIZER (HOP-SCO-00004).
5. THERMOWELLS REQUIRED TO FACILITATE PROCESS TROUBLESHOOTING AND OBTAIN ADDITIONAL DATA DURING TESTING AND OPERATIONS.
6. VALVE SHALL BE ACCESSIBLE TO THE OPERATOR.
7. PIPE MATERIAL AND SIZE TO BE ADDED ON FINAL VENDOR SUBMITTAL.
8. PCV SET PRESSURE TO BE ADDED ON FINAL VENDOR SUBMITTAL.
9. THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO A MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-HLW-M6-HOP-20008 REV 3. THIS DRAWING INCLUDES INFORMATION FROM 24590-HLW-M6N-HOP-00118, -00123, -00166, -00197, 24590-HLW-M6N-M80T-00004, AND 24590-WTP-SDDR-MS-11-00051.

HOLD/OPEN ITEMS:

1. PENDING PRELIMINARY DOCUMENTITED SAFETY ANALYSIS (PDSA) AND PROGRAMMABLE PROTECTION SYSTEM (PPJ) CONTROL STRATEGY CLARIFICATIONS.

REFERENCES:

1. 24590-HLW-3YD-HOP-00001, SYSTEM DESCRIPTION FOR THE HLW MELTER OFFGAS TREATMENT PROCESS AND PROCESS VESSEL VENT EXHAUST (HOP AND PVV SYSTEMS).

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 JURISDICTION OVER THE PRODUCTION, USE, AND DISPOSAL OF SOURCE, SPECIAL NUCLEAR AND BYPRODUCT MATERIAL AT DOE-OWNED NUCLEAR FACILITIES. INFORMATION CONTAINED HEREIN ON RADIO NUCLIDES IS PROVIDED FOR PROCESS DESCRIPTION PURPOSES ONLY.

DRAWING INDEX

DWG NO	TITLE
24590-HLW-M6-HOP-20008001	HOP SYS MELTER 2 SECONDARY OFFGAS TREATMENT
24590-HLW-M6-HOP-20008002	HOP SYS MELTER 2 SECONDARY OFFGAS TREATMENT
24590-HLW-M6-HOP-20008003	HOP SYS MELTER 2 SECONDARY OFFGAS TREATMENT

Q
QUALITY DESIGNATOR

REVISION HISTORY

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR CONSTRUCTION, SEE NOTE 9					7-20-11

ISSUED BY RPP-WTP PDC
INT DATE
ISSUE STAMP

	PROJECT No.	24590
	SITE	HANFORD
	AREA	200E
	BUILDING No.	30

	BY	DATE
ORIGINATOR		7-20-11
CHECKER		07/20/11
APPROVER		7/20/11
REVIEWER		7-20-11

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. 24590-HLW-ADR-M-03-001 REV: 3
E&NS SCREENING REQUIRED? [X] YES [ ] NO E&NS INITIAL IF YES

BECHTEL

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

P&ID - HLW
MELTER OFFGAS TREATMENT PROCESS SYSTEM MELTER 2 SECONDARY OFFGAS TREATMENT

SCALE: NONE

24590-HLW-M6-HOP-20008001

REV 0

SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREQ-002

'E' SIZE - 44x34
COMPUTER GENERATED - MANUAL DESIGN CHANGES NOT PERMITTED

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7/20/2011 10:22:23 AM

PLOTTED BY: gcooke1

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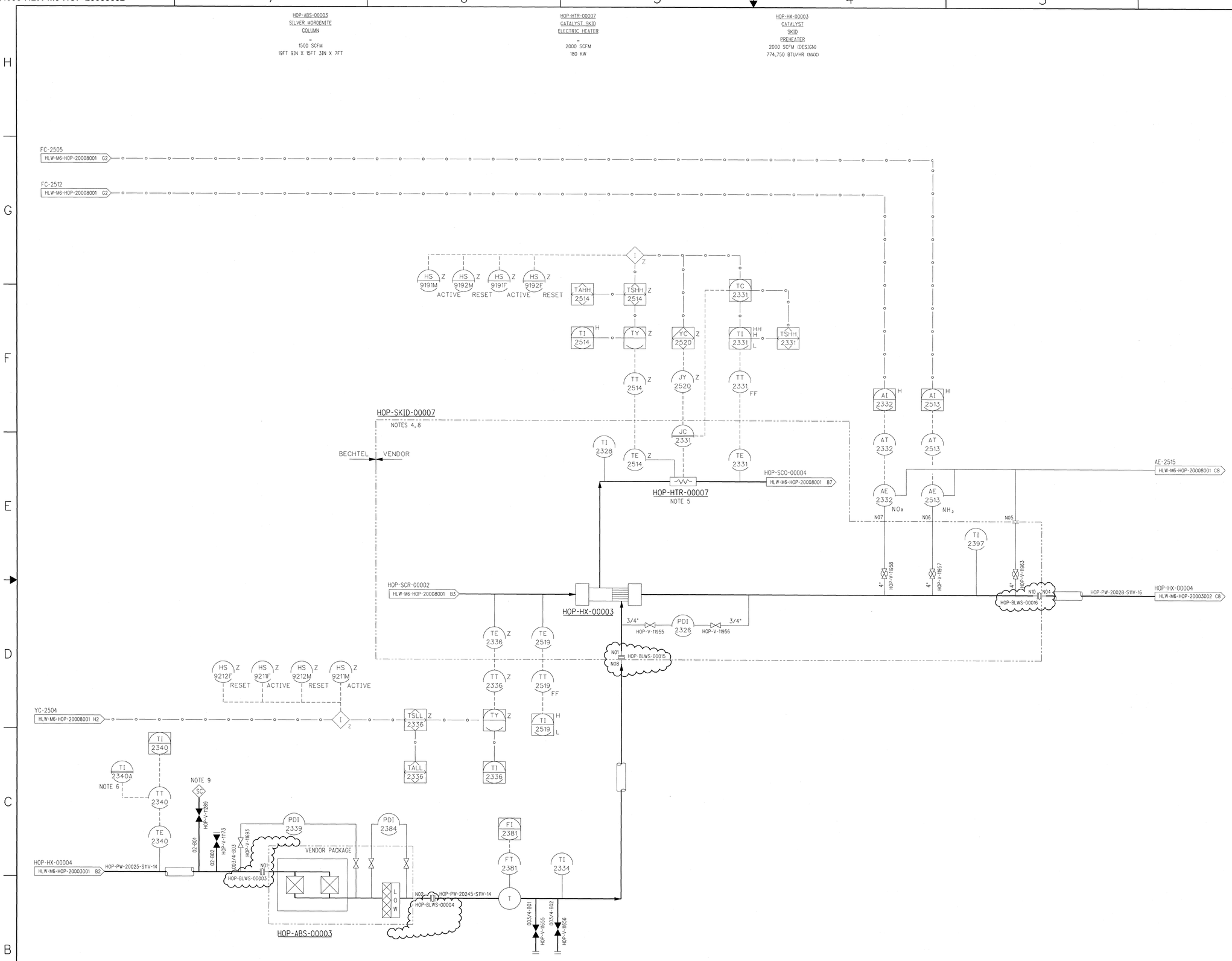

NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
2. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
3. THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-III, UNLESS OTHERWISE NOTED.
4. CATALYTIC OXIDIZER SKID (HOP-SKID-00008) HOUSES THE PREHEATER (HOP-HX-00003) ELECTRIC HEATER (HOP-HTR-00007).
5. HEATER UNIT SHALL BE EQUIPPED WITH OVER-TEMPERATURE PROTECTION (SUPPLIED BY VENDOR).
6. INSTRUMENT PERFORMS AN AIR PERMIT FUNCTION.
7. LOCATE CHALLENGE GAS INJECTION PORT AT A MINIMUM OF 10 PIPE DIAMETERS, INCLUDING ELBOWS, UPSTREAM OF THE INLET OF THE SILVER MORDENITE COLUMN.
8. PIPE MATERIAL AND SIZE TO BE ADDED ON FINAL VENDOR SUBMITTAL.
9. THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO A MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-HLW-M6-HOP-20008 REV 3. THIS DRAWING INCLUDES INFORMATION FROM 24590-HLW-M6LN-HOP-00002, 24590-HLW-M6N-HOP-00013, -00118, -00123, -00166, -00197, AND 24590-HLW-M6N-M80T-00004.

HOLD/OPEN ITEMS:

NONE

REFERENCES:

1. 24590-HLW-3YD-HOP-00001, SYSTEM DESCRIPTION FOR THE HLW MELTER OFFGAS TREATMENT PROCESS AND PROCESS VESSEL VENT EXHAUST (HOP AND PVV SYSTEMS).

PLEASE NOTE THAT HOARDE, SPECIAL NUCLEAR AND BYPRODUCT MATERIALS, AS DEFINED IN THE ATOMIC ENERGY ACT OF 1954, AS AMENDED, AND REGULATIONS PROMULGATED PURSUANT TO THE ACT OR PRIOR ACTS OF CONGRESS, OR PRODUCED PURSUANT TO ITS ALA AUTHORITY DOE ASSERTS, THAT PURSUANT TO THE NEAT DOD SOLE AND EXCLUSIVE JURISDICTION OVER THE PROTECTION OF ITS NUCLEAR WEAPONS, NAVAL NUCLEAR PROPULSION, AND OTHER DOD-OWNED NUCLEAR FACILITIES. INFORMATION CONTAINED HEREIN ON RADIO NUCLIDES IS PROVIDED FOR PROCESS DESCRIPTION PURPOSES ONLY.

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR CONSTRUCTION, SEE NOTE 9	MK	CB	RDP	Sal Cagan	7-20-11

Q
QUALITY DESIGNATOR

REVISION HISTORY

ISSUED BY RPP-WTP PDC
INIT DATE
ISSUE STAMP

PROJECT No.	24590	
SITE	HANFORD	
AREA	200E	
BUILDING No.	30	

	BY	DATE
ORIGINATOR	Robert K Fish	7-20-11
CHECKER	David Gordon	07/20/11
APPROVER	Chris Mott	7/20/11
REVIEWER	R Peterson	7-20-11
		7/20/11

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. 24590-HLW-ADR-M-03-001 REV: 3
EMS SCREENING REQUIRED? [X] YES [ ] NO EMS INITIAL IF YES

BECHTEL

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

P&ID - HLW MELTER OFFGAS TREATMENT PROCESS SYSTEM MELTER 2 SECONDARY OFFGAS TREATMENT

SCALE: NONE

24590-HLW-M6-HOP-20008002

REV 0

SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREG-002

"E" SIZE - 44x34
COMPUTER GENERATED - MANUAL DESIGN CHANGES NOT PERMITTED

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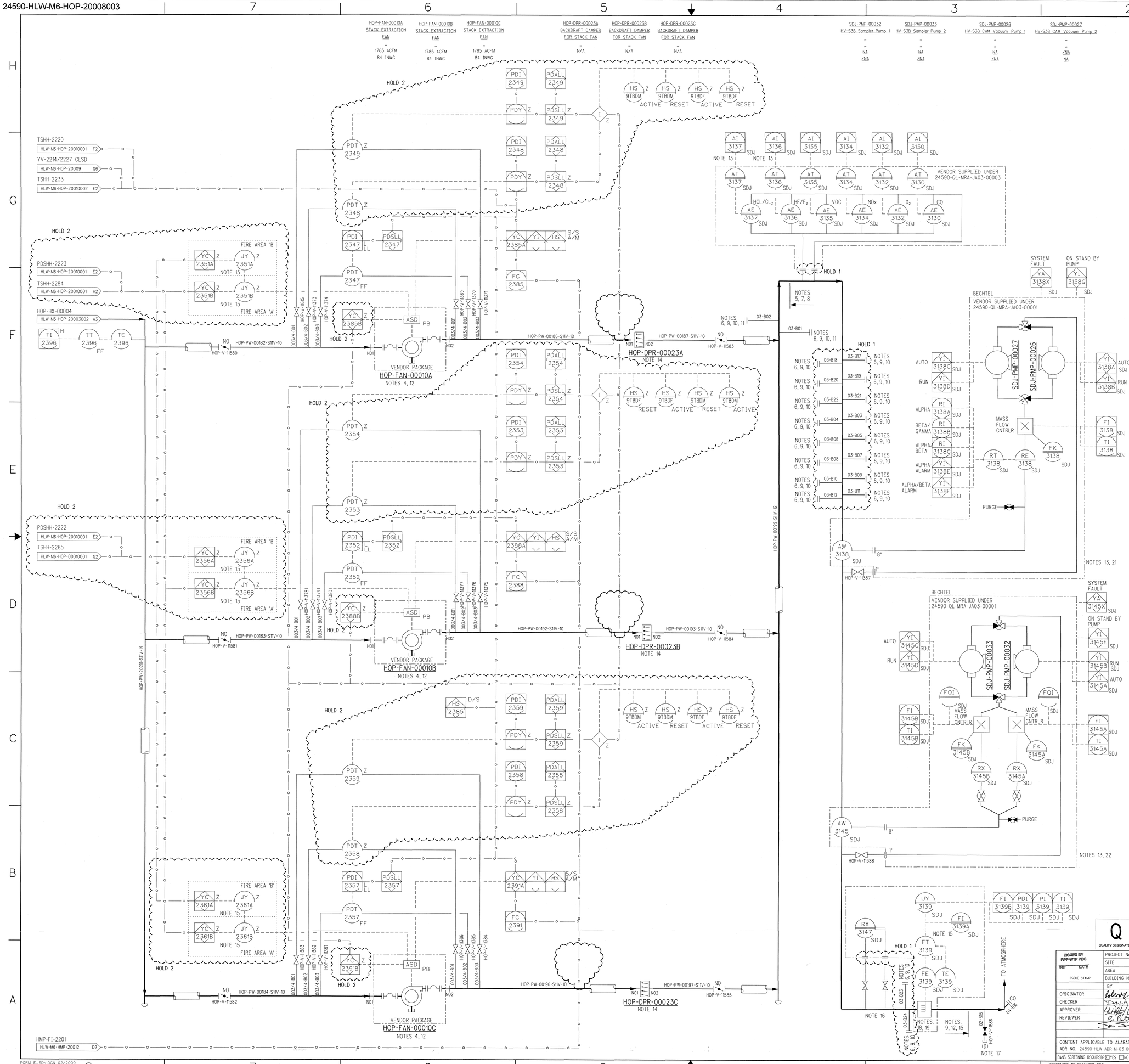
PLOTTED BY: eewebb

FORM E_SDN.DGN 02/2009



NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
2. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
3. THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-III, UNLESS OTHERWISE NOTED.
4. FAN-00010A/B/C ARE 50% CAPACITY EACH, AND WILL BE OPERATED ON A ROTATING BASIS, 2 OPERATING AND 1 IN STAND-BY.
5. GAS ANALYZERS SHALL BE PROVIDED FOR MONITORING: CO, O2, AND VOC FOR DANGEROUS WASTE PERMIT NOX FOR PREVENTION OF SIGNIFICANT DETERIORATION AND HF, F2, HCL, CL2 FOR RADIATION AIR PERMIT. FT-IR TECHNOLOGY SHALL BE UTILIZED AS BARCT INDICATOR FOR SILVER MODERNITE,
6. TEST PORT PAIRS PLACED AT 90° ORIENTATION TO EACH OTHER.
7. THE 3000 SERIES INSTRUMENTS ARE SDJ SYSTEM, AND THE 2300 SERIES INSTRUMENTS AND PIPE REMAIN HOP SYSTEM. THE 3000 (SDJ) INSTRUMENTS ARE AIR PERMIT AFFECTING.
8. REQUIRED RUN OF STRAIGHT PIPE FOR THE SDJ SYSTEM TEST AND INSTRUMENT TAPS (REF LINE HOP-PW-00199-S11V-12): LAST BEND TO 03-B03/B04 = 10D, 03-B03/B04 TO 03-B05/B06= 8D. 03-B05/B06 TO 03-B07/B08 = 2D, 03-B07/B08 TO 03-B09/B10= 2D. 03-B09/B10 TO UPSTREAM AE TAP-2D, AE TAP TO RE TAP = 8D. 03-B11/B12 TO UPSTREAM RE TAP=2 FT, UPSTREAM RE TAP TO FE-3139 = 8D. AND 03-B13/B14 TO FE-3139 = 4 IN.
9. ALLOW 1 DIA +36" CLEARANCE FROM TEST PORTS OUTWARD FOR PROBE INSERTION AND EXTRACTION.
10. INSTALL BLIND FLANGE AS CLOSE AS POSSIBLE TO MAIN LINE.
11. LOCATE INJECTION PORT AFTER STACK FANS, AND BEFORE LAST BEND TO SDJ SAMPLE PORTS (NO MINIMUM STRAIGHT PIPE RUN FROM INJECTION PORT TO LAST BEND REQUIRED).
12. HOP FANS ARE TO BE FED BY EMERGENCY DIESEL GENERATOR (EDG) ON LOSS OF OFFSITE POWER. FANS SHALL HAVE HEAT TRACE TO PREVENT CONDENSATION.
13. INSTRUMENT PERFORMS AN AIR PERMIT FUNCTION.
14. THIS IS A LOUVER DAMPER SYMBOL.
15. ISOLATING CONTACT OR (JY) PROVIDES ITS INTERRUPTION OF 480V POWER TO THE ADJUSTABLE SPEED DRIVE.
16. CARBON-14 SAMPLER SHALL BE PROVIDED.
17. LOCATE STACK DRAIN AT HEIGHT TO ALLOW PLACEMENT OF 55 GAL DRUM ON TROLLY UNDERNEATH.
18. AVERAGING PITOT INSTALLED WITH SINGLE-END SUPPORT; DRILLED HOLE SIZE IS 1".
19. INSTRUMENT IS BARCT INDICATOR FOR BOOSTER AND EXHAUST FANS.
20. THE STACK DISCHARGE SYSTEM (SDJ) INSTRUMENTS, EQUIPMENT, SAMPLING PROBES AND SAMPLE LINES ASSOCIATED WITH THIS DRAWING ARE SEISMIC CATEGORY SC-III FOR BOUNDARY, AND SC-IV FOR FUNCTION (ISM CCN 226891).
21. CONTINUOUS AIR MONITOR (CAM) SHALL BE PROVIDED TO MONITOR GROSS ALPHA AND GROSS BETA/GAMMA RADIATION.
22. RECORD SAMPLER FOR RETROSPECTIVE ANALYSIS SHALL BE PROVIDED, IODINE-129 SAMPLING SHALL ALSO BE PERFORMED BY THIS SAMPLER.
23. THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO A MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-HLW-M6-HOP-20008 REV 3. THIS DRAWING INCLUDES INFORMATION FROM 24590-HLW-M6N-HOP-00013, -00174, -00197, -00202, AND 24590-HLW-M6N-M8OT-00004.

HOLD/OPEN ITEMS:

1. PENDING PORT DESIGN INFORMATION FROM C&I.
2. PENDING PRELIMINARY DOCUMENTED SAFETY ANALYSIS (PDSA) AND PROGRAMMABLE PROTECTION SYSTEM (PPJ) CONTROL STRATEGY CLARIFICATIONS.

REFERENCES:

1. 24590-HLW-3YD-HOP-00001, SYSTEM DESCRIPTION FOR THE HLW MELTER OFFGAS TREATMENT PROCESS AND PROCESS VESSEL VENT EXHAUST (HOP AND PVV SYSTEMS).

PLEASE NOTE THAT HOWEVER, SPECIAL NUCLEAR AND BYPRODUCT MATERIALS, AS DEFINED IN THE ATOMIC ENERGY ACT OF 1954 (42 USC 2014(e)(2) AND (5)) ARE EXCLUDED FROM THE DANGEROUS WASTE PORTIONS OF THE PERMIT PURSUANT TO ITS AEA AUTHORITY (SEE ABOVE), THAT PURSUANT TO THE AEA IT HAS SOLE AND EXCLUSIVE REGULATORY AUTHORITY AND AUTHORITY TO REGULATE HAZARDS, SPECIAL NUCLEAR AND BYPRODUCT MATERIALS AT DOE-OWNED NUCLEAR FACILITIES, OTHERS. INFORMATION CONTAINED HEREIN ON HAZARD INCLUDES IS PRESCRIBED FOR PROCESS DESCRIPTION PURPOSES ONLY.

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR CONSTRUCTION, SEE NOTE 23					7-20-11

REVISION HISTORY

Q QUALITY DESIGNATOR

ISSUED BY RPP-WTP PDC

	BY	DATE
ORIGINATOR		07/15/11
CHECKER		07/15/11
APPROVER		7-20-11
REVIEWER		7-19-11

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. 24590-HLW-ADR-M-03-001 REV: 3
E&NS SCREENING REQUIRED? [X] YES [ ] NO E&NS INITIAL IF YES

PROJECT No. 24590
SITE HANFORD
AREA 200E
BUILDING No. 30

BECHTEL
RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

P&ID - HLW MELTER OFFGAS TREATMENT PROCESS SYSTEM MELTER 2 SECONDARY OFFGAS TREATMENT

SCALE: NONE

24590-HLW-M6-HOP-20008003 REV 0

SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREQ-002

'E' SIZE - 44x34
COMPUTER GENERATED - MANUAL DESIGN CHANGES NOT PERMITTED

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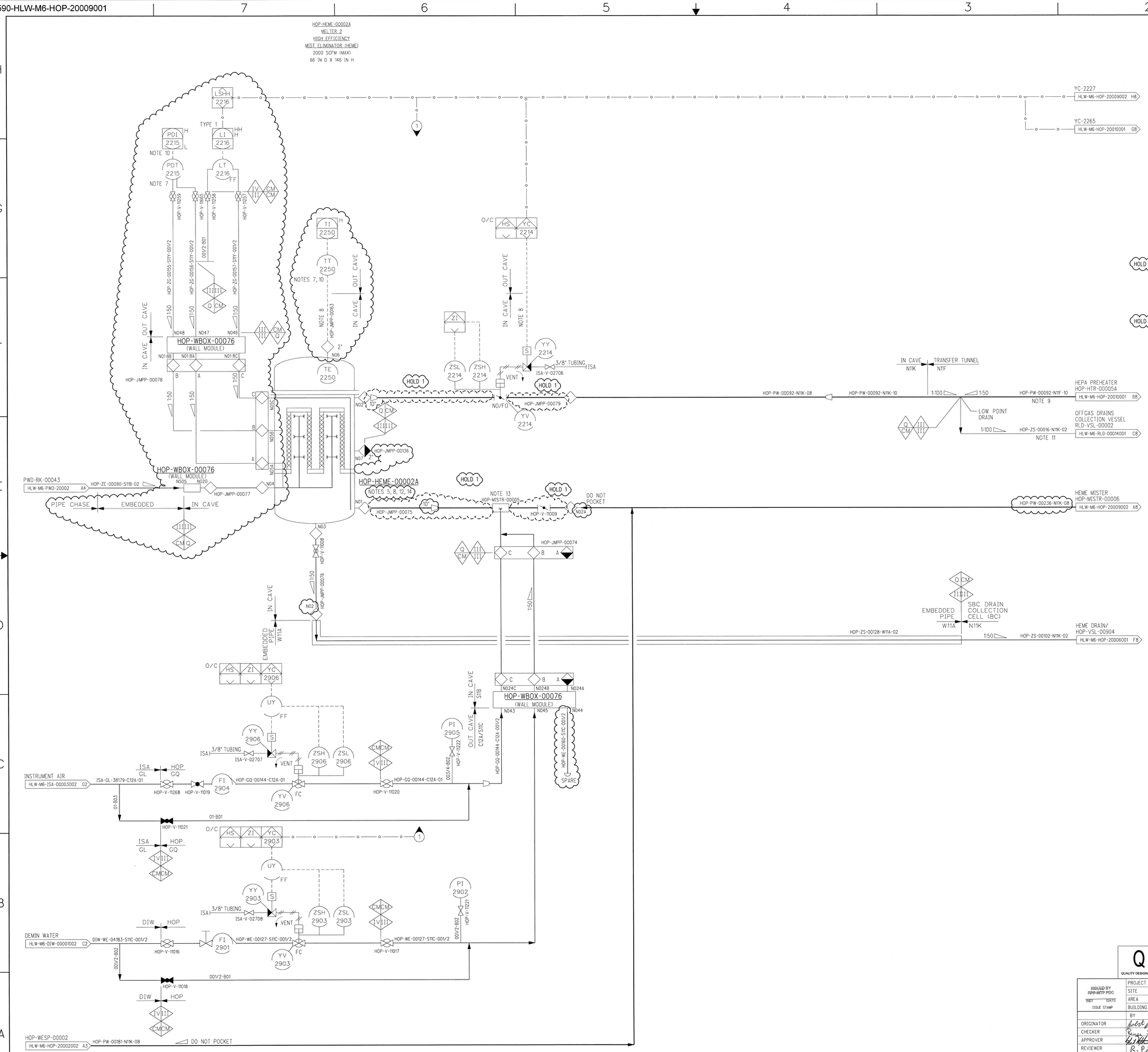
PLOTTED BY: rvivero

FORM E_SDN.DGN 02/2009



NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
2. CONTENTS OF THIS DRAWING ARE DANGEROUS WASTE PERMIT AFFECTING.
3. THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-III, UNLESS OTHERWISE NOTED.
4. HEME CONTAINS FIVE (5) MULTI-SECTION FILTER ASSEMBLIES DESIGNED FOR REMOTE REPLACEMENT.
5. REFER TO ENGINEERING SPECIFICATION 24590-WTP-3PS-MV00-T0001 FOR VESSEL NOZZLE LOADS WITH THE EXCEPTION OF NOZZLES N01 AND N02 AS DESCRIBED IN 24590-WTP-SDDR-PROC-05-00235.
6. INSTRUMENTS ARE QUALITY LEVEL CM UNLESS OTHERWISE NOTED OR ARE AIR PERMIT AFFECTING. INSTRUMENT, ROOT VALVE AND TUBING CONFINEMENT REQUIREMENTS ARE THE SAME AS THE CONNECTING PROCESS PIPE UNLESS NOTED OTHERWISE.
7. TRANSMITTER WILL BE SUPPLIED WITH LOCAL INDICATION.
8. FOR INSTRUMENTATION JUMPERS REFER TO 24590-HLW-M6-ISA-00008.
9. PIPING IN THE TRANSFER TUNNEL WILL HAVE WELDED CONNECTIONS ONLY.
10. INSTRUMENT PERFORMS AN AIR PERMIT FUNCTION.
11. DRIP PAN PROVIDED BELOW DRAIN LINES FOR SECONDARY CONTAINMENT.
12. THE HEME INTERNAL WASHDOWN PIPING THAT DOES NOT PENETRATE THE VESSEL SHELL, THE FILTER CAGES, AND THE WASHDOWN SPRAY NOZZLES ARE QUALITY LEVEL CM. (HOLD 1)
13. THE TAG HOP-MISTR-00005 REFERS TO A COMMERCIALLY AVAILABLE MISTING NOZZLE AND IS QUALITY LEVEL CM, SEISMIC CATEGORY SC-III. THE MISTING NOZZLE IS LOCATED INSIDE THE JUMPER PRESSURE BOUNDARY.
14. HEME REMOVAL EFFICIENCY IS SAFETY SIGNIFICANT. (HOLD 1)
15. THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-HLW-M6-HOP-20009 REV ~~7~~ 8. THIS DRAWING INCLUDES INFORMATION FROM 24590-HLW-M6LN-HOP-00017, 24590-HLW-M6N-HOP-00073, 00145, -00153, -00155, -00162, -00163, -00175, -00198, AND 24590-HLW-M6PR-HOP-00006.

SPK 10/6/11

HOLD/OPEN ITEMS:

1. PENDING DETERMINATION OF HEME FUNCTIONAL SAFETY REQUIREMENTS.

REFERENCES:

1. 24590-HLW-3YD-HOP-00001, SYSTEM DESCRIPTION FOR THE HLW MELTER OFFGAS TREATMENT PROCESS AND PROCESS VESSEL VENT EXHAUST (HOP AND PVV SYSTEMS).

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 RADIO NUCLIDES IS PROVIDED FOR PROCESS DESCRIPTION PURPOSES ONLY.

DRAWING INDEX

DWG NO	TITLE
24590-HLW-M6-HOP-20009001	HOP SYSTEM HOP-HEME-00002A
24590-HLW-M6-HOP-20009002	HOP SYSTEM HOP-HEME-00002B

Q
QUALITY DESIGNATOR

REVISION HISTORY

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR CONSTRUCTION, SEE NOTE 15	MK	RCS	RDP	RPK	9-29-11

ISSUED BY RPP-WTP PDC
INIT DATE
ISSUE STAMP

PROJECT No.	24590	
SITE	HANFORD	
AREA	200E	
BUILDING No.	30	

BECHTEL

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

	BY	DATE
ORIGINATOR	Robert L. Pitts	09/29/11
CHECKER	Roger Stancunas	09/29/11
APPROVER	Chris Mertz	9/29/11
REVIEWER	R. P. Stein	9-29-11
		9/29/11

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. 24590-HLW-ADR-M-03-001 REV: 3
EMS SCREENING REQUIRED? [X] YES [ ] NO EMS INITIAL IF YES: MK

P&ID - HLW
MELTER OFFGAS TREATMENT PROCESS SYSTEM MELTER 2 PRIMARY OFFGAS HEME HOP-HEME-00002A

SCALE: NONE

24590-HLW-M6-HOP-20009001

REV 0

SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-QPP-SEQ-002

'E' SIZE - 44x34
COMPUTER GENERATED - MANUAL DESIGN CHANGES NOT PERMITTED

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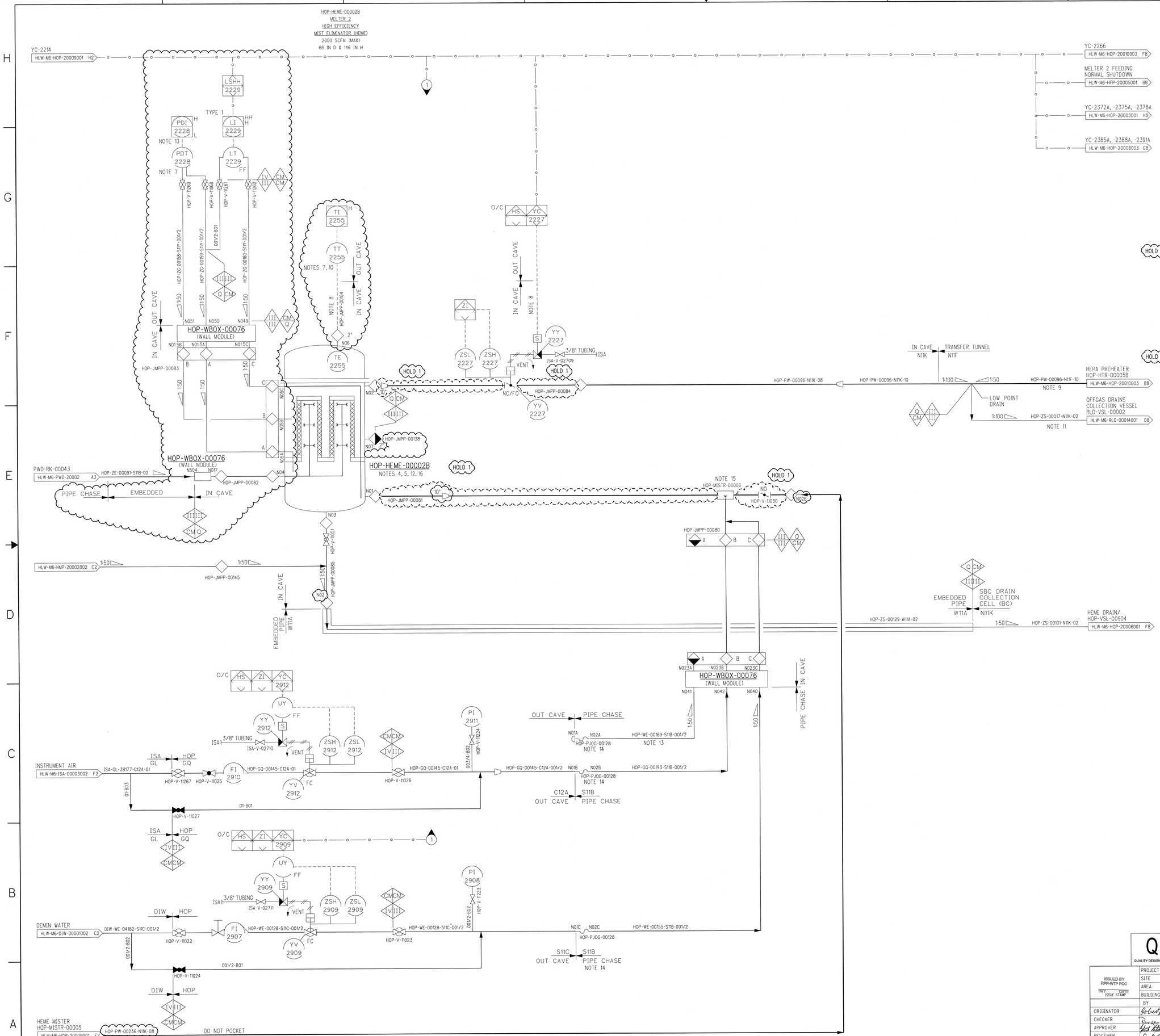
FORM E_SDN.DGN 02/2009



NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
2. CONTENTS OF THIS DRAWING ARE DANGEROUS WASTE PERMIT AFFECTING.
3. THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY III, UNLESS OTHERWISE NOTED.
4. HEME CONTAINS FIVE (5) MULTI-SECTION FILTER ASSEMBLIES DESIGNED FOR REMOTE REPLACEMENT.
5. REFER TO ENGINEERING SPECIFICATION 24590-WTP-3PS-MV00-T0001 FOR VESSEL NOZZLE LOADS WITH THE EXCEPTION OF NOZZLES N01 AND N02 AS DESCRIBED IN 24590-WTP-SDDR-PROC-05-00235.
6. INSTRUMENTS ARE QUALITY LEVEL CM UNLESS OTHERWISE NOTED OR ARE AIR PERMIT AFFECTING. INSTRUMENT, ROOT VALVE AND TUBING CONFINEMENT REQUIREMENTS ARE THE SAME AS THE CONNECTING PROCESS PIPE UNLESS NOTED OTHERWISE.
7. TRANSMITTER WILL BE SUPPLIED WITH LOCAL INDICATION.
8. FOR INSTRUMENTATION JUMPERS REFER TO AND 24590-HLW-M6-ISA-00008.
9. PIPING IN THE TRANSFER TUNNEL WILL HAVE WELDED CONNECTIONS ONLY.
10. INSTRUMENT PERFORMS AN AIR PERMIT FUNCTION.
11. DRIP PAN PROVIDED BELOW DRAIN LINES FOR SECONDARY CONTAINMENT.
12. HOLD 1 — THE HEME INTERNAL WASHDOWN PIPING THAT DOES NOT PENETRATE THE VESSEL SHELL, THE FILTER CAGES, AND THE WASHDOWN SPRAY NOZZLES ARE QUALITY LEVEL CM.
13. PIPING REFERENCED TO THIS NOTE SHALL BE QUALITY LEVEL CM AND SEISMIC CATEGORY SC-III.
14. THE GEOMETRY OF JOGGLED (OFFSET) PENETRATIONS IS QUALITY LEVEL Q FOR RADIATION PROTECTION. THE QUALITY LEVEL AND SEISMIC CATEGORY DESIGNATIONS OF PIPING WITHIN JOGGLES ARE THE SAME AS CONNECTING PIPING.
15. THE TAG HOP-MISTR-00006 REFERS TO A COMMERCIALLY AVAILABLE MISTING NOZZLE AND IS QUALITY LEVEL CM, SEISMIC CATEGORY SC-III. THE MISTING NOZZLE IS LOCATED INSIDE THE JUMPER PRESSURE BOUNDARY.
16. HOLD 1 — HEME REMOVAL EFFICIENCY IS SAFETY SIGNIFICANT.
17. THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-HLW-M6-HOP-20009 REV 7. THIS DRAWING INCLUDES INFORMATION FROM 24590-HLW-M6LN-HOP-00017, 24590-HLW-M6N-HOP-00073, -00078, -00145, -00153, -00155, -00162, -00163, -00175, -00198, AND 24590-HLW-M6PR-HOP-00006. SPK 10/6/11

HOLD/OPEN ITEMS:

1. PENDING DETERMINATION OF HEME FUNCTIONAL SAFETY REQUIREMENTS.

REFERENCES:

1. 24590-HLW-3YD-HOP-00001, SYSTEM DESCRIPTION FOR THE HLW MELTER OFFGAS TREATMENT PROCESS AND PROCESS VESSEL VENT EXHAUST (HOP AND PVV SYSTEMS).

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 RADIO NUCLIDES IS PROVIDED FOR PROCESS DESCRIPTION PURPOSES ONLY.

Q — QUALITY DESIGNATOR

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR CONSTRUCTION, SEE NOTE 17		RCS			9-27-11

REVISION HISTORY

ISSUED BY RPP-WTP PDC — TRIT / PRTF ISSUE STAMP

PROJECT No.	24590	
SITE	HANFORD	
AREA	200E	
BUILDING No.	30	

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

	BY	DATE
ORIGINATOR	Robert Fish	09/27/11
CHECKER	Russ Stevens	09/27/11
APPROVER	Ted Ammerman	9/27/11
REVIEWER	R. Peterson	9-27-11

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. 24590-HLW-ADR-M-03-001 REV: 3
EMS SCREENING REQUIRED? [X] YES [ ] NO EMS INITIAL IF YES

P&ID - HLW
MELTER OFFGAS TREATMENT PROCESS SYSTEM MELTER 2 PRIMARY OFFGAS HEME HOP-HEME-00002B

SCALE: NONE
24590-HLW-M6-HOP-20009002
REV 0

SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREQ-002

E SIZE - 44x34
COMPUTER GENERATED - MANUAL DESIGN CHANGES NOT PERMITTED

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FORM E_SDN.DGN 02/2009

Table III.10.J.A – HLW Plant Miscellaneous Unit System Description

Sub-system Description	Sub-system Designation	Engineering Description (Drawing Nos., Specification Nos., etc.)	Narrative Description, Tables, and Figures
HLW Melter Process System HMP-MLTR-00001 (HLW Melter 1) HMP-MLTR-00002 (HLW Melter 2)	HMP	RESERVED	Section 4.1.4.2; Table C-8; and Figures C1-1, C1-4, C1-27 and C1-54 in Operating Unit Group 10, Addendum C of this Permit.
Melter Offgas Treatment Process System HOP-FCLR-00001 (Melter 1 Offgas Film Cooler) HOP-FCLR-00002 (Melter 2 Offgas Film Cooler) HOP-FCLR-00003 (Melter 1 Standby Offgas Insert) HOP-FCLR-00004 (Melter 2 Standby Offgas Insert)	HOP	**24590-HLW** -M5-V17T-P0002, Rev1 -M5-V17T-P20002, Rev 1 -M6-HMP-00002, Rev 5 -M6-HMP-20002, Rev 6 -3YD-HOP-00001[a]	Section 4.1.4.3; Table C-8; and Figures C1-1, C1-4 and C1-27-in Operating Unit Group 10, Addendum C of this Permit.
Melter Offgas Treatment Process System (Cont.) HOP-SCB-00001 (Melter 1 Submerged Bed Scrubber, SBS) HOP-SCB-00002 (Melter 2 Submerged Bed Scrubber, SBS)	HOP	**24590-HLW** -M5-V17T-P0003, Rev 1 -M5-V17T-P20003, Rev 1 ~~-M6-HOP-00001, Rev 5~~ -M6-HOP-00001001, Rev 0 -M6-HOP-00001002, Rev 0 -M6-HOP-00001003, Rev 0 ~~-M6-HOP-20001, Rev 6~~ -M6-HOP-20001001, Rev 0 -M6-HOP-20001002, Rev 0 -M6-HOP-20001003, Rev 0 -MKD-HOP-P0016, Rev 0 -MK-HOP-P0001001, Rev 0 -MK-HOP-P0001002, Rev 0 -MK-HOP-P0001003, Rev 0 -MK-HOP-P0001004, Rev 0 -N1D-HOP-~~P~~00010, Rev ~~0~~6 -P1-P01T-00002, Rev 7 -3YD-HOP-00001[a]	Section 4.1.4.3; Table C-8; and Figures C1-1 and C1-4 in Operating Unit Group 10, Addendum C of this Permit.

Table III.10.J.A – HLW Plant Miscellaneous Unit System Description

Sub-system Description	Sub-system Designation	Engineering Description (Drawing Nos., Specification Nos., etc.)	Narrative Description, Tables, and Figures
HOP-HEPA-00008A (Melter 2 Secondary Offgas HEPA Filter) HOP-HEPA-00008B (Melter 2 Secondary Offgas HEPA Filter)			
Melter Offgas Treatment Process System (Cont.) HOP-ADBR-00001A (Melter 1Activated Carbon Adsorber – located on Activated Carbon Adsorber Skid HOP-ADBR-00001) HOP-ADBR-00001B (Melter 1 Activated Carbon Adsorber – located on Activated Carbon Adsorber Skid HOP-ADBR-00001) HOP-ADBR-00002A (Melter 2 Activated Carbon Adsorber – located on Activated Carbon Adsorber Skid HOP-ADBR-00002) HOP-ADBR-00002B (Melter 2 Activated Carbon Adsorber – located on Activated Carbon Adsorber Skid HOP-ADBR-00002)	HOP	**24590-HLW** -M5-V17T-P0004, Rev 1 -M5-V17T-P20004, Rev 0 ~~-M6-HOP-P0003, Rev 2~~ -M6-HOP-00003001, Rev 0 -M6-HOP-00003002, Rev 0 ~~-M6-HOP-P20003, Rev 2~~ -M6-HOP-20003001, Rev 0 -M6-HOP-20003002, Rev 0 -MVD-HOP-00015, Rev 3 -MVD-HOP-00016, Rev 3 -N1D-HOP-00003, Rev 1 -P1-P01T-00002, Rev 7 **24590-WTP** -3PS-MWK0-T0001, Rev 5~~4~~	Section 4.1.4.3; Table C-8; and Figures C1-1 and C1-4 in Operating Unit Group 10, Addendum C of this Permit.
Melter Offgas Treatment Process System (Cont.) HOP-HEME-00001A (Melter 1 High Efficiency Mist Eliminator, HEME) HOP-HEME-00001B (Melter 1 High Efficiency Mist Eliminator, HEME) HOP-HEME-00002A (Melter 2 High Efficiency Mist Eliminator, HEME) HOP-HEME-00002B (Melter 2 High Efficiency Mist Eliminator, HEME)	HOP	**24590-HLW** -M5-V17T-P0003, Rev 1 -M5-V17T-P20003, Rev 1 ~~-M6-HOP-00009, Rev 5~~ -M6-HOP-00009001, Rev 0 -M6-HOP-00009002, Rev 0 ~~-M6-HOP-20009, Rev 6~~ -M6-HOP-20009001, Rev 0 -M6-HOP-20009002, Rev 0 -MVD-HOP-00007, Rev 5 -MV-HOP-P0002001, Rev 0 -MV-HOP-P0002002, Rev 0 -MV-HOP-P0002003, Rev 0 -N1D-HOP-~~P~~00001, Rev ~~0~~5	Section 4.1.4.3; Table C-8; and Figures C1-1 and C1-4 in Operating Unit Group 10, Addendum C of this Permit.

Table III.10.J.A – HLW Plant Miscellaneous Unit System Description

Sub-system Description	Sub-system Designation	Engineering Description (Drawing Nos., Specification Nos., etc.)	Narrative Description, Tables, and Figures
		-P1-P01T-00002, Rev 7 -3YD-HOP-00001[a]	
Melter Offgas Treatment Process System (Cont.) HOP-SCO-00001 (Thermal Catalytic Oxidizer – located on Catalyst SkidHOP-SKID-00005) HOP-SCO-00004 (Thermal Catalytic Oxidizer – located on Catalyst Skid HOP-SKID-00007)	HOP	**24590-HLW** -M5-V17T-P0004, Rev 1 -M5-V17T-20004, Rev 0 ~~-M6-HOP-00008, Rev 2~~ -M6-HOP-00008001, Rev 0 -M6-HOP-00008002, Rev 0 -M6-HOP-00008003, Rev 0 ~~-M6-HOP-20008, Rev 2~~ -M6-HOP-20008001, Rev 0 -M6-HOP-20008002, Rev 0 -M6-HOP-20008003, Rev 0 -MKD-HOP-P0019, Rev 0 -MKD-HOP-P0020, Rev 0 -N1D-HOP-P0004, Rev 1 -NID-HOP-~~P0~~0005, Rev ~~1~~5 -P1-PO1T-00002, Rev 7 -3PS-MBTV-T0002, Rev 1 **24590-LAW** -3PS-MBTV-T0001, Rev 1	Section 4.1.4.3; Table C-8; and Figures C1-1 and C1-4 in Operating Unit Group 10, Addendum C of this Permit.
Melter Offgas Treatment Process System (Cont.) HOP-SCR-00001 (NOx Selective Catalytic Reducer – located on Catalyst Skid HOP-SKID-00005) HOP-SCR-00002 (NOx Selective Catalytic Reducer – located on Catalyst Skid HOP-SKID-00007)	HOP	**24590-HLW** -M5-V17T-P0004, Rev 1 -M5-V17T-P20004, Rev 0 ~~-M6-HOP-00008, Rev 2~~ -M6-HOP-00008001, Rev 0 -M6-HOP-00008002, Rev 0 -M6-HOP-00008003, Rev 0 ~~-M6-HOP-20008, Rev 2~~ -M6-HOP-20008001, Rev 0 -M6-HOP-20008002, Rev 0 -M6-HOP-20008003, Rev 0 -MKD-HOP-P0019, Rev 0 -MKD-HOP-P0020, Rev 0 -N1D-HOP-P0004, Rev 1 -N1D-HOP-P0005, Rev 1 -P1-PO1T-00002, Rev 7 -3PS-MBTV-T0002, Rev 1 **24590-LAW** -3PS-MBTV-T0001, Rev 1	Section 4.1.4.3; Table C-8; and Figures C1-1 and C1-4 in Operating Unit Group 10, Addendum C of this Permit.

Table III.10.J.A – HLW Plant Miscellaneous Unit System Description

Sub-system Description	Sub-system Designation	Engineering Description (Drawing Nos., Specification Nos., etc.)	Narrative Description, Tables, and Figures
Melter Offgas Treatment Process System (Cont.) HOP-HX-00001 (Catalyst Skid Preheater – located on Catalyst Skid HOP-SKID-00005) HOP-HX-00003 (Catalyst Skid Preheater – located on Catalyst Skid HOP-SKID-00007)	HOP	**24590-HLW** -M5-V17T-P0004, Rev 1 -M5-V17T-20004, Rev 0 ~~-M6-HOP-00008, Rev 2~~ -M6-HOP-00008001, Rev 0 -M6-HOP-00008002, Rev 0 -M6-HOP-00008003, Rev 0 ~~-M6-HOP-20008, Rev 2~~ -M6-HOP-20008001, Rev 0 -M6-HOP-20008002, Rev 0 -M6-HOP-20008003, Rev 0 -MKD-HOP-P0019, Rev 0 -MKD-HOP-P0020, Rev 0 -N1D-HOP-00008, Rev 2 -P1-PO1T-P0002, Rev 7 -3PS-MBTV-T0002, Rev 1 **24590-LAW** -3PS-MBTV-T0001, Rev 1	Section 4.1.4.3; Table C-8; and Figures C1-1 and C1-4 in Operating Unit Group 10, Addendum C of this Permit.
Melter Offgas Treatment Process System (Cont.) HOP-HTR-00001 (Catalyst Skid Electric Heater – located on Catalyst Skid HOP-SKID-00005) HOP-HTR-00007 (Catalyst Skid Electric Heaters – located on Catalyst Skid HOP-SKID-00007)	HOP	**24590-HLW** -M5-V17T-P0004, Rev 1 -M5-V17T-20004, Rev 0 ~~-M6-HOP-00008, Rev 2~~ -M6-HOP-00008001, Rev 0 -M6-HOP-00008002, Rev 0 -M6-HOP-00008003, Rev 0 ~~-M6-HOP-20008, Rev 2~~ -M6-HOP-20008001, Rev 0 -M6-HOP-20008002, Rev 0 -M6-HOP-20008003, Rev 0 -MKD-HOP-P0019, Rev 0 -MKD-HOP-P0020, Rev 0 -P1-PO1T-00002, Rev 7 -3PS-MBTV-T0002, Rev 1 **24590-LAW** -3PS-MBTV-T0001, Rev 1	Section 4.1.4.3; Table C-8; and Figures C1-1 and C1-4 in Operating Unit Group 10, Addendum C of this Permit.
Melter Offgas Treatment Process System (Cont.) HOP-ABS-00002 (Silver Mordenite Column)	HOP	**24590-HLW** -M5-V17T-P0004, Rev 1 -M5-V17T-20004, Rev 0 ~~-M6-HOP-00008, Rev 2~~ -M6-HOP-00008001, Rev 0 -M6-HOP-00008002, Rev 0	Section 4.1.4.3; Table C-8; and Figures C1-1 and C1-4 in Operating Unit Group 10, Addendum C of this Permit.

Table III.10.J.A – HLW Plant Miscellaneous Unit System Description

Sub-system Description	Sub-system Designation	Engineering Description (Drawing Nos., Specification Nos., etc.)	Narrative Description, Tables, and Figures
HOP-ABS-00003 (Silver Mordenite Column)		-M6-HOP-00008003, Rev 0 ~~-M6-HOP-20008, Rev 2~~ -M6-HOP-20008001, Rev 0 -M6-HOP-20008002, Rev 0 -M6-HOP-20008003, Rev 0 -MKD-HOP-00014, Rev 5 -MKD-HOP-00017, Rev 7 -NID-HOP-P0006, Rev 1 -P1-P01T-00001, Rev 9 -3PS-MBT0-TP001, Rev 2	
Melter Offgas Treatment Process System (Cont.) HOP-HTR-00001B (HEPA Preheater) HOP-HTR-00002A (HEPA Preheater) HOP-HTR-00005A (HEPA Preheater) HOP-HTR-00005B (HEPA Preheater)	HOP	**24590-HLW** -M5-V17T-P0003, Rev 1 -M5-V17T-P20003, Rev 1 -M6-HOP-00010, Rev 3 -M6-HOP-20010, Rev 4 -MED-HOP-00013, Rev 4 -3PS-MEE0-T0001, Rev 1	Section 4.1.4.3; Table C-8; and Figures C1-1 and C1-4 in Operating Unit Group 10, Addendum C of this Permit.
Melter Offgas Treatment Process System (Cont.) HOP-HX-00002 (Silver Mordenite Preheater) HOP-HX-00004 (Silver Mordenite Preheater)	HOP	**24590-HLW** -M5-V17T-P0004, Rev 1 -M5-V17T-20004, Rev 0 ~~-M6-HOP-00003, Rev 2~~ -M6-HOP-00003001, Rev 0 -M6-HOP-00003002, Rev 0 ~~-M6-HOP-20003, Rev2~~ -M6-HOP-20003001, Rev 0 -M6-HOP-20003002, Rev 0 -N1D-HOP-P0007, Rev 0 -P1-P01T-00002, Rev 7	Section 4.1.4.3; Table C-8; and Figures C1-1 and C1-4 in Operating Unit Group 10, Addendum C of this Permit.
Melter Offgas Treatment Process System (Cont.) HOP-FAN-00001A (Booster Extraction Fan) HOP-FAN-00001B (Booster Extraction Fan) HOP-FAN-00001C (Booster Extraction	HOP	**24590-HLW** -M5-V17T-P0004, Rev 1 -M5-V17T-20004, Rev 0 ~~-M6-HOP-00003, Rev 2~~ -M6-HOP-00003001, Rev 0 -M6-HOP-00003002, Rev 0 ~~-M6-HOP-20003, Rev 2~~ -M6-HOP-20003001, Rev 0 -M6-HOP-20003002, Rev 0 -MAD-HOP-P0018, Rev 2	Section 4.1.4.3; Table C-8; and Figures C1-1 and C1-4 in Operating Unit Group 10, Addendum C of this Permit.

Table III.10.J.A – HLW Plant Miscellaneous Unit System Description

Sub-system Description	Sub-system Designation	Engineering Description (Drawing Nos., Specification Nos., etc.)	Narrative Description, Tables, and Figures
Fan) HOP-FAN-00009A (Booster Extraction Fan) HOP-FAN-00009B (Booster Extraction Fan) HOP-FAN-00009C (Booster Extraction Fan)		-P1-P01T-00001, Rev 9 **24590-WTP** -3PS-MACS-TP004, Rev 0	
Melter Offgas Treatment Process System (Cont.) HOP-FAN-00008A (Stack Extraction Fan) HOP-FAN-00008B (Stack Extraction Fan) HOP-FAN-00008C (Stack Extraction Fan) HOP-FAN-000010A (Stack Extraction Fan) HOP-FAN-000010B (Stack Extraction Fan) HOP-FAN-000010C (Stack Extraction Fan)	HOP	**24590-HLW** -M5-V17T-P0004, Rev 1 -M5-V17T-20004, Rev 0 ~~-M6-HOP-00008, Rev 2~~ -M6-HOP-00008001, Rev 0 -M6-HOP-00008002, Rev 0 -M6-HOP-00008003, Rev 0 ~~-M6-HOP-20008, Rev 2~~ -M6-HOP-20008001, Rev 0 -M6-HOP-20008002, Rev 0 -M6-HOP-20008003, Rev 0 -MAD-HOP-00038, Rev 5 -P1-P01T-00005, Rev 6 **24590-WTP** -3PS-MACS-TP004, Rev 0	Section 4.1.4.3; Table C-8; and Figures C1-1 and C1-4 in Operating Unit Group 10, Addendum C of this Permit.
Melter Offgas Treatment Process System (Cont.) HLW Stack	HOP	**24590-HLW** -M5-V17T-P0004, Rev 1 -M5-V17T-20004, Rev 0 ~~-M6-HOP-00008, Rev 2~~ -M6-HOP-00008001, Rev 0 -M6-HOP-00008002, Rev 0 -M6-HOP-00008003, Rev 0 ~~-M6-HOP-20008, Rev 2~~ -M6-HOP-20008001, Rev 0 -M6-HOP-20008002, Rev 0 -M6-HOP-20008003, Rev 0	Section 4.1.4.3; and Figures C1-1 and C1-4 in Operating Unit Group 10, Addendum C of this Permit.
Pulse Jet Ventilation System	PJV	**24590-HLW** -M6-PJV-00001, Rev 4	

Quarter Ending 09/30/2012 24590-HLW-PCN-ENV-12-005

Hanford Facility RCRA Permit Modification Notification Form
Part III, Operating Unit 10
Waste Treatment and Immobilization Plant

Index

Page 2 of 3: Hanford Facility RCRA Permit, Part III, Operating Unit 10, Waste Treatment and Immobilization Plant
Replace HLW Facility Material Selection Data Sheets With Updated Corrosion Evaluations in Appendix 10.9 of the Dangerous Waste Permit (DWP).

Submitted by Co-Operator:

D. M. Busche — 7/24/12 Date

GRANT W. RYAN for

Reviewed by ORP Program Office:

D. L. Noyes — 8/7/12 Date

Quarter Ending 09/30/2012

24590-HLW-PCN-ENV-12-005

Hanford Facility RCRA Permit Modification Notification Form

Unit:	Permit Part:
Waste Treatment and Immobilization Plant	**Part III, Operating Unit 10**

Description of Modification:

The purpose of this Class 1 prime modification is to replace Material Selection Data Sheets with updated Corrosion Evaluations for the following HLW Facility systems in Appendix 10.9 of the DWP:

Appendix 10.9			
Replace:		With:	
	24590-HLW-N1D-HOP-P0005, Rev. 1		24590-HLW-N1D-HOP-00005, Rev. 5
	See Discussion Below		24590-HLW-N1D-HOP-00008, Rev. 2

This modification requests Ecology approval and incorporation into the permit the specific changes that are identified by revision bars that have been issued since the last revision of the permitted version. Revisions are the result of ongoing design review. The following identifies the changes:

24590-HLW-N1D-HOP-00005 (HOP-SCR-00001/-00002, NOx Selective Catalytic Reducer)

- Updated design temperature
- Updated equipment descriptions
- Added Section p - Inadvertent Nitric Acid Addition
- Updated design temperature and pressure
- Incorporated revised Process Corrosion Data Sheet
- Revised the Section b additional pitting discussion
- Added AEA notice
- Revised Sections A-D, and O
- Added Section q - Non-Routine Start-up, Shut-down and Transient Operations
- Updated References and Bibliography sections

24590-HLW-N1D-HOP-00008 (HOP-HX-00001 & -00003, Catalyst Skid Preheater)

- The Catalyst Skid Preheater was incorporated into the DWP under Package HLW-026 and discussed in Thermal Catalytic Oxidizers/Reducers Specification 24590-WTP-3PS-MBTV-TP001, Rev. 0

In accordance with Permit Condition III.10.C.2.e, this permit modification may include page changes to the Permit, attachments, and permit application supporting documentation. Necessary permit changes are attached to this PCN. Ecology is requested to approve the attached permit changes and incorporate the changes in the next revision of the WTP Dangerous Waste Permit.

See attached.

Quarter Ending 09/30/2012 24590-HLW-PCN-ENV-12-005

WAC 173-303-830 Modification Class:	Class 1	Class [1]1	Class 2	Class 3
Please mark the Modification Class:		X		

Enter relevant WAC 173-303-830, Appendix I Modification citation number: NA

Enter wording of WAC 173-303-830, Appendix I Modification citation:

In accordance with WAC 173-303-830(4)(d)(i), this modification notification is requested to be reviewed and approved as a Class [1]1 modification. WAC 173-303-830(4)(d)(ii)(A) states, "Class 1 modifications apply to minor changes that keep the permit current with routine changes to the facility or its operation. These changes do not substantially alter the permit conditions or reduce the capacity of the facility to protect human health or the environment. In the case of Class 1 modifications, the director may require prior approval."

Modification Approved/Concur: ☑ Yes ☐ Denied (state reason below) Reason for denial:	Reviewed by Ecology: S. Dahl 9/6/12 Date

Table III.10.J.A – HLW Plant Miscellaneous Unit System Description

Sub-system Description	Sub-system Designation	Engineering Description (Drawing Nos., Specification Nos., etc.)	Narrative Description, Tables, and Figures
		24590-LAW -3PS-MBTV-T0001, Rev 1	
Melter Offgas Treatment Process System (Cont.) HOP-SCR-00001 (NOx Selective Catalytic Reducer – located on Catalyst Skid HOP-SKID-00005) HOP-SCR-00002 (NOx Selective Catalytic Reducer – located on Catalyst Skid HOP-SKID-00007)	HOP	**24590-HLW** -M5-V17T-P0004, Rev 1 -M5-V17T-P20004, Rev 0 -M6-HOP-00008, Rev 2 -M6-HOP-20008, Rev 2 -MKD-HOP-P0019, Rev 0 -MKD-HOP-P0020, Rev 0 ~~-N1D-HOP-P0004, Rev 1~~ -N1D-HOP-~~P000~~500005, Rev ~~1~~5 -P1-PO1T-00002, Rev 7 -3PS-MBTV-T0002, Rev 1 **24590-LAW** -3PS-MBTV-T0001, Rev 1	Section 4.1.4.3; Table C-8; and Figures C1-1 and C1-4 in Operating Unit Group 10, Addendum C of this Permit.
Melter Offgas Treatment Process System (Cont.) HOP-HX-00001 (Catalyst Skid Preheater – located on Catalyst Skid HOP-SKID-00005) HOP-HX-00003 (Catalyst Skid Preheater – located on Catalyst Skid HOP-SKID-00007)	HOP	**24590-HLW** -M5-V17T-P0004, Rev 1 -M5-V17T-20004, Rev 0 -M6-HOP-00008, Rev 2 -M6-HOP-20008, Rev 2 -MKD-HOP-P0019, Rev 0 -MKD-HOP-P0020, Rev 0 -N1D-HOP-00008, Rev 2 -P1-PO1T-P0002, Rev 7 -3PS-MBTV-T0002, Rev 1 **24590-LAW** -3PS-MBTV-T0001, Rev 1	Section 4.1.4.3; Table C-8; and Figures C1-1 and C1-4 in Operating Unit Group 10, Addendum C of this Permit.
Melter Offgas Treatment Process System (Cont.) HOP-HTR-00001 (Catalyst Skid Electric Heater – located on Catalyst Skid HOP-SKID-00005) HOP-HTR-00007 (Catalyst Skid Electric Heaters – located on Catalyst Skid HOP-SKID-00007)	HOP	**24590-HLW** -M5-V17T-P0004, Rev 1 -M5-V17T-20004, Rev 0 -M6-HOP-00008, Rev 2 -M6-HOP-20008, Rev 2 -MKD-HOP-P0019, Rev 0 -MKD-HOP-P0020, Rev 0 -P1-PO1T-00002, Rev 7 -3PS-MBTV-T0002, Rev 1 **24590-LAW** -3PS-MBTV-T0001, Rev 1	Section 4.1.4.3; Table C-8; and Figures C1-1 and C1-4 in Operating Unit Group 10, Addendum C of this Permit.
Melter Offgas Treatment Process	HOP	**24590-HLW**	Section 4.1.4.3; Table C-

R11385137

CORROSION EVALUATION

HOP-SCR-00001 & HOP-SCR-00002 (HLW)
NOx Selective Catalytic Reducer

ISSUED BY
RPP-WTP PDC

- Design Temperature (°F): 1000
- Design Pressure (in WG) (internal/external): 84/82
- Location: outcell; Room H-A123

Contents of this document are Dangerous Waste Permit affecting

Operating conditions are as stated on Process Corrosion Data Sheet

Operating Modes Considered:

- Normal operations up to a maximum temperature of 750 °F.
- Design to include a cool down mode that will prevent condensation of acid gasses.

Materials Considered:

Material (UNS No.)	Acceptable Material	Unacceptable Material
Carbon Steel		X
Type 304L (S30403)	X[1]	
Type 316L (S31603)	X[2]	
Type 347 (S34700)	X	
6% Mo (N08367/N08926)		X
Hastelloy® C-22® (N06022)		X
Ti-2 (R50400)		X

Recommended Materials

- Enclosure/shell-side components: Type 347 stainless steel
- Catalyst support frame & instrument housings: Type 347 stainless steel
- [1]Structural support (not in contact with offgas stream): Type 304 (or Type 316L) stainless steel (max 0.030% C; dual certified)
- [2]Instrument materials: Type 316 stainless steel (max 0.030% C, dual certified)
- [2]Ammonia piping and spray nozzles: Type 316 stainless steel (max 0.030% C; dual certified)

Recommended Corrosion Allowance: 0.010 inch (includes 0.00 inch erosion allowance)

Process & Operations Limitations:

- Effort shall be made to prevent condensation at all times. This does not preclude use of water for cleaning with approved procedures. Procedure shall provide for drying.
- During plant start-up, effort shall be made to minimize the ammonia slip into the reducer (optimize system).
- Operating limits shall be included in the operating procedures.

Concurrence DR
Operations

REV	DATE	REASON FOR REVISION	PREPARER	CHECKER	MET	APPROVER
5	6/30/11	Incorporate revised PCDS Addition general discussion Sect d – addt'l discussion	DLAdler	RBDavis	NA	SWVail

CORROSION EVALUATION

REVISION HISTORY

4	11/6/09	Update design temp Editorial and format changes Add AEA notice	DLAdler	RBDavis	NA	SWVail
3	7/21/08	Incorporate revised PCDS Revise operating temps Revise material recommendation	DLAdler	JRDivine	RBDavis	SWVail
2	9/15/04	Update equipment quantity Update equipment description Update design temp/pressure Incorporate new PCDS Add section p -- Inadvertent Addition of Nitric acid Extensive non-technical edits	DLAdler	JRDivine	NA	APRangus
1	9/17/02	Correct Item Number Update format Remove open issues	DLAdler	JRDivine	SS	SMKirk
0	2/4/02	Initial Issue	DLAdler	JRDivine	NA	B. Posta
REV	**DATE**	**REASON FOR REVISION**	**PREPARER**	**CHECKER**	**MET**	**APPROVER**

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.

This bound document contains a total of 8 sheets.

CORROSION EVALUATION

Corrosion Considerations:

The volatile organic and NO_x cleanup system is a series of four components starting with the recuperative heat exchanger, electric duct heater bank, organic oxidizer catalytic bed, and the selective reduction catalytic bed. All four units are supplied on the same skid; however, because the conditions are unique to each section, individual corrosion evaluations are produced to allow the flexibility of design. This enables the supplier to tailor to the specific design conditions of each component. This evaluation is specific to the functioning of the NO_x selective catalytic reducer.

The gas treatment system is designed to remove aerosols, acid gases, and radionuclides from the off-gas. The system includes coolers, scrubbers, precipitators, mist eliminators, heaters, fans, pre-heaters, catalytic beds, and exhaust blowers. The type of corrosion mechanism and its rate of attack depend on the nature of the atmosphere (temperature, chemistry, moisture, and particulates). In general, corrosion occurs when process gases contain moisture, N_2, O_2, CO_2, NH_3, NO, N_2O, NO_2, HCl, HF, I_2, SO_2, and Hg. The temperature in the component is higher than the condensation temperature of water; therefore, the component will remain dry during operation.

The materials selection encompasses the enclosure, interior and exterior structural framework, ammonia spray heads, and the catalyst boxes. Any moisture in the system is vaporized prior to entering the system during normal operations. When the system is operational, conditions should preclude moisture; however, during startup and shutdown, moisture could enter the crevices and occluded areas through condensation. Preventing condensation during off normal operation is important. Proper insulation and its maintenance can sometimes solve corrosion problems during short temperature transients or cause the condensation to occur on surfaces distant from the housing. However, insulated equipment with operating gas temperatures during startup and shutdown will pass through the dew point can still have significant corrosion issues. Using corrosion resistant material will limit corrosion losses due to the condensation. Moisture may wet the surfaces resulting in conditions that could support electrochemical processes. Precaution is taken to insulate the duct and enclosure to reduce the heat loss and the cold surfaces that can support condensation. In addition, corrosion resistant stainless steel is used to minimize the consequences of corrosion.

The moisture content in the gas that reaches the catalyst skid components (pre heater, heater, SCO and SCR) is less than 30% relative humidity. Dry surfaces do not corrode. The uniform corrosion, crevice corrosion, and pitting corrosion can be managed with austenitic stainless steel alloys Type 304/304L and Type 316/316L. The corrosion with these alloys is expected to be relatively low, 0.25 mpy max. Therefore, a total corrosion allowance of 0.010 inch is adequate for the offgas treatment system.

a General Corrosion
Uniform corrosion is not anticipated for all normal operating conditions. The dry air eliminates the electrolyte necessary to support electrochemical processes. However, because sections of the selective catalytic reducer may experience elevated temperatures, both types 304L and 316L stainless steel are precluded from use as the primary pressure boundary or enclosure. The stabilized austenitic grade of type 347 stainless steel is recommended and is suitable for the elevated temperatures and design conditions for the enclosure.

Conclusion
Type 304L is satisfactory for structural components not in contact with the offgas stream. Type 347 is recommended for all components of the pressure boundary and enclosure that are in contact with the offgas. A uniform corrosion allowance is added for normal wear and corrosion during off-normal events.

b Pitting Corrosion
Pitting corrosion is not anticipated for all normal, dry-air operating conditions. Localized corrosion for short durations during off-normal conditions may occur.

Conclusion
At the stated operating conditions, pitting corrosion is not a concern. Type 316L and 347 are both resistant to pitting corrosion.

CORROSION EVALUATION

c End Grain Corrosion
End grain corrosion only occurs in high acid conditions and is not a concern.

Conclusion:
Not a concern

d Stress Corrosion Cracking
The system is normally dry, free of moisture and most acid gases. Stress corrosion cracking will only be a concern if the column is allowed to have multiple cooling cycles below 225°F in the presence of moisture. Aggressive ion concentrations are small; therefore, any corrosion that could be accelerated by the aggressive ions will be low. While concentration mechanisms like evaporation are expected, their contribution would be small based upon the dry operating conditions.

Conclusion
At the stated operating conditions, stress corrosion cracking is not a concern.

e Crevice Corrosion
Crevice corrosion will only be a concern if column is allowed to cool below 225°F in the presence of moisture.

Conclusion
At the stated operating conditions, crevice corrosion is not a concern.

f Corrosion at Welds
None anticipated.

Conclusion
Not a concern.

g Microbiologically Induced Corrosion (MIC)
Conditions in this equipment are not conducive to MIC

Conclusion
Not a concern.

h Fatigue/Corrosion Fatigue
Equipment shall be designed to accommodate the expected fatigue cycles over the 40-year design life.

Conclusion
Not a concern.

i Vapor Phase Corrosion
Offgas equipment is essentially entirely vapor space. Comments under General Corrosion apply.

Conclusion
Not a concern.

j Erosion
Velocities are not expected to be sufficient to cause concern.

Conclusion
Not a concern.

k Galling of Moving Surfaces
None expected.

Conclusion
Not a concern.

CORROSION EVALUATION

l Fretting/Wear
None anticipated.

Conclusion
Not a concern.

m Galvanic Corrosion
None anticipated.

Conclusion
Not a concern.

n Cavitation
None anticipated.

Conclusion
Not a concern.

o Creep
At the design and operating temperatures, creep is not a concern.

Conclusion
At the stated operating conditions, creep is not a problem.

p Inadvertent Addition of Nitric Acid
Introduction of nitric acid into the offgas stream is not a likely scenario.

Conclusion
Not applicable.

q. Non-Routine, Start-up, Shut-down and Transient Operations
Non-routine operations will likely not influence corrosion.

Conclusion
Not a concern.

CORROSION EVALUATION

References:

1. 24590-HLW-M4C-HOP-00011, Rev. 1, *HLW Melter Offgas System Design Basis Flowsheets*
2. 24590-WTP-RPT-PR-04-0001, Rev. 0CC, *WTP Process Corrosion Data*
3. CCN 174990, e-mail from J Wood to R Davis, 25 March, 2008, "Design Temperatures For HOP TCOs"

Bibliography:

1. 24590-CM-POA-MBT0-00002-03-00001, *Data Sheet – HLW Thermal Catalytic Oxidizers/Reducers – Mechanical Data Sheet*
2. Allegheny Ludlum, 2003, Stainless Steels, Types 321, 347, and 348, Technical Data Blue Sheet, Allegheny Technologies, Inc.
3. Maziasz, PJ, RW Swindeman, JP Shingledecker, KL More, BA Pint, E Lara-Curzio, and ND Evans, 2003, *Improving High-Temperature Performance of Austenitic Stainless Steels for Advanced Microturbine Recuperators,* The Institute for Materials, Minerals and Mining, Maney Publishing, London, UK
4. Sedriks, AJ, 1996, *Corrosion of Stainless Steels*, John Wiley & Sons, Inc., New York, NY 10158

CORROSION EVALUATION

PROCESS CORROSION DATA SHEET

Component(s) (Name/ID #) NOx selective catalytic reducer (HOP-SCR-00001, HOP-SCR-00002)

Facility HLW

In Black Cell? No

Chemicals	Unit[1]	Contract Maximum[2]		Non-Routine		Notes
		Leach	No leach	Leach	No Leach	
Aluminum	g/m^3					
HCl	g/m^3					
HF	g/m^3					
Iron	g/m^3					
NO	g/m^3	2.86E-01	2.97E-01			
NO_2	g/m^3	1.05E-01	1.14E-01			
Phosphate	g/m^3					
SO_2	g/m^3	9.0E-04	9.0E-04			Note 5
Mercury	g/m^3					
Carbonate	g/m^3					
Particulate	g/m^3					
HNO_3	g/m^3	2.6E-03	2.6E-03			Assumption 1
HNO_2	g/m^3	3.4E-03	3.4E-03			Assumption 1
Ammonia	g/m^3	1.83E-01	1.8E-01			Note 3
Humidity	%	0.1%	0.1%			Note 5
Temperature	°F					Note 4

List of Organic Species:

References

System Description: 24590-HLW-3YD-HOP-00001
Mass Balance Document: 24590-WTP-M4C-V11T-00005, Rev A
Normally Associated Streams: HOP32, HOP30
Off Normal Streams (e.g., overflow from other vessels): N/A
P&ID: N/A
PFD: 24590-HLW-M5-V17T-00004; 24590-HLW-M5-V17T-20004
Technical Reports: N/A

Notes:

1. Concentrations less than 1×10^{-4} g/m^3 do not need to be reported; list concentration values to three significant digits max.
2. Data developed from a mass balance model which has constituents in the plant feed which are important to corrosion, adjusted to contract maximum values, except as noted.
3. Anhydrous ammonia is injected into the SCR to aid in the conversion of NO_x.
4. The normal operating temperature is 750 °F at the inlet, and 678 °F at the outlet (page A-6, 24590-HLW-M4C-HOP-00011, Rev 1)
   The maximum operating temperature is 750 °F at the inlet, and 689 °F at the outlet (page A-10, 24590-HLW-M4C-HOP-00011, Rev 1)
5. Source: 24590-HLW-M4C-HOP-00011, Rev 1, pages A-10 through A-13

Assumptions

1. Based on empirical data from testing per Attachment 28 of 24590-HLW-M4E-HOP-00005, page 4.

5.3.8.4 NO_x Selective Catalytic Oxidizer Reducer (HOP-SCR-00001, HOP-SCR-00002)

Routine Operations

The NO_x SCR reduces (destroy) nitrogen oxides (NO_x) in the process offgas. Gas from the TCO flows into a chamber where the gas is mixed, due to the turbulent flow, with anhydrous ammonia gas injected into the gas stream. The ammonia is added at a stoichiometric ratio of slightly more than 1 to ensure efficient reaction of about 95 %. The ammonia addition rate is controlled based on an in-stream analysis of the concentration and flow rate of the NO_x into the NO_x SCR. The ammonia slip needs to be controlled because ammonia is also an air pollutant. The offgas from the mixing chamber flows into the NO_x SCR catalyst bed at a temperature of about 750 °F where the reaction takes place. The inlet temperature is well above the temperature for ammonium nitrate formation (NH_4NO_3 decomposes above 410 °F). In the SCR, NO_x is reduced to nitrogen and water.

Non-Routine Operations that Could Affect Corrosion or Erosion

Any extended facility shutdown mode that results in cessation of airflow thorough offgas system, resulting in condensation of effluent inside equipment, is not desirable.

R11385140

CORROSION EVALUATION

HOP-HX-00001 & HOP-HX-00003 (HLW)
Catalyst Skid Preheater

ISSUED BY
RPP-WTP PDC

- Design Temperature (°F): 1000
- Design Pressure (in WG) (internal/external): 84/82
- Location: outcell; Room H-A123

Contents of this document are Dangerous Waste Permit affecting

Operating conditions are as stated on attached Selections Data Sheet

Operating Modes Considered:

- Assume off-normal conditions same as normal operations.
- Assume equipment will be monitored during operations for build-up of deposits (e.g. oxides and carbon fines)
- Design to include a cool down mode that will prevent condensation of acid gasses

Materials Considered:

Material (UNS No.)	Acceptable Material	Unacceptable Material
Carbon Steel	X[3]	
Type 304L (S30403)	X[1]	
Type 316L (S31603)	X[2]	
Type 347 (S34700)	X	
Type 439 (S43035)	X	
6% Mo (N08367/N08926)		X
Hastelloy® C-22® (N06022)		X
Ti-2 (R50400)		X

Recommended Material:

- Hot-side components: Type 347 stainless steel or heat-resistant nickel-base alloy
- Heat transfer surface: Type 347 or Type 439 stainless steel or heat-resistant nickel-base alloy, no corrosion allowance required for heat transfer surface
- [2]Cold-side components and enclosure: Type 347 stainless steel (max 0.030% C; dual certified)
- High temperature seals identified by Supplier shall be reviewed and approved by MET
- [1]Structural support (not in contact with offgas stream): Type 304 (or Type 316) stainless steel (max 0.030% C; dual certified)
- [3]Base (weldment to floor embeds): Carbon steel

Recommended Corrosion Allowance: 0.010 inch (includes 0.00 inch erosion allowance)

Process & Operations Limitations:

- Effort shall be made to prevent condensation at all times. This does not preclude cleaning with water with approved procedures.
- Operating limits shall be included in the operating procedures.

Concurrence DR
Operations

REV	DATE	REASON FOR REVISION	PREPARER	CHECKER	MET	APPROVER
2	6/30/11	Incorporate revised PCDS Mat'l recommendation for cold-side Mat'l for seals to be approved Specify addt'l operating modes Various format and editorial changes	DLAdler	RBDavis	NA	SWVail

CORROSION EVALUATION

REVISION HISTORY

1	11/6/09	Update design temp Editorial and format change Include additional material recommendation Modify sections l and o Add AEA notice	DLAdler	RBDavis	NA	SWVail
0	7/21/08	Initial Issue	DLAdler	JRDivine	RBDavis	SWVail
REV	**DATE**	**REASON FOR REVISION**	**PREPARER**	**CHECKER**	**MET**	**APPROVER**

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.

This bound document contains a total of 7 sheets.

CORROSION EVALUATION

Corrosion Considerations:

The gas treatment system is designed to remove aerosols, acid gases, and radionuclides from the off-gas. The system includes coolers, scrubbers, precipitators, mist eliminators, heaters, fans, pre-heaters, catalytic beds, and exhaust blowers. The type of corrosion mechanism and its rate of attack depend on the nature of the atmosphere (temperature, chemistry, moisture, and particulates). In general, corrosion occurs when process gases contain moisture, N_2, O_2, CO_2, NH_3, NO, N_2O, NO_2, HCl, HF, I_2, SO_2 and Hg. The temperature in the component is higher than the condensation temperature of water; therefore the component will remain dry during operation.

Preventing condensation during off normal operation is important. Proper insulation and its maintenance can sometimes solve corrosion problems during short temperature transients or cause the condensation to occur on surfaces distant from the housing. However, insulated equipment with operating gas temperatures during startup and shutdown will pass through the dew point can still have significant corrosion issues. Using corrosion resistant material will limit corrosion losses due to the condensation.

The moisture content in the gas that reaches the catalyst skid components (pre heater, heater, SCO and SCR) is less than 30% relative humidity. Dry surfaces do not corrode. The uniform corrosion, crevice corrosion, and pitting corrosion can be managed with austenitic stainless steel alloys Type 304/304L and Type 316/316L. The corrosion with these alloys is expected to be relatively low, 0.25 mpy max. Therefore, a total corrosion allowance of 0.010 inch is adequate for the offgas treatment system.

a General Corrosion
The anticipated dry-air conditions are not conducive to general corrosion and none is expected.

Conclusion
Type 304L is satisfactory on the basis of uniform corrosion and for structural support components not in contact with the offgas stream at an elevated temperature (>500 °F). Surfaces exposed to the offgas stream shall be fabricated using Type 347 stainless steel to minimize oxidation and the potential for intermetallic compound formation.

b Pitting Corrosion
Pitting corrosion will only be a concern if moisture is present. It is assumed that there will be no condensation in the unit, but Type 316L is recommended for added assurance.

Conclusion
At the stated operating conditions, pitting corrosion is not a serious concern. Type 316L is recommended.

c End Grain Corrosion
End grain corrosion only occurs in high acid conditions and is not a concern.

Conclusion:
Not a concern

d Stress Corrosion Cracking
Stress corrosion cracking will only be a concern if the preheaters experience multiple cooling cycles below 225°F in the presence of moisture.

Conclusion
At the stated operating conditions, stress corrosion cracking is not a concern.

e Crevice Corrosion
With no moisture present, crevice corrosion is not a concern.

Conclusion
At the stated operating conditions, crevice corrosion is not a concern.

f Corrosion at Welds
Assuming dry conditions and proper welding procedures, corrosion at welds is not anticipated.

Conclusion
At the stated operating conditions, weld corrosion is not a concern.

g Microbiologically Induced Corrosion (MIC)
The stated operating conditions are not suitable for microbial growth.

Conclusion
At the stated operating conditions, MIC is not a concern.

CORROSION EVALUATION

h Fatigue/Corrosion Fatigue
Extreme temperature cycling or fluctuations are not expected.

Conclusion
At the expected operating conditions, corrosion fatigue is not a concern.

i Vapor Phase Corrosion
Components essentially consist entirely of vapor space so general corrosion comments apply.

Conclusion:
See comments under general corrosion.

j Erosion
The velocity and solids content are sufficiently low that erosion is not a concern.

Conclusion
Erosion is not a concern.

k Galling of Moving Surfaces
There are no unlubricated moving surfaces present.

Conclusion:
Galling is not a concern.

l Fretting/Wear
Tube to tube support plates will likely move and fretting is likely unless designed to minimize movement.

Conclusion:
Fretting is a concern. Design will preclude tube movement using baffles and support plates.

m Galvanic Corrosion
No significantly dissimilar metals are present and it is assumed that condensation is controlled by design.

Conclusion:
Galvanic corrosion is not a concern.

n Cavitation
Cavitation is not expected in an off-gas system

Conclusion:
Cavitation is not a concern.

o Creep
At the design and operating temperatures, creep is not a concern. Although the design temperature is within the creep range of common stainless steels, the materials selected have higher creep threshold temperatures.

Conclusion
At the stated operating conditions, creep is not a concern.

p Inadvertent Addition of Nitric Acid
Introduction of nitric acid into the offgas stream is not a likely scenario.

Conclusion
Not applicable.

CORROSION EVALUATION

References:

1. 24590-HLW-M4C-HOP-00011, Rev. 1, *HLW Melter Offgas System Design Basis Flowsheets*
2. 24590-WTP-RPT-PR-04-0001, Rev. 0CC, *WTP Process Corrosion Data*
3. CCN 174990, e-mail from J Wood to R Davis, 25 March, 2008, "Design Temperatures For HOP TCOs"

Bibliography:

1. 24590-HLW-MED-HOP-00031, *24590-HLW-ME-HOP-HX-00002 & 24590-HLW-ME-HOP-HX-00004 - Welded Plate And Frame Heat Exchanger Mechanical Data Sheet*

CORROSION EVALUATION

24590-WTP-RPT-PR-04-0001, Rev. 0CC
WTP Process Corrosion Data

PROCESS CORROSION DATA SHEET

Component(s) (Name/ID #) Catalyst skid preheater (HOP-HX-00001, HOP-HX-00003)

Facility HLW

In Black Cell? No

Chemicals	Unit[1]	Contract Maximum[2]		Non-Routine		Notes
		Leach	No leach	Leach	No Leach	
Aluminum	g/m^3					
HCl	g/m^3					
HF	g/m^3					
Iron	g/m^3					
NO	g/m^3	4.02E-01	4.16E-01			
NO_2	g/m^3	1.46E-01	1.59E-01			
Phosphate	g/m^3					
SO_2	g/m^3	1.4E-03	1.4E-03			Note 5
Mercury	g/m^3					
Carbonate	g/m^3					
Particulate	g/m^3					
HNO_3	g/m^3	3.9E-03	3.9E-03			Assumption 1
HNO_2	g/m^3	5.0E-03	5.0E-03			Assumption 1
Humidity	%	3%	3%			Note 5
Temperature	°F					Note 3, Note 4

List of Organic Species:

References

System Description: 24590-HLW-3YD-HOP-00001
Mass Balance Document: 24590-WTP-M4C-V11T-00005, Rev A
Normally Associated Streams: HOP23, HOP26, HOP30, HOP25
Off Normal Streams (e.g., overflow from other vessels): N/A
P&ID: N/A
PFD: 24590-HLW-M5-V17T-00004; 24590-HLW-M5-V17T-20004
Technical Reports: N/A

Notes:

1. Concentrations less than 1x 10^{-4} g/m^3 do not need to be reported; list concentration values to three significant digits max.
2. Data developed from a mass balance model which has constituents in the plant feed which are important to corrosion, adjusted to contract maximum values, except as noted.
3. Normal operating temperatures range from 330 °F at inlet of the cool side, to 624 °F at the outlet of the cool side and 676 °F at inlet of the hot side, to 421 °F at the outlet of the hot side (page A-6, 24590-HLW-M4C-HOP-00011, Rev 1).
4. Maximum operating temperatures range from 330 °F at inlet of the cool side, to 621 °F at the outlet of the cool side and 689 °F at inlet of the hot side, to 431 °F at the outlet of the hot side (page A-10, 24590-HLW-M4C-HOP-00011, Rev 1).
5. Source: 24590-HLW-M4C-HOP-00011, Rev 1, pages A-10 through A-13

Assumptions

1. Based on empirical data from testing per Attachment 28 of 24590-HLW-M4E-HOP-00005, page 4.

CORROSION EVALUATION

5.3.8.2 Catalyst Skid Preheaters (HOP-HX-00001, HOP-HX-00003)

Routine Operations

The catalyst skid preheater is a plate-type recuperative heat exchanger to recover heat from the skid offgas exhaust. The preheater recovers heat from the NO_x selective catalytic oxidizer reducer (SCR) offgas to reduce the electrical load on the catalyst skid electric heater.

Non-Routine Operations that Could Affect Corrosion or Erosion

None identified.

Quarter Ending June 30, 2012 24590-LAB-PCN-ENV-06-002

Hanford Facility RCRA Permit Modification Notification Form
Part III, Operating Unit 10
Waste Treatment and Immobilization Plant

Index

Page 2 of 2: Hanford Facility RCRA Permit, Part III, Operating Unit 10, Waste Treatment and Immobilization Plant
Submit the final design Independent Qualified Registered Professional Engineer (IQRPE) Structural Integrity Assessment Report for the LAB Radioactive Liquid Waste Disposal System (RLD), LAB Area Sink Drain Collection Vessel (RLD-VSL-00164), and Hot Cell Drain Collection Vessel (RLD-VSL-00165) in Appendix 11.11 of the Dangerous Waste Permit (DWP).

Submitted by Co-Operator:

Donna Busche 5/15/12

D. M. Busche Date

Reviewed by ORP Program Office:

6/6/12

D. L. Noyes Date

Quarter Ending June 30, 2012 24590-LAB-PCN-ENV-06-002

Hanford Facility RCRA Permit Modification Notification Form

Unit:	Permit Part:
Waste Treatment and Immobilization Plant	**Part III, Operating Unit 10**

Description of Modification:

The purpose of this Class 1 prime modification is to update and replace the final design IQRPE Structural Integrity Assessment Report for the LAB RLD, LAB Area Sink Drain Collection Vessel (RLD-VSL-00164), and Hot Cell Drain Collection Vessel (RLD-VSL-00165) in Appendix 11.11 of the DWP.

Appendix 11.11			
Replace:	COGEMA-IA-040 24590-CM-HC4-HXYG-00138-01-00020, Rev. 00A	With:	24590-CM-HC4-HXYG-00240-02-00004, Rev. 00A (IA-3007244-000)

This modification requests Ecology approval and incorporation into the permit the updated, final design IQRPE report. The referenced report includes changes provided in applicable document change forms (e.g., DCN, SCN, SDDR, FCN, FCR, etc.) that were submitted to Ecology in accordance with Condition III.10.C.9.h. In addition, the report includes changes associated with the resolution to comments on change documents since the issuance of the last revision of the permitted document.

Significant changes are summarized below:

IQRPE Structural Integrity Assessment Report for LAB RLD Lab Area Sink Drain Collection Vessel (RLD-VSL-00164) and Hot Cell Drain Collection Vessel (RLD-VSL-00165)

- Updated assessment report based on the review of additional data from reference documents such as material requisitions, specifications, mechanical system data sheets, system descriptions, vessel design drawings, vendor drawings, seismic analyses, design criteria, and design calculations

For each item of "Information Assessed" in the structural integrity assessment report, the items listed under the "Source of Information" column were reviewed and found to furnish adequate design requirements and controls to ensure the design fully satisfies the requirements of Washington Administrative Code, WAC-173-303-640, *Dangerous Waste Regulations, Tank Systems.*

This modification requests Ecology approval and incorporation of the following list of outstanding change documents into the permit. Although not yet incorporated into the revised documents attached to this PCN, this list of outstanding DCNs are intended to be incorporated into this modification.

None

WAC 173-303-830 Modification Class:	Class 1	Class [1]1	Class 2	Class 3
Please mark the Modification Class:		X		

Enter relevant WAC 173-303-830, Appendix I Modification citation number: NA

Enter wording of WAC 173-303-830, Appendix I Modification citation:

In accordance with WAC 173-303-830(4)(d)(i), this modification notification is requested to be reviewed and approved as a Class [1]1 modification. WAC 173-303-830(4)(d)(ii)(A) states, "Class 1 modifications apply to minor changes that keep the permit current with routine changes to the facility or its operation. These changes do not substantially alter the permit conditions or reduce the capacity of the facility to protect human health or the environment. In the case of Class 1 modifications, the director may require prior approval."

Modification Approved/Concur: ☑ Yes ☐ Denied (state reason below)

Reason for denial:

Reviewed by Ecology:

A. Carlson 7/2/12 Date

R11510902

ISSUED BY
RPP-WTP PDC

24590-CM-HC4-HXYG-00240-02-00004

REV 00A

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 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.

SUBCONTRACT SUBMITTAL
REVIEW NOT REQUIRED

AREVA

AFS-12-0113

May 3, 2012

Ms. Trina A. Howard
Subcontracts Administrator
Bechtel National RPP-WTP Project
2435 Stevens Center Place
Richland, Washington 99354

Dear Ms. Howard:

BECHTEL NATIONAL, INC. CONTRACT NO. 24590-CM-HC4-HXYG-00240 IQRPE STRUCTURAL INTEGRITY ASSESSMENT REPORT FOR LAB RLD LAB AREA SINK DRAIN COLLECTION VESSEL (RLD-VSL-00164) AND HOT CELL DRAIN COLLECTION VESSEL (RLD-VSL-00165) – IA-3007244-000

The structural integrity assessment of the subject vessels has been completed per the contract requirements and is enclosed for your use. The assessment found that the design is sufficient to ensure that the vessels are adequately designed and have sufficient structural strength, compatibility with the waste(s) to be processed/stored/treated, and corrosion protection to ensure that they will not collapse, rupture, or fail.

If you have any questions, please contact Tarlok Hundal at (509) 371-1975, or via email at tarlok.hundal@areva.com.

Sincerely,

Fred R. Renz
Contract Management
AREVA Federal Services LLC
Richland Office

llm

Enclosure (1)

cc: D. C. Pfluger, MS 5-I w/enclosures (2)

AREVA Federal Services LLC
2101 Horn Rapids Road, RC-19, Richland, WA 99354, P. O. Box 840, Richland, WA 99352
Tel.: 509 375 8096 - Fax: 509 375 8495 - www.areva.com

IQRPE STRUCTURAL INTEGRITY ASSESSMENT REPORT FOR LAB RLD LAB AREA SINK DRAIN COLLECTION VESSEL (RLD-VSL-00164) AND HOT CELL DRAIN COLLECTION VESSEL (RLD-VSL-00165)

"I, Tarlok Singh 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 LAB Area Sink Drain Collection Vessel (RLD-VSL-00164) and Hot Cell Drain Collection Vessel (RLD-VSL-00165), as required by the Washington Administrative Code, *Dangerous Waste Regulations*, Section WAC-173-303-640(3) (a) through (g) applicable components."

"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 fully satisfies the requirements of the WAC.

The attached review is fifteen (15) pages numbered one (1) through fifteen (15).

Signature

5/3/12

Date

Scope	Scope of this Integrity Assessment	This Integrity Assessment includes the following two vessels located in the Analytical Laboratory Building: • LAB Area Sink Drain Collection Vessel (RLD-VSL-00164), located in cell A-B003 at Elevation (-) 18'-7" as shown on Drawing 24590-LAB-P1-60-P0007 (see pages 3-9), and • Hot Cell Drain Collection Vessel (RLD-VSL-00165), located in cell A-B004 at Elevation (-) 19'-2" as shown on Drawing 24590-LAB-P1-60-P0007 (see pages 10-15).
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 requirements and controls to ensure that the design fully satisfies the requirements of Washington Administrative Code (WAC), Chapter 173-303 WAC, *Dangerous Waste Regulations,* Section WAC-173-303-640 (3) (a) through (g) applicable elements of the *Tank Systems.*

References	Material Requisitions, Specifications, and Drawings	Material Requisitions (MR): 24590-CM-MRA-MVA0-00010, Rev. 1, Pressure Vessels, High Alloy or Clad-LAB (MS099) (N130) (for vessel RLD-VSL-00164, including Material Requisition Supplement Nos. S0003, S0004, S0005, S0006, S0007, and S0008 to MR Rev. 1); 24590-QL-MRA-MVA0-00008, Rev. 2, Pressure Vessels, Shop Fabricated, Large, QL-LAB (MS004) (N142) (for vessel RLD-VSL-00165, including Material Requisition Supplement No. S0006 to MR Rev. 2). Specifications: The following Specifications with their respective revision and Specification Change Notices (SCNs) are listed in the above listed Material Requisitions: 24590-WTP-3PS-MV00-T0001, Engineering Specification for Pressure Vessel Design and Fabrication; 24590-WTP-3PS-MV00-T0002, Engineering Specification for Seismic Qualification Criteria for Pressure Vessels; 24590-WTP-3PS-MVB2-T0001, Engineering Specification for Welding of Pressure Vessels, Heat Exchangers, and Boilers; 24590-WTP-3PS-G000-T0001, Engineering Specification for Supplier Quality Assurance Program Requirements; 24590-WTP-3PS-G000-T0002, Engineering Specification for Positive Material Identification (PMI) for Shop Fabrication; 24590-WTP-3PS-G000-T0003, Engineering Specification for Packaging, Handling, and Storage Requirements; 24590-WTP-3PS-FB01-T0001, Engineering Specification for Structural Design Loads for Seismic Category III & IV Equipment and Tanks. Plant Drawings: 24590-LAB-P1-60-P0007, Rev. 2, Analytical Laboratory General Arrangement Plan at El. (-) 19'-2", Sections E-E, F-F, & G-G; 24590-LAB-P1-60-00010, Rev. 2, Analytical Laboratory General Arrangement Sections A-A, B-B, C-C, & D-D; 24590-LAB-M5-V17T-P0029, Rev. 1, WTP Analytical Laboratory Process Flow Diagram Radioactive Liquid Disposal; 24590-LAB-M6-RLD-00001001, Rev. 1, P & ID-LAB Radioactive Liquid Waste Disposal System - C5 Collection and Transfer; 24590-LAB-M6-RLD-00002001, Rev. 1, P & ID-LAB Radioactive Liquid Waste Disposal System - C3 Collection & Transfer.

References (Cont'd)	Drawings and Mechanical Data Sheets	<u>Vendor Fabrication Drawings (*Bechtel Code 1 Drawings)</u>: 24590-CM-POA-MVA0-00010-01-02, Rev. 00H, Lab Area Sink Drain Collection Vessel (RLD-VSL-000164); 24590-CM-POA-MVA0-00010-01-00006, Rev. 00F, Lab Area Sink Drain Collection Vessel (RLD-VSL-000164); 24590-QL-POC-MVA0-00008-01-00001, Rev. 00G, Hot Cell Drain Collection Vessel (RLD-VSL-000165); 24590-QL-POC-MVA0-00008-01-00002, Rev. 00D, Hot Cell Drain Collection Vessel (RLD-VSL-000165). * Bechtel Code 1 Drawing is an "as fabricated vendor drawing" approved/accepted by Bechtel. <u>Mechanical Data Sheets</u>: 24590-LAB-MVD-RLD-P0164, Rev. 1, Lab Area Sink Drain Collection Vessel (RLD-VSL-00164); 24590-LAB-MVD-RLD-P0165, Rev. 1, Hot Cell Drain Collection Vessel (RLD-VSL-00165). <u>System Description:</u> 24590-LAB-3YD-RLD-00001, Rev. 4, System Description for the Analytical Laboratory Radioactive Liquid Waste Disposal System (including SDCN # 00005).

	Information Assessed	Source of Information	Assessment
Design	Vessel design standards are appropriate and adequate for the vessel's intended use.	Specifications, Drawings, and Mechanical Data Sheet listed above under References; ASME Boiler and Pressure Vessel (B&PV) Code, Section VIII, Division 1, Rules for Construction of Pressure Vessels, American Society of Mechanical Engineers.	The RLD system LAB Area Sink Drain Collection Vessel, RLD-VSL-00164 and all appurtenances are designed to the ASME B&PV Code, Section VIII, Division 1 rules which are appropriate for pressure vessels operating with mixed waste solutions over the pressure and temperature ranges specified for this vessel. Supplementary requirements are specified in the Engineering Specification for Pressure Vessel Design and Fabrication. Supplementary requirements address pressure vessel fatigue analysis, positive material identification, lifting attachment design, equipment drop evaluation, fabrication tolerances, acceptable welding procedures for the vessel and appurtenances, welder qualifications and testing records, NDE inspections and records, and lifting, packaging, shipping, handling and storage requirements. These are adequate and acceptable design standards for the intended use of the vessel. The Mechanical Data Sheet for the vessel identifies it as a Seismic Category (SC-III) equipment. The RLD-VSL-00164 is a vertical vessel with a 102 in. ID and a height of 69 in. from the bottom tangent line to the top tangent line. The vessel's shell is built with 3/8" thick plate and top and bottom Flanged & Dished (F & D) heads are built with 15/16" and 3/8" thick plates, respectively. The vessel is supported on a cylindrical skirt (approx. 1'-10" high) which in turn is supported on a base plate anchored to the concrete floor at Elev. (-) 18'-7". The vessel has internal equipment such as eductors, spray nozzles, and piping that are supported from the vessel's top head. Material for the shell, bottom and top head, and the vessel's internal equipment is UNS N08367 (6% Molybdenum stainless steel alloy) and hereafter referred to as 6% Mo. The supporting skirt is specified as SA-240 304 stainless steel plate (0.030% maximum carbon content) and is hereafter referred to as 304 stainless steel. The operating volume is to be about 2,740 gallons and the total internal volume is to be about 3,180 gallons.

	Information Assessed	Source of Information	Assessment
Design (cont'd)	If a non-standard vessel is to be used, the design calculations demonstrate sound engineering principles of construction.	Specifications, Material Requisition, Drawings, and Mechanical Data Sheet listed above under References; ASME Boiler and Pressure Vessel (B&PV) Code, Section VIII, Division 1, Rules for Construction of Pressure Vessels, American Society of Mechanical Engineers; 24590-CM-POA-MVA0-00010-05-02, Rev. 00D, Pressure Vessel Calculations of Lab Area Sink Drain Collection Vessel (RLD-VSL-00164); 24590-LAB-VDCN-MS-11-00002, Revise Supplier Calculation for CM LAB RLD Collection Vessel 24590-LAB-MV-VSL-00164 to Incorporate IQRPE Comments (Vessel Anchorage Calculation).	The RLD system LAB Area Sink Drain Collection Vessel, RLD-VSL-00164 is a standard ASME B&PV Code, Section VIII, Division 1 vessel. The Mechanical Data Sheet requires that the ASME B&PV Code, Section VIII, Division 1 vessel be delivered after design, fabrication, inspection and testing with an ASME code stamp and that the vessels be nationally registered. Supplemental design information is provided by the reference documents listed in the Source of Information column for utilizing sound engineering principles of construction of the vessels. Review of the Pressure Vessel Calculations shows that the vessel has been designed as a standard vessel per applicable requirements of ASME B&PV Code, Section VIII, Division 1 and other documents listed in the Material Requisition for the vessel. The aforementioned statements and the vendor fabrication drawings reviewed demonstrate that sound engineering principles of construction and fabrication have been used for the vessel.

	Information Assessed	Source of Information	Assessment
Design (cont'd)	Vessel has adequate strength, after consideration of the corrosion allowance, to withstand the operating pressure, operating temperature, and seismic loads.	Specifications, Material Requisition, Drawings, and Mechanical Data Sheet listed above under References; ASME Boiler and Pressure Vessel (B&PV) Code, Section VIII, Division 1, Rules for Construction of Pressure Vessels, American Society of Mechanical Engineers; ASME Boiler and Pressure Vessel (B&PV) Code, Section VIII, Division 2, Alternate Rules for Construction of Pressure Vessels, American Society of Mechanical Engineers; 24590-CM-POA-MVA0-00010-05-02, Rev. 00D, Pressure Vessel Calculations of Lab Area Sink Drain Collection Vessel (RLD-VSL-00164); 24590-LAB-VDCN-MS-11-00002, Revise Supplier Calculation for CM LAB RLD Collection Vessel 24590-LAB-MV-VSL-00164 to Incorporate IQRPE Comments (Vessel Anchorage Calculation).	The Mechanical Data Sheet identifies the vessel's operating pressure and temperature ranges, the materials selected for the vessel, the corrosion allowance, and the vessel quality level, and requirements for seismic design. The specifications for the vessel require specific consideration of the operating pressures and temperatures and seismic loads in the design process. ASME B&PV Code, Section VIII, Division 1 requires that corrosion allowance thickness shall be excluded from nominal vessel thickness when evaluating the adequacy of vessel components for these loads at end of life. The Engineering Specification for Seismic Qualification Criteria for Pressure Vessels adopts ASME B&PV Code, Section VIII, Division 2 design rules to address seismic design and analysis acceptance criteria for the vessel proper and ASME B&PV Code, Section VIII, Division 1 for the vessel supports. Detailed requirements for seismic load determination are furnished in the specification for Seismic Category III & IV Equipment and Tanks. Review of the Pressure Vessel Calculations shows that the vessel has adequate strength after the appropriate consideration of corrosion allowance, operating temperature and pressure, seismic, and other applicable loads have been accounted for. Furthermore, approval and acceptance of the vendor fabrication drawings by Bechtel National Inc. (BNI) is an added assurance that all applicable requirements stated above and as described in documents (including daughter documents) listed in Material Requisition for the vessel have been met.

	Information Assessed	Source of Information	Assessment
Foundation	Vessel foundation will maintain the load of a full vessel.	Specifications listed above under References; ASME Boiler and Pressure Vessel (B&PV) Code, Section VIII, Division 1, Rules for Construction of Pressure Vessels, American Society of Mechanical Engineers; 24590-CM-POA-MVA0-00010-05-02, Rev. 00D, Pressure Vessel Calculations of Lab Area Sink Drain Collection Vessel (RLD-VSL-00164); 24590-LAB-VDCN-MS-11-00002, Revise Supplier Calculation for CM LAB RLD Collection Vessel 24590-LAB-MV-VSL-00164 to Incorporate IQRPE Comments (Vessel Anchorage Calculation); 24590-WTP-DB-ENG-01-001, Rev. 1Q, Basis of Design.	The Engineering Specification for Pressure Vessel Design and Fabrication requires the use of ASME B&PV Code, Section VIII, Division 1 for the design of the vessel supports. This code ensures an adequate design for the vessel supports. Review of the Pressure Vessel Calculations shows that the vessel's support skirt has adequate strength to maintain the load of full vessel. Furthermore, Chapter 14 of the Basis of Design document requires that the foundation underlying the vessel support must be adequate to support the load from full vessel, which is out of scope of this assessment. The assessment of the adequacy of the underlying foundation is part of a separate integrity assessment report for the Secondary Containment of the vessel.
	If in an area subject to flooding, the vessel is anchored.	Specifications listed above under References and Mechanical Data Sheet; 24590-CM-POA-MVA0-00010-05-02, Rev. 00D, Pressure Vessel Calculations of Lab Area Sink Drain Collection Vessel (RLD-VSL-00164); 24590-LAB-VDCN-MS-11-00002, Revise Supplier Calculation for CM LAB RLD Collection Vessel 24590-LAB-MV-VSL-00164 to Incorporate IQRPE Comments (Vessel Anchorage Calculation).	The Specification for Pressure Vessel Design and Fabrication requires the anchors be designed to secure the buoyant vessel in case the vessel is submerged to the level indicated in the Mechanical Data Sheet (MDS). The MDS does not indicate any submerged conditions for the vessel. However, review of the Pressure Vessel Calculations and Vessel Anchorage Calculation of the vessel shows that the vessel is adequately anchored to the concrete floor to sustain the buoyant and other applicable forces on the empty and full vessel.
	Vessel system will withstand the effects of frost heave.	24590-WTP-DC-ST-01-001, Rev. 13, Structural Design Criteria.	The Structural Design Criteria document requires that all structural foundations extend a distance below grade that exceeds the depth of the 30" frost line. The vessel is located inside/interior of the building at below grade elevation {(-) 18'-7"}, therefore, the vessel foundation is 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 Data Sheet listed above under References; 24590-LAB-N1D-RLD-P0002, Rev. 1, Plant Item Material Selection Data Sheet, RLD-VSL-00164 (LAB) Lab Area Sink Drain Collection Vessel (RLD C3 Vessel); 24590-WTP-PSAR-ESH-01-002-01, Rev. 4t, Preliminary Documented Safety Analysis to Support Construction Authorization; General Information; 24590-WTP-PER-PR-03-001, Rev. 1, Prevention of Hydrogen Accumulation in WTP Tank Systems And Miscellaneous Treatment Unit Systems.	The Mechanical Data Sheet presents the waste specific gravity, storage temperatures and pressures. The Plant Item Material Selection Data Sheet addresses the pH range and chemical composition of the waste to select appropriate vessel materials and specify the corrosion allowance. Other waste characteristics that are hazardous, such as ignitability, reactivity, and toxicity are addressed by the Preliminary Documented Safety Analysis report as an integral part of the design process. The RLD vessels provide primary confinement of the waste during normal operations, abnormal operations and during and after a Design Basis Earthquake. The vessel has mixing eductors to mitigate any sludge buildup and the vessel is actively vented via the LAB vent system to prevent any build-up of flammable gases. Prevention of Hydrogen Accumulation document shows that the contents of the vessels are not expected to generate hydrogen gas that would accumulate 1% by volume (i.e., 25% of the LFL) in the headspace. Therefore, this vessel does not pose hydrogen accumulation hazard. The vessel is also grounded to control ignition sources.
	Vessel is designed to store or treat the wastes with the characteristics defined above and any treatment reagents.	System Description listed above under Reference; 24590-LAB-N1D-RLD-P0002, Rev. 1, Plant Item Material Selection Data Sheet, RLD-VSL-00164 (LAB) Lab Area Sink Drain Collection Vessel (RLD C3 Vessel).	The System Description discusses normal and abnormal operations for the RLD vessels. Diluted acid or water will be used for flushing/rinsing. The Plant Item Material Selection Data Sheet demonstrates that the 6% Mo material selected for vessel design is appropriate to process, treat or store the waste discussed above.
	The waste types are compatible with each other.	System Description listed above under Reference.	The System Description for the LAB (RLD) does not describe any operations where incompatible wastes are mixed in these vessels for processing. The RLD vessel's primary function is to collect, contain, and transfer liquid streams.

	Information Assessed	Source of Information	Assessment
Corrosion Protection	Vessel material and protective coatings ensure the vessel structure is adequately protected from the corrosive effects of the waste stream and external environments (expected to not leak or fail for the design life of the system)	Drawings, Mechanical Data Sheet and System Description listed above under References; 24590-LAB-N1D-RLD-P0002, Rev. 1, Plant Item Material Selection Data Sheet, RLD-VSL-00164 (LAB) Lab Area Sink Drain Collection Vessel (RLD C3 Vessel).	The Plant Item Material Selection Data Sheet shows that the LAB Area Sink Drain Collection Vessel, RLD-VSL-00164 normally operates at a pH range of 6 to 8 and at a temperature of 78°F. The vessel is designed for a 15 psig pressure and a temperature of 240°F. Other pertinent vessel operation and design information is provided in the Mechanical Data Sheet. Potential acid cleaning operations of the vessel were also considered. The materials selected are 6 % Mo and a corrosion allowance of 0.04 in. The RLD vessel is located in the LAB cell (A-B003) at Elevation (-) 18'-7". The vessel's support skirt material is 304 stainless steel. This cell is equipped with a sump to pump out any leaks. Therefore, the cell should remain dry during normal operations which will limit external corrosion of the vessel over the facility design life. The RLD vessel receives waste from Floor Drain Collection Vessel (RLD-VSL-00163) and various floor and sink drains in the LAB facility for short term storage, and transfers it to the LAB Hot Cell Drain Collection Vessel (RLD-VSL-00165) for further processing.
Corrosion Allowance	Corrosion allowance is adequate for the intended service life of the vessel.	Mechanical Data Sheet listed above under References; 24590-LAB-N1D-RLD-P0002, Rev. 1, Plant Item Material Selection Data Sheet, RLD-VSL-00164 (LAB) Lab Area Sink Drain Collection Vessel (RLD C3 Vessel).	The bases for the RLD vessel's material selection and corrosion allowance are furnished in the Plant Item Material Selection Data Sheet. Selection of 6% Mo material for the vessel with a corrosion allowance of 0.04 in. for a service life of 40 years is adequate and appropriate. The material selections and corrosion allowances are carried forward to the Mechanical Data Sheet consistently and correctly.
Pressure Relief	Pressure controls (vents and relief valves) are adequately designed to ensure pressure relief if normal operating pressures in the vessel are exceeded.	Drawings and System Description listed above under References.	The RLD system LAB Area Sink Drain Collection Vessel, RLD-VSL-00164 is designed to have unrestricted overflow through an 8" pipe line to the cell sump (RLD-SUMP-00041) as shown on the drawings and described in the System Description document. The sump contents will be transferred via pump (RLD-PMP-00182A/B) to the LAB Hot Cell Drain Collection Vessel (RLD-VSL-00165) for further processing. The vessel is also connected to the LAB vent system via an 8" pipe vent line to prevent its over pressurization.

	Information Assessed	Source of Information	Assessment
Design	Vessel design standards are appropriate and adequate for the vessel's intended use.	Specifications, Drawings, and Mechanical Data Sheet listed above under References; ASME Boiler and Pressure Vessel (B&PV) Code, Section VIII, Division 1, Rules for Construction of Pressure Vessels, American Society of Mechanical Engineers.	The RLD system Hot Cell Drain Collection Vessel, RLD-VSL-00165 and all appurtenances are designed to the ASME B&PV Code, Section VIII, Division 1 rules which are appropriate for pressure vessels operating with mixed waste solutions over the pressure and temperature ranges specified for this vessel. Supplementary requirements are specified in the Engineering Specification for Pressure Vessel Design and Fabrication. Supplementary requirements address pressure vessel fatigue analysis, positive material identification, lifting attachment design, equipment drop evaluation, fabrication tolerances, acceptable welding procedures for the vessel and appurtenances, welder qualifications and testing records, NDE inspections and records, and lifting, packaging, shipping, handling and storage requirements. These are adequate and acceptable design standards for the intended use of the vessel. The Mechanical Data Sheet for the vessel identifies it as a Seismic Category (SC-III) equipment. The RLD-VSL-00165 is a vertical vessel with a 192 in. ID and a height of 28.75 in. from the bottom tangent line to the top tangent line. The vessel's top and bottom Flanged & Dished (F & D) heads are built with 0.715" thick plate. Vessel's shell is built with 0.688" thick plate. The vessel is supported on a cylindrical skirt (approx. 3'-1" high) which in turn is supported on a base plate anchored to the concrete floor at Elev. (-) 19'-2". The vessel has internal equipment such as eductors, spray nozzles, and piping that are supported from the vessel's top head. Material for the shell, bottom and top head, and the vessel's internal equipment is UNS N08367 (6% Molybdenum stainless steel alloy) and hereafter referred to as 6% Mo. The supporting skirt is specified as SA-240 304 stainless steel plate (0.030% maximum carbon content, dual certified) and is hereafter referred to as 304 stainless steel. The operating volume is to be about 6,615 gallons and the total internal volume is to be about 9,100 gallons.

	Information Assessed	Source of Information	Assessment
Design (cont'd)	If a non-standard vessel is to be used, the design calculations demonstrate sound engineering principles of construction.	Specifications, Material Requisition, Drawings, and Mechanical Data Sheet listed above under References; ASME Boiler and Pressure Vessel (B&PV) Code, Section VIII, Division 1, Rules for Construction of Pressure Vessels, American Society of Mechanical Engineers; 24590-QL-POC-MVA0-00008-02-00002, Rev. 00C, Design Report of the Hot Cell Drain Collection Vessel (RLD-VSL-00165).	The RLD system Hot Cell Drain Collection Vessel, RLD-VSL-00165 is a standard ASME B&PV Code, Section VIII, Division 1 vessel. The Mechanical Data Sheet requires that the ASME B&PV Code, Section VIII, Division 1 vessel be delivered after design, fabrication, inspection and testing with an ASME code stamp and that the vessels be nationally registered. Supplemental design information is provided by the reference documents listed in the Source of Information column for utilizing sound engineering principles of construction of the vessels. Review of the Design Report of the vessel shows that it has been designed as a standard vessel per applicable requirements of ASME B&PV Code, Section VIII, Division 1 and other documents listed in the Material Requisition for the vessel. The aforementioned statements and the vendor fabrication drawings reviewed demonstrate that sound engineering principles of construction and fabrication have been used for the vessel.

	Information Assessed	Source of Information	Assessment
Design (cont'd)	Vessel has adequate strength, after consideration of the corrosion allowance, to withstand the operating pressure, operating temperature, and seismic loads.	Specifications, Material Requisition, Drawings, and Mechanical Data Sheet listed above under References; ASME Boiler and Pressure Vessel (B&PV) Code, Section VIII, Division 1, Rules for Construction of Pressure Vessels, American Society of Mechanical Engineers; ASME Boiler and Pressure Vessel (B&PV) Code, Section VIII, Division 2, Alternate Rules for Construction of Pressure Vessels, American Society of Mechanical Engineers; 24590-QL-POC-MVA0-00008-02-00002, Rev. 00C, Design Report of the Hot Cell Drain Collection Vessel (RLD-VSL-00165); 24590-LAB-VDCN-MS-11-00003, Revise Supplier Calculation for LAB Hot Cell RLD Collection Vessel 24590-LAB-MV-VSL-00165 to Incorporate IQRPE Comments (Vessel Anchorage Calculation).	The Mechanical Data Sheet identifies the vessel's operating pressure and temperature ranges, the materials selected for the vessel, the corrosion allowance, and the vessel quality level, and requirements for seismic design. The design specifications for the vessels require specific consideration of the operating pressures and temperatures and seismic loads in the design process. ASME B&PV Code, Section VIII, Division 1 requires that corrosion allowance thickness shall be excluded from nominal vessel thickness when evaluating the adequacy of vessel components for these loads at end of life. The Engineering Specification for Seismic Qualification Criteria for Pressure Vessels adopts ASME B&PV Code, Section VIII, Division 2 design rules to address seismic design and analysis acceptance criteria for the vessel proper and ASME B&PV Code, Section VIII, Division 1 for the vessel supports. Detailed requirements for seismic load determination are furnished in the specification for Seismic Category III & IV Equipment and Tanks. Review of the Design Report of the vessel shows that it has adequate strength after the appropriate consideration of corrosion allowance, operating temperature and pressure, seismic, and other applicable loads have been accounted for. Furthermore, approval and acceptance of the vendor fabrication drawings by Bechtel National Inc. (BNI) is an added assurance that all applicable requirements stated above and as described in documents (including daughter documents) listed in Material Requisition for the vessel have been met.

	Information Assessed	Source of Information	Assessment
Foundation	Vessel foundation will maintain the load of a full vessel.	Specifications listed above under References; ASME Boiler and Pressure Vessel (B&PV) Code, Section VIII, Division 1, Rules for Construction of Pressure Vessels, American Society of Mechanical Engineers; 24590-QL-POC-MVA0-00008-02-00002, Rev. 00C, Design Report of the Hot Cell Drain Collection Vessel (RLD-VSL-00165); 24590-LAB-VDCN-MS-11-00003, Revise Supplier Calculation for LAB Hot Cell RLD Collection Vessel 24590-LAB-MV-VSL-00165 to Incorporate IQRPE Comments (Vessel Anchorage Calculation); 24590-WTP-DB-ENG-01-001, Rev. 1Q, Basis of Design.	The Engineering Specification for Pressure Vessel Design and Fabrication requires the use of ASME B&PV Code, Section VIII, Division 1 for the design of the vessel supports. This code ensures an adequate design for the vessel supports. Review of the Design Report of the vessel shows that the vessel's support skirt has adequate strength to maintain the load of full vessel. Furthermore, Chapter 14 of the Basis of Design document requires that the foundation underlying the vessel support must be adequate to support the loads from full vessel, which is out of scope of this assessment. The assessment of the adequacy of the underlying foundation is part of a separate integrity assessment report for the Secondary Containment of the vessel.
	If in an area subject to flooding, the vessel is anchored.	Specifications listed above under References and Mechanical Data Sheet; 24590-QL-POC-MVA0-00008-02-00002, Rev. 00C, Design Report of the Hot Cell Drain Collection Vessel (RLD-VSL-00165); 24590-LAB-VDCN-MS-11-00003, Revise Supplier Calculation for LAB Hot Cell RLD Collection Vessel 24590-LAB-MV-VSL-00165 to Incorporate IQRPE Comments (Vessel Anchorage Calculation).	The Specification for Pressure Vessel Design and Fabrication requires the anchors be designed to secure the buoyant vessel in case the vessel is submerged to the level indicated in the Mechanical Data Sheet (MDS). The MDS does not indicate any submerged conditions for the vessel. However, review of the Design Report and Vessel Anchorage Calculation of the vessel shows that the vessel is adequately anchored to the concrete floor to sustain the buoyant and other applicable forces on the empty and full vessel.
	Vessel system will withstand the effects of frost heave.	24590-WTP-DC-ST-01-001, Rev. 13, Structural Design Criteria.	The Structural Design Criteria document requires that all structural foundations extend a distance below grade that exceeds the depth of the 30" frost line. The vessel is located inside/interior of the building at below grade elevation {(-) 19'-2"}, therefore, the vessel foundation is 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 Data Sheet listed above under References; 24590-LAB-N1D-RLD-P0003, Rev. 1, Plant Item Material Selection Data Sheet, RLD-VSL-00165 (LAB) Hot Cell Drain Collection Vessel; 24590-WTP-PSAR-ESH-01-002-01, Rev. 4t, Preliminary Documented Safety Analysis to Support Construction Authorization: General Information; 24590-WTP-PER-PR-03-001, Rev. 1, Prevention of Hydrogen Accumulation in WTP Tank Systems And Miscellaneous Treatment Unit Systems.	The Mechanical Data Sheet presents the waste specific gravity, storage temperatures and pressures. The Plant Item Material Selection Data Sheet addresses the pH range and chemical composition of the waste to select appropriate vessel materials and specify the corrosion allowance. Other waste characteristics that are hazardous, such as ignitability, reactivity, and toxicity are addressed by the Preliminary Documented Safety Analysis report as an integral part of the design process. The RLD vessels provide primary confinement of the waste during normal operations, abnormal operations and during and after a Design Basis Earthquake. The vessel has continually mixing eductors to mitigate any sludge buildup and the vessel is actively vented via the LAB vent system to prevent any build-up of flammable gases. Prevention of Hydrogen Accumulation document shows that the contents of the vessels are not expected to generate hydrogen gas that would accumulate 1% by volume (i.e., 25% of the LFL) in the headspace. Therefore, this vessel does not pose hydrogen accumulation hazard. The vessel is also grounded to control ignition sources.
Waste Characteristics	Vessel is designed to store or treat the wastes with the characteristics defined above and any treatment reagents.	System Description listed above under Reference; 24590-LAB-N1D-RLD-P0003, Rev. 1, Plant Item Material Selection Data Sheet, RLD-VSL-00165 (LAB) Hot Cell Drain Collection Vessel.	The System Description discusses normal and abnormal operations for the RLD vessels. Diluted acid or water will be used for flushing/rinsing. The Plant Item Material Selection Data Sheet demonstrates that the 6% Mo material selected for vessel design is appropriate to process, treat or store the waste discussed above.
	The waste types are compatible with each other.	System Description listed above under Reference.	The System Description for the LAB (RLD) does not describe any operations where incompatible wastes are mixed in these vessels for processing. The RLD vessel's primary function is to collect, contain, and transfer liquid streams.

	Information Assessed	Source of Information	Assessment
Corrosion Protection	Vessel material and protective coatings ensure the vessel structure is adequately protected from the corrosive effects of the waste stream and external environments (expected to not leak or fail for the design life of the system)	Drawings, Mechanical Data Sheet, and System Description listed above under References; 24590-LAB-N1D-RLD-P0003, Rev. 1, Plant Item Material Selection Data Sheet, RLD-VSL-00165 (LAB) Hot Cell Drain Collection Vessel.	The Plant Item Material Selection Data Sheet shows that the Hot Cell Drain Collection Vessel, RLD-VSL-00165 normally operates at a pH range of 6 to 8 and at a temperature of 78°F. The vessel is designed for a 15 psig pressure and a temperature of 240°F. Other pertinent vessel operation and design information is provided in the Mechanical Data Sheet. Potential acid cleaning operations of the vessel were also considered. The material selected is 6 % Mo and a corrosion allowance of 0.04 in. The RLD vessel is located in the LAB cell (A-B004) at Elevation (-) 19'-2". The vessel's support skirt material is 304 stainless steel. This cell is equipped with a sump to pump out any leaks. Therefore, the cell should remain dry during normal operations which will limit external corrosion of the vessel over the facility design life. The RLD vessel receives waste from Floor Drain Collection Vessel (RLD-VSL-00163) and cell sump, Lab Area Sink Drain Collection Vessel (RLD-VSL-00164) and cell sump, and various floor and sink drains in the LAB facility for short term storage, and transfers it to the PTF plant wash disposal vessel (PWD-VSL-00044 or PWD-VSL-00033) for further processing.
Corrosion Allowance	Corrosion allowance is adequate for the intended service life of the vessel.	Mechanical Data Sheet listed above under References; 24590-LAB-N1D-RLD-P0003, Rev. 1, Plant Item Material Selection Data Sheet, RLD-VSL-00165 (LAB) Hot Cell Drain Collection Vessel.	The bases for the RLD vessel's material selection and corrosion allowance are furnished in the Plant Item Material Selection Data Sheet. Selection of 6% Mo material for the vessel with a corrosion allowance of 0.04 in. for a service life of 40 years is adequate and appropriate. The material selections and corrosion allowances are carried forward to the Mechanical Data Sheet consistently and correctly.
Pressure Relief	Pressure controls (vents and relief valves) are adequately designed to ensure pressure relief if normal operating pressures in the vessel are exceeded.	Drawings and System Description listed above under References.	The RLD system Hot Cell Drain Collection Vessel, RLD-VSL-00165 is designed to have unrestricted overflow through a 6" dip pipe to the cell sump (RLD-SUMP-00042) as shown on the drawings and described in the System Description document. The sump contents will be transferred via pump (RLD-PMP-00183A/B) to the PTF plant wash disposal vessel (PWD-VSL-00044 or PWD-VSL-00033) for further processing. The vessel is also connected to the LAB vent system via a 6" pipe vent line to prevent its over pressurization.

Quarter Ending June 30, 2012 24590-LAB-PCN-ENV-06-004

Hanford Facility RCRA Permit Modification Notification Form
Part III, Operating Unit 10
Waste Treatment and Immobilization Plant

Index

Page 2 of 3: Hanford Facility RCRA Permit, Part III, Operating Unit 10, Waste Treatment and Immobilization Plant
Update the Independent, Qualified, Registered, Professional Engineer (IQRPE) Structural Integrity Assessment Report for the LAB Facility Below Grade Level Secondary Containment in Appendix 11.11 of the Dangerous Waste Permit (DWP).

Submitted by Co-Operator:

Donna Busche 6/12/12
D. M. Busche Date

Reviewed by ORP Program Office:

D. L. Noyes 7/10/12
D. L. Noyes Date

Quarter Ending June 30, 2012 24590-LAB-PCN-ENV-06-004

Hanford Facility RCRA Permit Modification Notification Form	
Unit: **Waste Treatment and Immobilization Plant**	Permit Part: **Part III, Operating Unit 10**

Description of Modification:

The purpose of this Class 1 prime modification is to update and replace the following IQRPE Structural Integrity Assessment Report for the LAB Facility Below Grade Level Secondary Containment in Appendix 11.11 of the DWP.

Appendix 11.11			
Replace:	COGEMA-IA-018 - 24590-CM-HC4-HXYG-00138-01-16	With:	IQRPE Structural Integrity Assessment Report for LAB Below Grade Level Secondary Containment, 24590-CM-HC4-HXYG-00240-02-00005

This modification requests Ecology approval and incorporation into the permit the updated integrity assessment report. The referenced report includes changes provided in applicable document change forms (e.g., DCN, SCN, SDDR, FCN, FCR, etc.) that were submitted to Ecology in accordance with Condition III.10.C.9.h. In addition, the report includes changes associated with the resolution to comments on change documents since the issuance of the last revision of the permitted document.

Changes are summarized below:

- Updates assessment report based on the review of additional data from reference documents such as excavation site plans and sections; structural concrete forming designs, plans, sections, and details; structural concrete reinforcement designs, plans, sections, and details; engineering calculations; structural design criteria and codes; test reports; and secondary containment plans and designs.

For each item of "Information Assessed" in the structural integrity assessment report, the items listed under the "Source of Information" column were reviewed and found to furnish adequate design requirements and controls to ensure the design fully satisfies the requirements of Washington Administrative Code, WAC-173-303-640, *Dangerous Waste Regulations, Tank Systems.*

This modification requests Ecology approval and incorporation of the following list of outstanding change documents into the permit. Although not yet incorporated into the revised documents attached to this PCN, this list of outstanding DCNs are intended to be incorporated into this modification.

None

In accordance with Permit Condition III.10.C.2.e, this permit modification may include page changes to the Permit, attachments, and permit application supporting documentation. Necessary permit changes are attached to this PCN. Ecology is requested to incorporate changes in the next revision of the WTP Dangerous Waste Permit.

None

Quarter Ending June 30, 2012 24590-LAB-PCN-ENV-06-004

WAC 173-303-830 Modification Class:	Class 1	Class [1]1	Class 2	Class 3
Please mark the Modification Class:		X		

Enter relevant WAC 173-303-830, Appendix I Modification citation number: NA

Enter wording of WAC 173-303-830, Appendix I Modification citation:

In accordance with WAC 173-303-830(4)(d)(i), this modification notification is requested to be reviewed and approved as a Class [1]1 modification. WAC 173-303-830(4)(d)(ii)(A) states, "Class 1 modifications apply to minor changes that keep the permit current with routine changes to the facility or its operation. These changes do not substantially alter the permit conditions or reduce the capacity of the facility to protect human health or the environment. In the case of Class 1 modifications, the director may require prior approval."

Modification Approved/Concur:	Reviewed by Ecology:
[X] Yes [ ] Denied (state reason below) Reason for denial:	A. Carlson — Date: 8/6/12

R11511833

ISSUED BY
RPP-WTP PDC

24590-CM-HC4-HXYG-00240-02-00005

REV 00A

SUBCONTRACT SUBMITTAL
REVIEW NOT REQUIRED

AFS-12-0112

AREVA

May 23, 2012

Ms. Trina Howard
Subcontract Administrator
Bechtel National, Inc.
2435 Stevens Center Place
Richland, Washington 99354

Dear Ms. Howard:

BECHTEL NATIONAL, INC. CONTRACT NO. 24590-CM-HC4-HXYG-00240 IQRPE STRUCTURAL INTEGRITY ASSESSMENT REPORT FOR LAB BELOW GRADE LEVEL SECONDARY CONTAINMENT (IA-3007238-000)

The integrity assessment of the LAB below grade level secondary containment has been completed per the contract requirements and is enclosed for your use. The assessment found that the design is sufficient to ensure that the secondary containment rooms are adequately designed and have sufficient structural strength, compatibility with the waste(s) to be processed/stored/treated, and corrosion protection to ensure that they will not collapse, rupture, or fail.

If you have any questions, please contact Tarlok Hundal at (509) 371-1975, or via email at tarlok.hundal@areva.com.

Sincerely,

Fred R. Renz
Contracts Administration
AREVA Federal Services LLC
Richland Office

Enclosure (1)

lak

cc: D. C. Pfluger, MS 5I w/enclosure (2)

AREVA Federal Services LLC

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Tel.: 509-375-8096 - Fax: 509-375-8495 - www.areva.com

IA-3007238-000

IQRPE STRUCTURAL INTEGRITY ASSESSMENT REPORT FOR LAB BELOW GRADE LEVEL SECONDARY CONTAINMENT

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.

IA-3007238-000

IQRPE STRUCTURAL INTEGRITY ASSESSMENT REPORT FOR LAB BELOW GRADE LEVEL SECONDARY CONTAINMENT

"I, Tarlok Singh 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 LAB Below Grade Level Secondary Containment, as required by the Washington Administrative Code, *Dangerous Waste Regulations*, Section WAC-173-303-640(3) (a) through (g) applicable components."

"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 fully satisfies the requirements of the WAC.

The attached review is thirteen (13) pages numbered one (1) through thirteen (13).

TARLOK SINGH HUNDAL
STATE OF WASHINGTON
20213
REGISTERED
PROFESSIONAL ENGINEER

T S Hundal

Signature

5/23/12

Date

Scope	Scope of this Integrity Assessment	This Integrity Assessment addresses Analytical Laboratory (LAB) Facility Secondary Containment at below grade elevations. The specific cells/rooms considered in this assessment are: **Room A-B002 @ Elev. (-) 6'-8 1/2"**: Pump Pit **Room A-B003 @ Elev. (-) 18'-7"**: Houses the Sink Drain Collection Vessel (RLD-VSL-00164) **Room A-B004 @ Elev. (-) 19'-2"**: Houses the Hot Cell Drain Collection Vessel (RLD-VSL-00165) **Room A-B005 @ Elev. (-) 6'-7"**: Pump Pit **Room A-B006 @ Elev. (-) 6'-7"**: Piping Pit **Room A-B007 @ Elev. (-) 6'-7"**: Pump Pit
References	Drawings	24590-LAB-P1-60-P0007, Rev. 2, Analytical Laboratory General Arrangement Plan at El. (-) 19'-2", Sections E-E, F-F, & G-G; 24590-LAB-P1-60-P0010, Rev. 1, Analytical Laboratory General Arrangement Sections A-A, B-B, C-C, & D-D; 24590-LAB-CE-C13T-00001, Rev. 2, Analytical Laboratory Excavation Site Plan; 24590-LAB-CE-C13T-00002, Rev. 2, Analytical Laboratory Excavation Sections; 24590-LAB-D0-S13T-00002, Rev. 4, Analytical Laboratory Structural Concrete Notes and Reinforcing Steel; 24590-LAB-DB-S13T-00018, Rev. 8, Analytical Laboratory C5 Cell Structural Concrete Forming Plans and Sections; 24590-LAB-DB-S13T-00019, Rev. 4, Analytical Laboratory C5 Cell Structural Concrete Forming Sections and Details; 24590-LAB-DB-S13T-00020, Rev. 2, Analytical Laboratory C2 Vault and C3 Cell Structural Concrete Forming Plans and Sections; 24590-LAB-DB-S13T-00021, Rev. 2, Analytical Laboratory C2 Vault and C3 Cell Structural Concrete Forming Sections and Details. 24590-LAB-DG-S13T-00018, Rev. 1, Analytical Laboratory C5 Cell Structural Concrete Reinforcement Plans Sections and Details; 24590-LAB-DG-S13T-00019, Rev. 2, Analytical Laboratory C2 Vault & C3 Cell Structural Concrete Reinforcement Plans and Sections.
Summary of Assessment		For each item of "Information Assessed" (i.e., Criteria) on the following pages, the documents listed under "Source of Information" were reviewed and found to furnish adequate design requirements and controls to ensure that the design fully satisfies the requirements of Washington Administrative Code (WAC), Chapter 173-303 WAC, *Dangerous Waste Regulations,* WAC-173-303-640, *Tank Systems.*

	Information Assessed	Source of Information	Assessment
Design	Description of subsurface conditions and soil bearing capacity are adequate	Drawings listed above under References; 24590-WTP-DC-ST-01-001, Rev. 13, Structural Design Criteria; 24590-BOF-3PS-CE01-T0001, Rev. 6, Engineering Specification for Excavation and Backfill; 24590-BOF-3PS-C000-T0001, Rev. 6, Engineering Specification for Material Testing Services; WTSC99-1036-42-17, RPP-WTP Final Report Geotechnical Investigation, Shannon & Wilson Inc. (H-1616-51), May 2000; 24590-LAB-DGC-S13T-00001, Rev. 0, C2 Vault & C3 Cell Concrete Reinforcement Design; 24590-LAB-DGC-S13T-00002, Rev. 0, Elevation +0-Ft Basemat Concrete Reinforcement Design; 24590-LAB-DGC-S13T-00003, Rev. 0, C5 Cell Concrete Reinforcement Design; 24590-WTP-3DP-G04B-00037, Rev. 19A, Engineering Calculations.	The Structural Design Criteria provides adequate design guidance for both mat and spread footings based on the Geotechnical Investigation report for the facility. Bearing capacity and settlement design parameters are presented for the dense Hanford Upper and Lower Sand Units and Structural Fill. Use of the loose wind blown (dune) sands for foundations is precluded. The Specification for Excavation and Backfill provides structural backfill requirements based on the geotechnical report and current codes and standards for the selection, placing, compacting, and backfill testing of candidate fill materials and completed backfills. The Specification for Material Testing Services provides current and adequate codes and standards for testing of the candidate structural fill materials, and in-situ testing of structural fills as they are placed. The codes and standards are consistent with those called out in the Specification for Excavation and Backfill. The drawings show that appropriate foundation subsurface and backfill materials have been utilized and/or placed under and around the Secondary Containment structures. Review of the Concrete Reinforcing design calculations of the concrete cells acting as Secondary Containment for the equipment installed in these cells show that the subsurface conditions and bearing capacity are adequate to sustain the applicable loads. The methodology described in the Engineering Calculations document assures that the final Secondary Containment structure is designed to comply with all applicable requirements.

	Information Assessed	Source of Information	Assessment
Design (cont'd)	Foundation design loads (including full tanks) and estimated settlement are adequately considered.	Drawings listed above under References; 24590-WTP-DC-ST-01-001, Rev. 13, Structural Design Criteria; ASCE 7-98, Minimum Design Loads for Buildings and Other Structures, American Society of Civil Engineers; ACI 318-99, Building Code Requirements for Structural Concrete and Commentary, American Concrete Institute; ACI 349-01, Code Requirements for Nuclear Safety-Related Concrete Structures and Commentary, American Concrete Institute; 24590-LAB-DGC-S13T-00001, Rev. 0, C2 Vault & C3 Cell Concrete Reinforcement Design; 24590-LAB-DGC-S13T-00003, Rev. 0, C5 Cell Concrete Reinforcement Design.	The Structural Design Criteria uses current adequate standards to define design loads and load combinations (ASCE 7-98, ACI 349-01 and ACI 318-99). Dead and fluid loads are included in these loads and load combinations. Settlement design parameters are included in the Structural Design Criteria (Section 7.7, Geotechnical Design Parameters and Foundation Design). Review of the C3 and C5 cells Reinforcement Design calculations shows that full loads of the vessels have been appropriately considered for their foundation design and the design drawings accurately reflect the detail as shown in the design calculations.

	Information Assessed	Source of Information	Assessment
Design (cont'd)	Design calculation approach and design basis of footings with design standard references (e.g., ACI) are adequate.	Drawings listed above under References; 24590-WTP-DB-ENG-01-001, Rev. 1Q, Basis of Design; 24590-WTP-DC-ST-01-001, Rev. 13, Structural Design Criteria; ACI 318-99, Building Code Requirements for Structural Concrete and Commentary, American Concrete Institute; 24590-LAB-DGC-S13T-00001, Rev. 0, C2 Vault & C3 Cell Concrete Reinforcement Design; 24590-LAB-DGC-S13T-00003, Rev. 0, C5 Cell Concrete Reinforcement Design; 24590-WTP-VV-ST-01-001, Rev. 5A, Verification and Validation Test Plan and Test Report for GTSTRUDL.	The Basis of Design provides many fundamental general requirements for footing design. The Structural Design Criteria document references current adequate detailed design criteria for the design of concrete foundations and footings. ACI 318-99 is referenced for the strength design of commercial grade structures. Review of the Concrete Reinforcing Design (structural design) calculations shows that design approach, basis, and methodology used for the design of the secondary containment foundations/footings are appropriate. The conclusions of the design calculations are correctly shown in the design drawings. The above mentioned codes and standards, design approach, methodology, and basis delineated are appropriate and adequate for the foundation design. The input parameters used in the GTSTRUDL computer code utilized for this secondary containment design are appropriate and the output results have been appropriately validated via the Verification and Validation Test Plan and Test Report document.

	Information Assessed	Source of Information	Assessment
Foundation Design	Foundation material is compatible with the soil.	Drawings listed above under References; 24590-WTP-3PS-DB01-T0001, Rev. 8, Engineering Specification for Furnishing and Delivering Ready-Mix Concrete; 24590-BOF-3PS-C000-T0001, Rev. 6, Engineering Specification for Material Testing Services; 24590-WTP-DB-ENG-01-001, Rev. 1Q, Basis of Design.	The materials for secondary containment structure and backfill used under the containment structure are consistently identified in the specifications, drawings, and calculations. The Specification for Furnishing and Delivering Ready-Mix Concrete provides adequate current testing requirements for the selection of coarse and fine aggregates and the procurement of cementitious materials. Adequate test procedures are provided in the Material Testing Services specification for testing candidate aggregates for chemical reactivity. Instructions for mixing and delivering ready-mix concrete are adequate and current. As noted in the Basis of Design document (Section 4.7), the groundwater table is more than 250 feet below the ground surface; therefore, no compatibility problem is expected between the concrete foundations and the surrounding backfill materials used under and around it.
	Foundation will withstand the effects of frost heave	Drawings listed above under References; 24590-WTP-DC-ST-01-001, Rev. 13, Structural Design Criteria.	The Structural Design Criteria includes adequate provisions to preclude frost heave in the section addressing lateral earth pressure loads. All structural foundations are required to extend into the soil below the frost line to preclude frost heave. The frost line depth is 30 in. below the finished grade. The structural drawings show that Rooms A-B003 and A-B004 are located inside the LAB building at approximately (-) 18'-7" and (-) 19'-2" slab elevation, respectively. Therefore, the foundation slabs will not be subject to frost heave effects.

	Information Assessed	Source of Information	Assessment
Seismic	Seismic considerations have been adequately addressed.	24590-WTP-PER-CSA-02-001, Rev. 10, Secondary Containment Design; 24590-WTP-DC-ST-01-001, Rev. 13, Structural Design Criteria; 24590-LAB-3YD-RLD-00001, Rev. 4, System Description for Radiological Liquid Waste Disposal System for the Analytical Laboratory; ACI 318-99, Building Code Requirements for Structural Concrete and Commentary; UBC 1997, Uniform Building Code; AISC M016-89, Manual of Steel Construction - Allowable Stress Design, Ninth Edition; 24590-LAB-DGC-S13T-00001, Rev. 0, C2 Vault & C3 Cell Concrete Reinforcement Design; 24590-LAB-DGC-S13T-00003, Rev. 0, C5 Cell Concrete Reinforcement Design.	The Secondary Containment Design document describes and provides references for the design methodology, materials, loads, and load combinations (including seismic loads) for the LAB facility secondary containment components. The System Description document shows the cells in this integrity assessment to be Seismic Category-III (SC-III) components. The Structural Design Criteria document provides detailed discipline specific codes and standards for the design of SC-III LAB secondary containment foundations, structures, and liners by the design engineers. Design loads and analysis methods for SC-III secondary containments and liners are taken from the Uniform Building Code. The ACI 318-99 code provides the design requirements and load combinations for the design of the secondary containment reinforced concrete foundations and structures. The AISC M016-89 code is used for the design of SC-III secondary containment stainless steel liners and building structural steel. The above listed codes, standards, and documents adequately address the applicable seismic requirement, which are appropriately considered in the Concrete Reinforcement Design calculations.

	Information Assessed	Source of Information	Assessment
Compatibility	The stored waste is compatible with its Secondary Containment and leak detection hardware based on a detailed chemical and physical analysis of the wastes used and other information sources.	Drawings listed above under References; 24590-WTP-DB-ENG-01-001, Rev. 1Q, Basis of Design; 24590-WTP-PER-M-02-001, Rev. 3, Material Selections for Building Secondary Containment/Leak Detection; 24590-WTP-PER-CSA-02-001, Rev. 10, Secondary Containment Design; 24590-WTP-PER-J-02-002, Rev. 4, Leak Detection in Secondary Containment Systems.	The Basis of Design document states that cells are to be appropriately lined and any leaks or spills will be removed within 24 hours of a leak detection or in as timely a manner as possible. Based on a detailed chemical and physical analysis of the wastes and other process information sources, the Material Selections report identifies appropriate corrosion resistant materials for Secondary Containment liners, special protective coatings, and leak detection hardware. The Secondary Containment Design document provides adequate typical construction details for liners including tank anchorage details, special protective coatings, sumps, and leak detection equipment to be used for Secondary Containment structures. Typical details are furnished for leak detection/sump level measurement systems equipment in the Leak Detection in Secondary Containment Systems document. The above mentioned documents provide adequate information that the materials and hardware used are compatible with the waste and the design drawings show the appropriate required installation details.

	Information Assessed	Source of Information	Assessment
Strength	The design shows that the Secondary Containment has sufficient strength and thickness to prevent failure owing to pressure gradients, static head during a release, physical contact with the waste, climatic conditions, and the stress of daily operations (e.g., vehicular traffic).	Drawings listed above under References; 24590-WTP-DC-ST-01-001, Rev. 13, Structural Design Criteria; 24590-WTP-DB-ENG-01-001, Rev. 1Q, Basis of Design; 24590-WTP-PER-CSA-02-001, Rev. 10, Secondary Containment Design; 24590-LAB-DGC-S13T-00001, Rev. 0, C2 Vault & C3 Cell Concrete Reinforcement Design; 24590-LAB-DGC-S13T-00003, Rev. 0, C5 Cell Concrete Reinforcement Design.	The Structural Design Criteria document identifies adequate and appropriate design codes and standards and all applicable load cases from site specific conditions that must be considered in the design. Pressure gradients, static head during a release, physical contact with the waste, climatic conditions, and the stresses of daily operations are adequately stated as design goals in the Basis of Design document. The Secondary Containment Design document describes and provides references for the design methodology, materials, loads, and load combinations (including seismic loads) for the LAB facility secondary containment components. The secondary containments being considered are located in the below ground level cells inside the LAB facility; therefore, they are not subject to vehicular traffic. Applicable pressure gradient due to soil load is considered in the design calculations. The Concrete Reinforcement Design calculations and drawings show that the foundation slabs and walls are adequately designed to sustain the applicable loads imposed by the RLD-VSL-00164/00165 vessels at the interface of vessel bottom and top of concrete floor and that of the soil around the cells.

	Information Assessed	Source of Information	Assessment
Strength (cont'd)	The Secondary Containment system has sufficient strength in the presence of operational stresses from site-specific conditions (i.e., traffic, heavy equipment, precipitation, frost).	Drawings listed above under References; 24590-WTP-PER-CSA-02-001, Rev. 10, Secondary Containment Design; 24590-WTP-3PS-NLLR-T0002, Rev. 1, Engineering Specification for Furnishing, Detailing, Fabrication, Delivery and Installation of Stainless Steel Liner Plates; 24590-WTP-PER-M-02-001, Rev. 3, Material Selections for Building Secondary Containment/Leak Detection; 24590-LAB-DGC-S13T-00001, Rev. 0, C2 Vault & C3 Cell Concrete Reinforcement Design; 24590-LAB-DGC-S13T-00003, Rev. 0, C5 Cell Concrete Reinforcement Design.	The LAB drawings show that the Secondary Containment structures being considered are installed below grade inside the building. Because they are located inside the building, traffic, heavy equipment, precipitation and frost are not applicable load cases. The Secondary Containment Design document identifies the applicable load cases (operational stresses) from site specific conditions that must be considered in the design. The Engineering Specification for Furnishing Stainless Steel Liner Plates includes specific provisions for protection of and repair of completed liners during the construction process. The Material Selections for Building Secondary Containment report addresses the potential effects of operations conditions on liner special protective coating integrity and the associated maintenance requirements. The Concrete Reinforcing Design calculations and drawings show that the secondary containment structure has sufficient strength to sustain loads from applicable operational loads.

	Information Assessed	Source of Information	Assessment
Foundation Integrity	The Secondary Containment is properly supported by a foundation or base in order to prevent failure from settlement, compression, or uplift, including the residual effects of installation.	Drawings listed above under References; 24590-WTP-DC-ST-01-001, Rev. 13, Structural Design Criteria; 24590-WTP-PER-CSA-02-001, Rev. 10, Secondary Containment Design. 24590-LAB-DGC-S13T-00001, Rev. 0, C2 Vault & C3 Cell Concrete Reinforcement Design; 24590-LAB-DGC-S13T-00003, Rev. 0, C5 Cell Concrete Reinforcement Design; 24590-LAB-DDC-S13T-00001, Rev. 0, C5 Vessel Anchorage-Hot Cell Drain Collection; 24590-LAB-DDC-S13T-00003, Rev. 0, C3 Vessel Anchorage-LAB Area Sink Drain Collection; 24590-LAB-DDC-S13T-00014, Rev. 0, Anchor Bolts Design for C2, C3, and C5 Vessels.	Settlement, compression, or uplift including the residual effects of installation, are addressed in the Secondary Containment Design document and the Structural Design Criteria. The design requirements and codes and standards specified are adequate to satisfy these performance goals. The design and construction specifications adequately provide for proper foundation construction and installation of the Secondary Containment. The LAB general arrangement drawings provide an adequate description of the Secondary Containment being considered. Review of the Concrete Reinforcement Design and Vessel Anchorage design calculations and drawings shows that the design process appropriately considered all applicable load factors for the foundation design to prevent its failure.

	Information Assessed	Source of Information	Assessment
Foundation Integrity (cont'd)	The placement, structural support, and type of material used for backfill around and below the Secondary Containment are appropriate.	Drawings listed above under References; 24590-BOF-3PS-CE01-T0001, Rev. 6, Engineering Specification for Excavation and Backfill; 24590-BOF-3PS-C000-T0001, Rev. 6, Engineering Specification for Material Testing Services. 24590-WTP-PER-CON-02-001, Rev. 6, Installation of Tank Systems and Miscellaneous Unit Systems.	The drawings and Specification for Excavation and Backfill provide specific materials to be used under and around the secondary containment foundations and contain placing and backfilling requirements. The Material Testing specifications contain current adequate industry standards for selecting and testing fill materials, and testing not less than once per each lift to ensure adequate compaction. Requirements for testing and record keeping are current and adequate for the backfill around and below the secondary containment. Furthermore, the certification of construction (installation) by an independent inspector as required by the Installation of Tank System document will ensure that all vessel system units including Secondary Containment structural support and backfill placement comply with the applicable documents.
Infiltration	The design or operation (e.g., diking & curbing) prevents run-on or infiltration of precipitation into the Secondary Containment system unless the collection system has sufficient excess capacity (25 yr rainfall) to contain the run-on precipitation.	Drawings listed above under References; 24590-WTP-DB-ENG-01-001, Rev. 1Q Basis of Design.	The Basis of Design document requires that secondary containment structures shall be capable to contain 100% liquid volume of the largest tank in the group of tanks plus the run-on or infiltration of precipitation from a 25-year, 24-hour rainfall event. The secondary containment cells housing the tanks are located inside the LAB where they are protected from direct run-on or infiltration of precipitation by the building structure as shown in the general arrangement drawings; therefore, they will not be subject to run-on or infiltration of precipitation effects.

	Information Assessed	Source of Information	Assessment
Infiltration (cont'd)	The design includes an external moisture barrier or other means to prevent moisture from entering the cell.	Drawings listed above under References; 24590-WTP-DB-ENG-01-001, Rev. 1Q, Basis of Design.	The Basis of Design document requires the design include provisions to prevent external moisture intrusion. The Secondary Containments shown in the general arrangement drawings are inside the LAB building which shields them from precipitation and surface water percolation. As noted in the Basis of Design document, the ground water table is located about 250 feet below the floors of the cells; therefore, ground water infiltration is precluded. However, as a good engineering practice, the drawings show that the Secondary Containment structures have the bituminous damp-proofing material applied to the external faces of their concrete walls.
Liner System	The containment area is free of cracks or gaps and the design discusses methods of their minimization.	Drawings listed above under References; 24590-WTP-PER-CSA-02-001, Rev. 10, Secondary Containment Design; 24590-WTP-3PS-NLLR-T0002, Rev. 1, Engineering Specification for Furnishing, Detailing, Fabrication, Delivery and Installation of Stainless Steel Liner Plates.	The Secondary Containment Design document provides current adequate design requirements and codes and standards to design leak tight stainless steel liners. This document includes appropriate details for installation of stainless steel liners free of cracks and gaps. The procurement specification for Furnishing, Detailing, Fabrication, Delivery and Installation of Stainless Steel Liner Plates provides adequate requirements and standards for furnishing stainless steel liners free of cracks and gaps. The design drawings show the appropriate required installation details.

	Information Assessed	Source of Information	Assessment
Liner System (cont'd)	The design has considered the compatibility of the concrete liner or coatings and waste and presents information on coatings planning to be used from the manufacturer addressing compatibility with the stored waste. The lining or coating must prevent the waste from migrating into the concrete.	Drawings listed above under References; 24590-WTP-PER-M-02-001, Rev. 3, Material Selections for Building Secondary Containment/Leak Detection; 24590-WTP-PER-CSA-02-001, Rev. 10, Secondary Containment Design.	The Material Selections document contains general information on the compatibility of planned Secondary Containment stainless steel liners and special protective coatings with the waste. These linings and special protective coatings prevent the waste from migrating into the concrete. The Secondary Containment Design document provides standard installation details for liners and special protective coatings that will ensure leak-tight liners that prevent the migration of the waste into the concrete. The design drawings show the appropriate required installation details.

Quarter Ending 09/30/2012 24590-LAB-PCN-ENV-12-002

Hanford Facility RCRA Permit Modification Notification Form
Part III, Operating Unit 10
Waste Treatment and Immobilization Plant

Index

Page 2 of 3: Hanford Facility RCRA Permit, Part III, Operating Unit 10, Waste Treatment and Immobilization Plant
Update General Arrangement (GA) drawings for the LAB in Appendix 11.4 of the Dangerous Waste Permit (DWP).

Submitted by Co-Operator:

D. M. Busche — 7/25/2012 Date

Grant W. Ryan for

Reviewed by ORP Program Office:

D. L. Noyes — 8/16/12 Date

Quarter Ending 09/30/2012

24590-LAB-PCN-ENV-12-002

Hanford Facility RCRA Permit Modification Notification Form	
Unit: **Waste Treatment and Immobilization Plant**	Permit Part: **Part III, Operating Unit 10**

Description of Modification:

The purpose of this Class 1 modification is to update the following GA drawings for the LAB in Appendix 11.4 of the DWP.

Appendix 11.4			
Replace:	24590-LAB-P1-60-P0007, Rev. 2	With:	24590-LAB-P1-60-00007, Rev. 3
	24590-LAB-P1-60-P0008, Rev. 2		24590-LAB-P1-60-00008, Rev. 3

This modification requests Ecology approval and incorporation into the permit the specific changes to the GA drawings that are indicated by revision notes, clouds, and triangles. The drawings include changes provided in applicable document change forms (e.g., DCN, SCN, SDDR, FCN, FCR, etc.) that were submitted to Ecology in accordance with Condition III.10.C.9.h. In addition, these drawings include changes associated with the resolution to comments on change documents since the issuance of the last revision of the permitted documents.

Significant changes to the GA drawings are summarized below:

- Revised notes and holds
- Updated radiation and contamination classifications of rooms to current standards
- Revised cover plate material call-outs for pump pits and valve pit shown on drawing 24590-LAB-P1-60-00007, Rev. 3
- Relocated, added, deleted, and relabeled equipment (e.g., transformer pad, pumps, pump skids, samplers, HEPA filters, control panels) to align with current design
- Revised room layouts and removed minor equipment tags
- Removed Quality Designation "Q" from the title block; a quality level designation is not specific to individual equipment on the drawings
- Incorporated changes from change documentation identified in the Notes section on each drawing

This modification requests Ecology approval and incorporation of the following list of outstanding change documents into the permit. Although not yet incorporated into the revised documents attached to this PCN, this list of outstanding DCNs are intended to be incorporated into this modification.

None

In accordance with Permit Condition III.10.C.2.e, this permit modification may include page changes to the Permit, attachments, and permit application supporting documentation. Necessary permit changes are attached to this PCN. Ecology is requested to incorporate changes in the next revision of the WTP DWP.

See attached pages.

Quarter Ending 09/30/2012

24590-LAB-PCN-ENV-12-002

WAC 173-303-830 Modification Class:	Class 1	Class [1]1	Class 2	Class 3
Please mark the Modification Class:	X			

Enter relevant WAC 173-303-830, Appendix I Modification citation number: A.1 and A.3

Enter wording of WAC 173-303-830, Appendix I Modification citation:

A.1. Administrative and informational changes

A.3. Equipment replacement or upgrading with functionally equivalent components (e.g., pipes, valves, pumps, conveyors, controls)

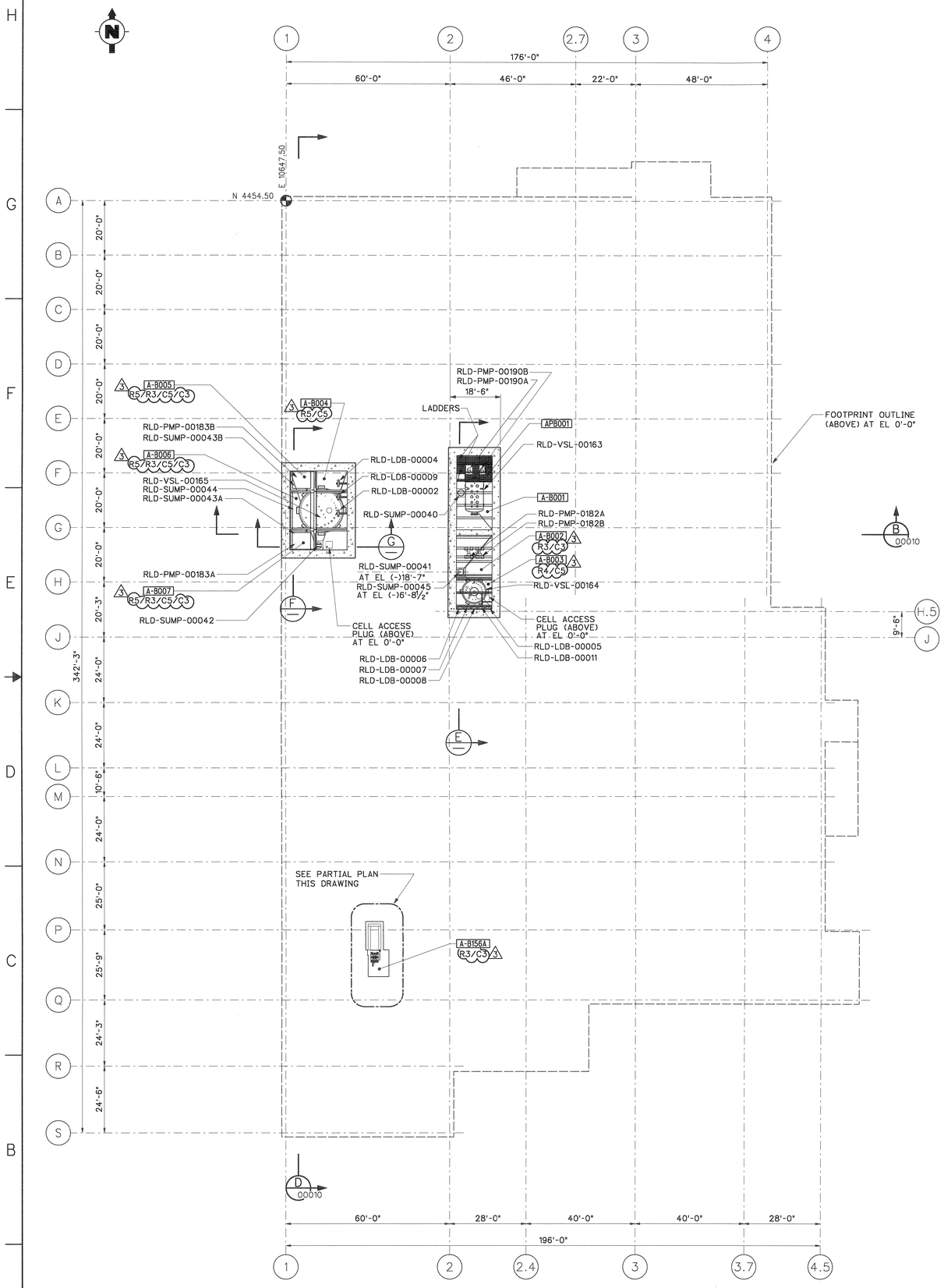
Modification Approved/Concur: ☑ Yes ☐ Denied (state reason below)

Reason for denial:

Reviewed by Ecology:

S. Dahl 9/6/12

Date



PLAN AT EL (-)19'-2"
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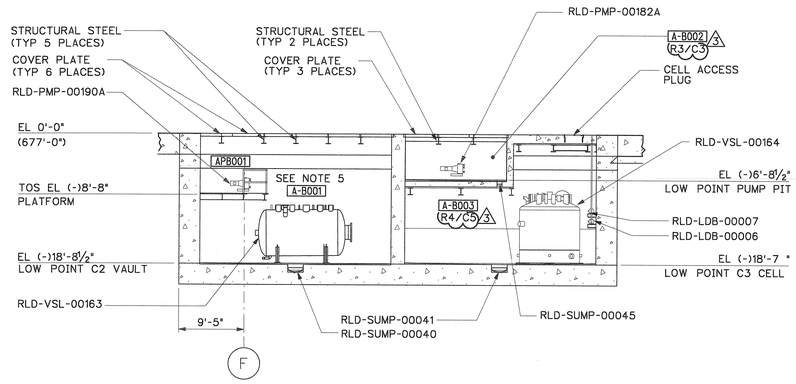

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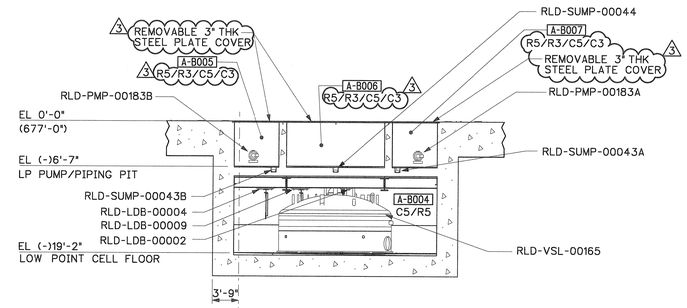

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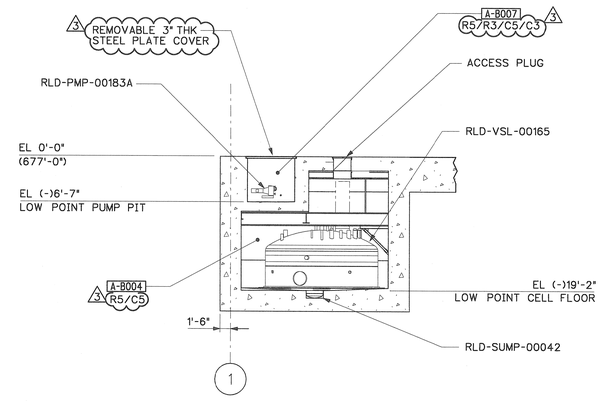

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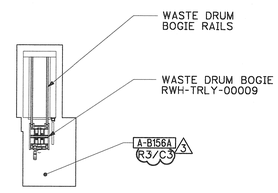
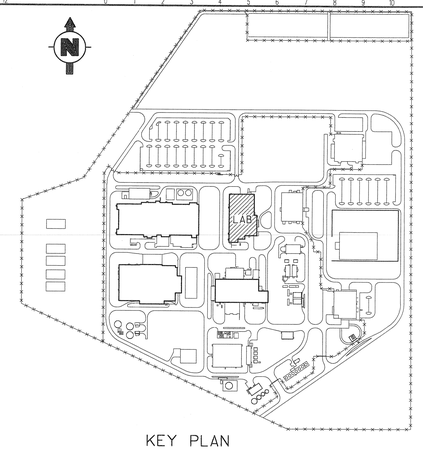


PARTIAL PLAN AT EL (-)2'-6"
BAGLESS WASTE TRANSFER PIT
SCALE: 1/8" = 1'-0"



KEY PLAN

LEGEND:

CA	CONTROLLED ACCESS		
FD	FIRE DOOR	EE	EMERGENCY EXIT
A-XXXX	ROOMS, CELLS, CAVES (VAULTS) AND TUNNELS		
ACXXXX	CORRIDORS & CONNECTING VESTIBULES		
ACHXX	CHASES	APXXXX	PLATFORMS
	SUMP IN LINED AREAS		SUMP IN NON-LINED AREAS
			GRATING
	CONCRETE		CONSTRUCTION ACCESS
	EQUIPMENT REMOVAL/PULL SPACE OR LAYDOWN AREA		

NOTES:

1. REFER TO DRAWING 24590-LAB-P1-60-00010 SECTION "A" FOR CONVERSIONS FROM LAB FACILITY ELEV's TO SITE ELEV's (LAB FACILITY ELEV 0'-0" = SITE ELEV 677'-0" MSL).
2. FOR SITE REF SEE PLOT PLAN DRAWING 24590-BOF-P1-50-00001.
3. COVER PLATES FOR ROOM ID's A-B001, A-B002, A-B005, A-B006, A-B007 AND CONCRETE ABOVE ROOM ID's A-B003, A-B004 ARE NOT SHOWN FOR CLARITY ON THE PLAN VIEW.
4. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
5. ALL OPERATING AREAS ARE DESIGNATED R2/C2 UNLESS NOTED OTHERWISE.
6. SEE REVISION 1 OF DRAWING FOR HISTORY. 3
7. FOR ROOM NUMBERS AND DESCRIPTION, SEE DRAWINGS 24590-LAB-A5-A19T-05200001, 24590-LAB-A5-A19T-05200002.
8. SEE REVISION 2 OF DRAWING FOR HISTORY. 3
9. SEE REVISION 2 OF DRAWING FOR HISTORY.
10. INCORPORATED: 24590-LAB-P1N-60-00008
    24590-LAB-P1N-60-00013
    24590-LAB-P1N-60-00016
    24590-LAB-P1N-60-00021
    ADDED NOTES 10, 11 AND 12. REVISED NOTES 6, 8 AND 9.
    UPDATED RADIATION/CONTAMINATION CLASSIFICATION TO CURRENT STANDARDS.
    REMOVED QUALITY DESIGNATION. UPDATE ADR REVISION.
11. FLOOR/LINER SLOPE IS REQUIRED IN ROOMS A-B001, A-B002, A-B003, A-B004, A-B005, A-B006 AND A-B007 WITH SUMPS. SLOPE IS A MINIMUM OF 1% TOWARD THE SUMP.
12. ROOMS ARE OFFICIALLY IDENTIFIED BY ROOM NUMBERS ONLY. ROOM NUMBERS ARE ESTABLISHED AND CONTROLLED ON GENERAL ARRANGEMENT DRAWINGS. ONLY ROOM NUMBERS ARE NEEDED TO IDENTIFY ROOMS ON ENGINEERING DISCIPLINE DOCUMENTS. WHILE ROOM NUMBERS ARE CONTROLLED, THE MOST COMMON NAME OF ROOMS ASSOCIATED WITH EACH ROOM NUMBER IS SHOWN FOR REFERENCE ONLY ON ARCHITECTURAL FLOOR PLANS.

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 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.

ISSUED BY
RPP-WTP PDC

REFERENCE DRAWINGS

DWG NO	TITLE
24590-BOF-P1-50-00001	RPP - WTP PLOT PLAN
24590-LAB-P1-60-00008	ANALYTICAL LABORATORY GENERAL ARRANGEMENT PLAN AT EL 0'-0"
24590-LAB-P1-60-00010	ANALYTICAL LABORATORY GENERAL ARRANGEMENT SECTIONS A-A, B-B, C-C & D-D
24590-LAB-A5-A19T-05200001	ANALYTICAL LABORATORY ARCHITECTURAL ROOM FINISH SCHEDULE
24590-LAB-A5-A19T-05200002	ANALYTICAL LABORATORY ARCHITECTURAL ROOM FINISH SCHEDULE

REVISION HISTORY

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
3	REVISE DRAWING - SEE NOTE 10	RW	CWS	JK	MP	4/25/12
2	REVISE DRAWING - SEE NOTES 8 & 9	KCK	RWM	MK	KW	7/29/04
1	REVISE DRAWING - SEE NOTE 6	KAC	RLH	WTM	KW	10/28/03
0	ISSUE FOR DESIGN	DKD	RLH	WTM	KW	02/13/03

ISSUE STAMP

PROJECT No.	24590	
SITE	HANFORD	
AREA	200E	
BUILDING No.	60	
	BY	DATE
ORIGINATOR	DK DIXON	02/13/03
CHECKER	WT MYE	02/13/03
APPROVER	WT MYERS	02/13/03
REVIEWER	K WALVEKAR	02/13/03

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. 24590-LAB-ADR-PL-02-001 REV: 4
SAFETY SCREEN REQUIRED? [X] YES [ ] NO E&NS INITIAL IF YES

BECHTEL

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

ANALYTICAL LABORATORY GENERAL ARRANGEMENT PLAN AT EL (-)19'-2" SECTIONS E-E, F-F & G-G

SCALE: AS NOTED

24590-LAB-P1-60-00007 REV 3

SAFETY SCREEN IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SRED-002

'E' SIZE - 44x34
COMPUTER GENERATED - MANUAL CHANGES NOT PERMITTED

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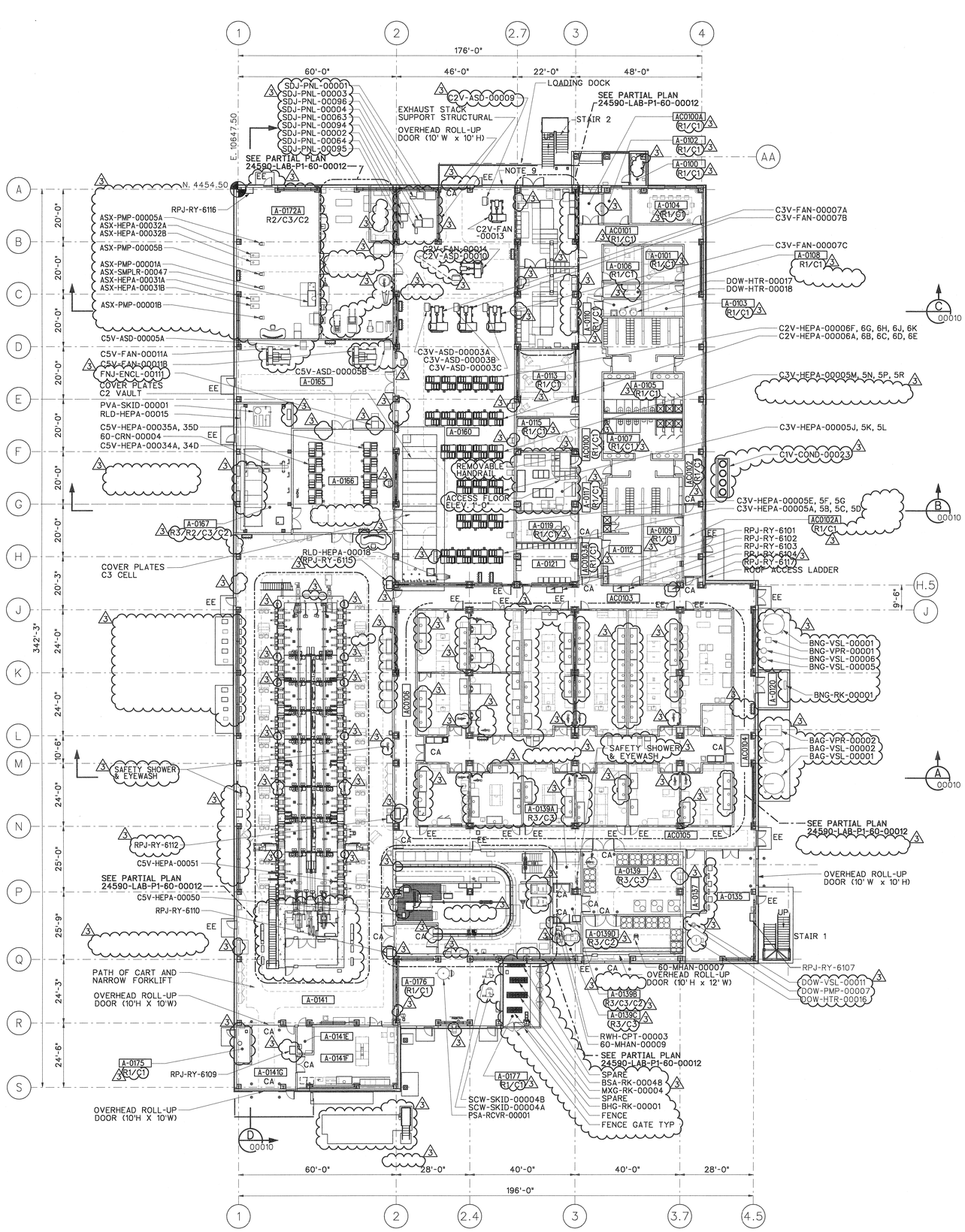
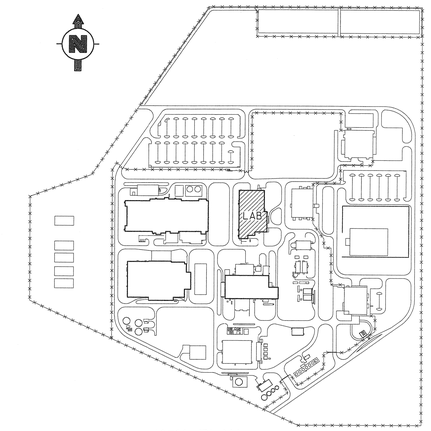
FORM E_SON.DGN 02/2003

24590LABP160000007.DGN 4/25/2012 7:43:16 AM



PLAN AT EL 0'-0"



KEY PLAN

NOTES:

1. REFER TO DRAWING 24590-LAB-P1-60-00010 SECTION "A" FOR CONVERSIONS FROM LAB FACILITY ELEVATIONS TO SITE ELEVATIONS. (LAB FACILITY ELEVATION 0'-0" = SITE ELEVATION 677'-0" MSL).
2. FOR SITE REFERENCE SEE PLOT PLAN DRAWING 24590-BOF-P1-50-00001.
3. FOR LEGEND SEE DRAWING 24590-LAB-P1-60-00007
4. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
5. ALL OPERATING AREAS ARE DESIGNATED R2/C2 UNLESS NOTED OTHERWISE.
6. FOR ROOM NUMBERS AND DESCRIPTION, SEE DRAWINGS 24590-LAB-A5-A19T-05200001, 24590-LAB-A5-A19T-05200002.
7. SEE REVISION 1 OF DRAWING FOR HISTORY.
8. RADIATION LEVEL FOR ROOM A-0167 IS R2 BUT AREA OVER THE C5 CELL PUMP PITS, PIPING & VALVE PIT COVER IS R3.
9. SEE REVISION 2 OF DRAWING FOR HISTORY.
10. INCORPORATED: 24590-LAB-P1N-60-00009, 24590-LAB-P1N-60-00011, 24590-LAB-P1N-60-00012, 24590-LAB-P1N-60-00013, 24590-LAB-P1N-60-00017, 24590-LAB-P1N-60-00023, 24590-LAB-P1N-60-00024, 24590-LAB-P1N-60-00025, 24590-LAB-P1N-60-00012, 24590-WTP-FC-C-11-0781, 24590-WTP-FC-E-11-0360, 24590-WTP-FC-P-08-0393, 24590-WTP-FC-M-09-0118, 24590-LAB-A1N-A10T-00003, 24590-LAB-A1N-A10T-00009

    ADDED THE FOLLOWING EQUIPMENT/LABELS:
    BNG-RK-00001 — RPJ-RY-6110,16,17
    C1V-COND-00023 — SDJ-PNL-00063,64,94,95,96; FNJ-ENCL-00111

    REVISED THE FOLLOWING EQUIPMENT/LABELS:
    60-MHAN-00009 — MXG-RK-00004
    BSA-RK-00048 — RPJ-RY-6105,06,09,15
    BHG-RK-00001 — RWH-CPT-00003
    C5V-ASD-00005A,B — SDJ-PNL-00001,02,03,04
    C5V-FAN-00011A,B

    DELETED THE FOLLOWING EQUIPMENT/LABELS:
    60-TRLY-0001 — DIW-WHA-00001
    C1V-FAN-00057,58,59 — DOW-SHR-00081,82,84,85
    C1V-HU-00050 — RPJ-RY-6112
    C3V-ENC-00016
    CV5-ENCL-00026,30

    REMOVED MINOR EQUIPMENT TAGS FROM GENERAL ARRANGEMENT.

    ADDED/REVISED/DELETED MINOR EQUIPMENT.

    REPLACED BAG-SKID-00001, BNG-SKID-00001 AND BNG-SKID-00002 WITH BAG-VSL-00001, BAG-VSL-00002, BAG-VPR-00002, BNG-VSL-00001, BNG-VSL-00005, BNG-VSL-00006 AND BNG-VPR-00001.

    SWITCH TAGS FOR C5V-ASD-00009,10.

    REPLACED DOW-SKID-00005 WITH DOW-HTR-00016, DOW-PMP-00007 AND DOW-VSL-00011.

    RELABELED EQUIPMENT IN A-0177 AND RELOCATED FENCE.

    REMOVED QUALITY DESIGNATION. REVISED ADR REVISION.

    UPDATED RADIATION/CONTAMINATION CLASSIFICATION TO COMPLY WITH CURRENT STANDARDS.

    REVISED NOTES 5, 7, 9 AND 10. ADDED NOTES 11 THRU 14.
11. ROOMS A-0141C (MSM MAINTENANCE SHOP) AND A-0141D (SPARE MSM ROOM) ARE TO BE OPERATED AND MAINTAINED AT AN R2/C3 LEVEL DURING NORMAL PLANT OPERATIONS. LOCAL CONTAMINATION LEVELS MAY INCREASE DURING MSM MAINTENANCE. LOCAL DECONTAMINATION AND SURVEY OPERATIONS WILL ENSURE AREA IS RETURNED TO R2 LEVELS AT COMPLETION OF MAINTENANCE ACTIVITIES.
12. ONLY MAJOR EQUIPMENT ITEMS ARE IDENTIFIED. REFER TO 24590-LAB-P1-P23T-00101 THRU 24590-LAB-P1-P23T-00108 FOR ALL EQUIPMENT IDENTIFICATIONS.
13. ROOMS ARE OFFICIALLY IDENTIFIED BY ROOM NUMBERS ONLY. ROOM NUMBERS ARE ESTABLISHED AND CONTROLLED ON GENERAL ARRANGEMENT DRAWINGS. ONLY ROOM NUMBERS ARE NEEDED TO IDENTIFY ROOMS ON ENGINEERING DISCIPLINE DOCUMENTS. WHILE ROOM NUMBERS ARE CONTROLLED, THE MOST COMMON NAME OF ROOMS ASSOCIATED WITH EACH ROOM NUMBER IS SHOWN FOR REFERENCE ONLY ON ARCHITECTURAL FLOOR PLANS.
14. ROOM TAGS: A-0172, A-0172B & AC107 AND A-0141B REMOVED FROM THIS DRAWING.

REFERENCE DRAWINGS

DWG NO	TITLE
24590-BOF-P1-50-00001	RPP - WTP PLOT PLAN
24590-LAB-P1-60-00007	ANALYTICAL LABORATORY GENERAL ARRANGEMENT PLAN AT EL. (-)19'-2" SECTIONS E-E, F-F, G-G
24590-LAB-P1-60-00009	ANALYTICAL LABORATORY GENERAL ARRANGEMENT PLAN AT EL. 17'-0"
24590-LAB-P1-60-00010	ANALYTICAL LABORATORY GENERAL ARRANGEMENT SECTIONS A-A, B-B, C-C & D-D
24590-LAB-P1-60-00011	ANALYTICAL LABORATORY GENERAL ARRANGEMENT PLAN AT ROOF
24590-LAB-P1-60-00012	ANALYTICAL LABORATORY GENERAL ARRANGEMENT PARTIAL PLANS AT EL. 0'-0"
24590-LAB-A5-A19T-05200001	ANALYTICAL LABORATORY ARCHITECTURAL ROOM FINISH SCHEDULE
24590-LAB-A5-A19T-05200002	ANALYTICAL LABORATORY ARCHITECTURAL ROOM FINISH SCHEDULE

ISSUED BY RPP-WTP PDC

REVISION HISTORY

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
3	REVISE DRAWING - SEE NOTE 10	RW	CWS	JP	MP	4/25/12
2	REVISE DRAWING - SEE NOTES 9 & 10	RWM	KAC	PR	KRW	1/5/05
1	REVISE DRAWING - SEE NOTES 7 & 8	RWM	KCK	WTM	KRW	7/29/04
0	ISSUE FOR DESIGN	KAC	RLH	WTM	KRW	10-28-03

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 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.

ISSUE STAMP		
PROJECT No.	24590	
SITE	HANFORD	
AREA	200E	
BUILDING No.	200A	
	BY	DATE
ORIGINATOR	KA CRISPIN	10/27/03
CHECKER	RL HENDERSON	10/27/03
APPROVER	K WALVEKAR	10/28/03
REVIEWER	WT MYERS	10/27/03

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. 24590-LAB-ADR-PL-02-001 REV. 4
SAFETY SCREEN REQUIRED? [X] YES [ ] NO EMS INITIAL IF YES

BECHTEL

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

ANALYTICAL LABORATORY GENERAL ARRANGEMENT PLAN AT EL 0'-0"

SCALE: 1/16"=1'-0"

24590-LAB-P1-60-00008 REV 3

SAFETY SCREEN IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREG-002

"E" SIZE - 44x34
COMPUTER GENERATED - MANUAL CHANGES NOT PERMITTED

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sample will be surveyed for final Radiological release, shipping papers including Chain of Custody will be verified for completion, and transfer with the shipment package.

The Laboratory design will be validated with information from tank utilization modeling of the process tanks and operational research modeling of the treatment process, as appropriate. General arrangement drawings 24590-LAB-P1-60-~~P~~00007 and ~~P~~00008 in Appendix 11.4 DWP Operating Group 10 provides a general layout of the 0'-0" and -19'-2" elevations of the WTP analytical laboratory where analytical, maintenance, administrative, and waste management activities take place. The following attributes are outlined in the facility design figures described above:

- Workstations have been defined as required by the sampling and analysis plan for WTP process control and waste form qualification
- Capability to provide limited process technology will be provided
- Contamination controls have been incorporated for reliability of laboratory service to the WTP processes
- Management of samples for off-site analysis by an outsource laboratory including feed receipt samples.

Drawings and other documents, found in DWP Operating Group10, Appendix 11.0 provide additional detail for the analytical laboratory:

- General arrangement drawings showing locations tank systems, secondary waste management and analytical laboratory activities
- Process flow diagrams for process information
- P&IDs, Mechanical Drawings, Typical system figures depicting the analytical laboratory tank system and ancillary equipment.

The WTP analytical laboratory contains both high-activity and low-activity laboratories. High-activity samples will be managed in the analytical hotcell laboratory (AHL). Low-activity samples will be managed and analyzed in the analytical radiological laboratory (ARL) also known as the Rad Labs. The ARL also includes a sample receiving/shipping area designed to manage the inflow of manually transported samples. The facility is also being designed to coordinate the management of samples that will be outsourced and analyzed at offsite laboratories. Outsource laboratories will be used to analyze the majority of very low-activity samples such as water quality and air emission samples. Outsource laboratories will also be used to analyze DST system unit characterization samples. Analytical methods and equipment selected to support laboratory analyses will be in accordance with applicable requirements. A laboratory information management system (LIMS) network is provided to track and maintain an inventory of samples, reagents, and materials in the WTP Laboratory area including sample analyses and data collection. In addition, the analytical laboratory includes waste drum management, maintenance, and support areas for facility operation.

Table III.10.E.D – Analytical Laboratory Tank Systems Description

Mixed Waste Tank Systems Name	Unit Designation	Engineering Description (Drawing Nos, Specification Nos, etc.)	Narrative Description, Tables & Figures	Maximum Capacity (gallons)
		-N1D-RLD-P0002, Rev 1 -N1D-RLD-P0003, Rev 1 -P1-60-P00007, Rev ~~2~~3 -P1-60-P00008, Rev ~~2~~3 -P1-60-P0010, Rev 1 **24590-WTP** -3PS-G000-T0002, Rev 8 -3PS-MV00-T0001, Rev 4 -3PS-MV00-T0002, Rev 3 -3PS-MV00-T0003, Rev 3		

Footnotes:
[a]System Descriptions are maintained in the Administrative Record, and are listed here for information only.

1

Quarter Ending June 30, 2012 24590-LAW-PCN-ENV-11-005

Hanford Facility RCRA Permit Modification Notification Form

Part III, Operating Unit 10

Waste Treatment and Immobilization Plant

Index

Page 2 of 3: Hanford Facility RCRA Permit, Part III, Operating Unit 10, Waste Treatment and Immobilization Plant
Replace Piping and Instrumentation Diagrams (P&ID) for the LAW Melter Feed Process (LFP) System in Appendix 9.2 of the Dangerous Waste Permit (DWP).

Submitted by Co-Operator:

Donna Busche 6/1/12
D. M. Busche Date

Reviewed by ORP Program Office:

6/14/15
D. L. Noyes Date

Quarter Ending June 30, 2012

24590-LAW-PCN-ENV-11-005

Hanford Facility RCRA Permit Modification Notification Form	
Unit: **Waste Treatment and Immobilization Plant**	Permit Part: **Part III, Operating Unit 10**

Description of Modification:

The purpose of this Class 1 prime modification is to update and replace the following P&IDs for the LFP system in Appendix 9.2 of the DWP. The additional drawings are the result of converting each of the permit versions of the drawings into multiple sheets in an effort to provide clearer representation of the LFP equipment, including additional details for instrumentation and logic controls.

Appendix 9.2			
Replace:	24590-LAW-M6-LFP-P0001, Rev. 2	With:	24590-LAW-M6-LFP-00001001, Rev. 0
			24590-LAW-M6-LFP-00001002, Rev. 0
			24590-LAW-M6-LFP-00001003, Rev. 0
			24590-LAW-M6-LFP-00001004, Rev. 0
			24590-LAW-M6-LFP-00001005, Rev. 0
			24590-LAW-M6-LFP-00001006, Rev. 0
	24590-LAW-M6-LFP-P0003, Rev. 2		24590-LAW-M6-LFP-00003001, Rev. 0
			24590-LAW-M6-LFP-00003002, Rev. 0
			24590-LAW-M6-LFP-00003003, Rev. 0
			24590-LAW-M6-LFP-00003004, Rev. 0
			24590-LAW-M6-LFP-00003005, Rev. 0
			24590-LAW-M6-LFP-00003006, Rev. 0

This modification requests Ecology approval and incorporation into the permit the specific changes to the P&IDs that are indicated by revision notes and clouds. The P&IDs include changes provided in applicable document change forms (e.g., DCN, SCN, SDDR, FCN, FCR, etc.) that were submitted to Ecology in accordance with Condition III.10.C.9.h. In addition, these P&IDs include changes associated with the resolution to comments on change documents since the issuance of the last revision of the permitted documents.

Significant changes to the P&IDs are summarized below:

- Converted drawing from a single sheet to multi-sheet drawings
- Modified, deleted, and added notes, holds, and references
- Modified, identified, and added support/utility system lines, valves, in-line components, instruments, and logic controls
- Incorporated changes from change documentation identified in the Notes section on each drawing
- Added cooling jackets to LFP vessels
- Added air purge lines for hydrogen mitigation in LFP vessels
- Added pipe spools and valves to facilitate cleaning pipelines

This modification requests Ecology approval and incorporation of the following list of outstanding change documents into the permit. Although not yet incorporated into the revised documents attached to this PCN, this list of outstanding DCNs are intended to be incorporated into this modification.

For 24590-LAW-M6-LFP-00001001:

24590-WTP-FC-P-11-0280

For 24590-LAW-M6-LFP-00001004 and 24590-LAW-M6-LFP-00003004:

24590-LAW-M6N-LFP-00042

Quarter Ending June 30, 2012 24590-LAW-PCN-ENV-11-005

In accordance with Permit Condition III.10.C.2.e, this permit modification may include page changes to the Permit, attachments, and permit application supporting documentation. Necessary permit changes are attached to this PCN. Ecology is requested to approve the attached permit changes and incorporate the changes in the next revision of the WTP Dangerous Waste Permit.

See attached.

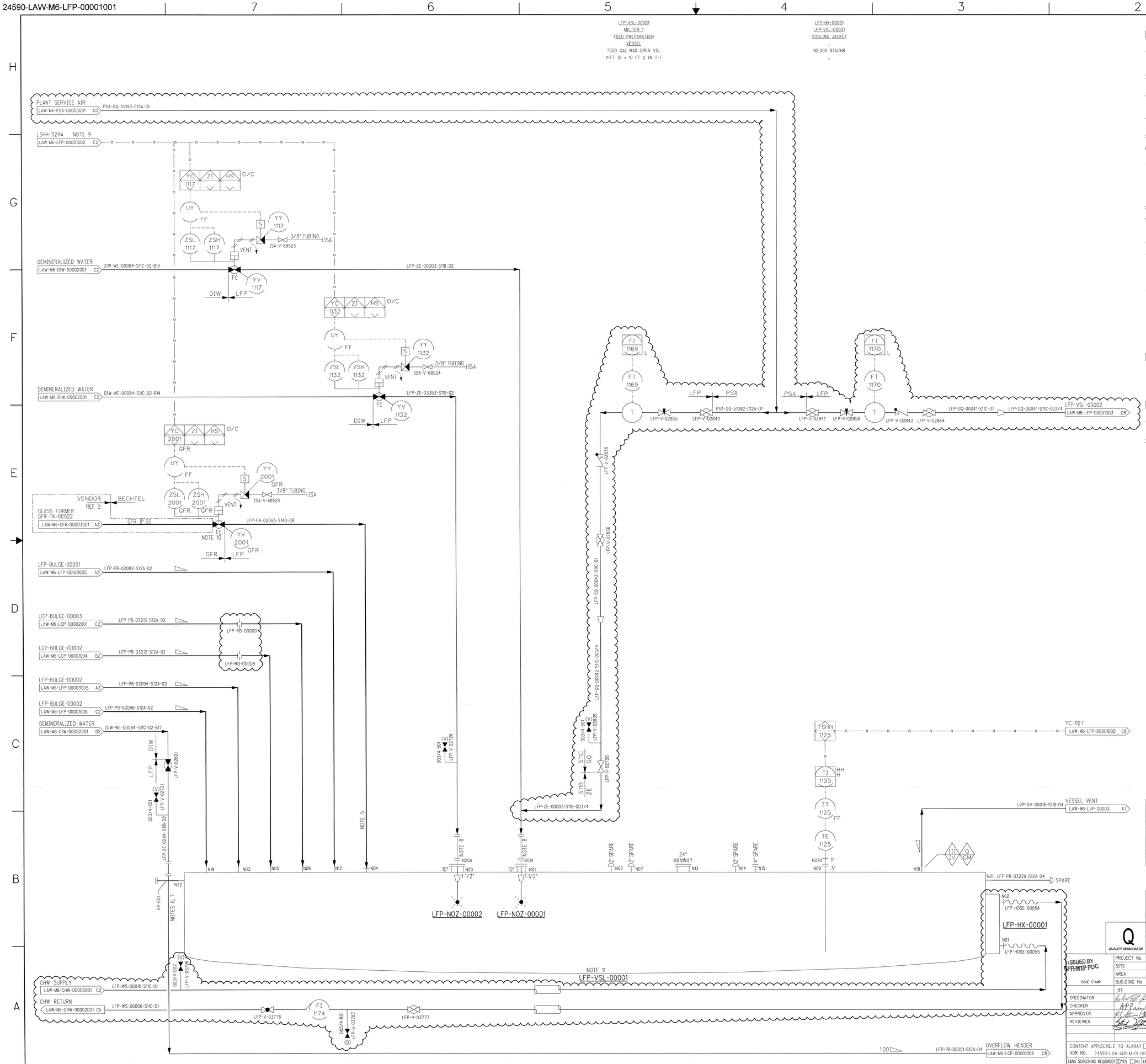
WAC 173-303-830 Modification Class:	Class 1	Class [1]1	Class 2	Class 3
Please mark the Modification Class:		X		

Enter relevant WAC 173-303-830, Appendix I Modification citation number: NA

Enter wording of WAC 173-303-830, Appendix I Modification citation:

In accordance with WAC 173-303-830(4)(d)(i), this modification notification is requested to be reviewed and approved as a Class [1]1 modification. WAC 173-303-830(4)(d)(ii)(A) states, "Class 1 modifications apply to minor changes that keep the permit current with routine changes to the facility or its operation. These changes do not substantially alter the permit conditions or reduce the capacity of the facility to protect human health or the environment. In the case of Class 1 modifications, the director may require prior approval."

Modification Approved/Concur: [X] Yes [ ] Denied (state reason below) Reason for denial:	Reviewed by Ecology: for ~~A. Carlson~~ S. Dahl	7/19/12 Date



NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
2. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
3. THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV, UNLESS OTHERWISE NOTED.
4. ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, UNLESS OTHERWISE NOTED.
5. MINIMUM ANGLE OF PIPE IS 60 DEGREES FROM HORIZONTAL.
6. A CROSS PIPE FITTING WILL BE USED. REMOVABLE SPOOL PIECE IS TO FACILITATE INSPECTION OF OVERFLOW DOWNCOMER.
7. FOR VESSEL LFP-VSL-00001, MAXIMUM HORIZONTAL DISTANCE BETWEEN DOWNCOMER PIPE AND VESSEL SHELL SHALL NOT BE MORE THAN FIVE PIPE DIAMETERS. CONNECT DEMINERALIZED WATER LINE AT THE TOP FLANGE CONNECTION OF THE CROSS FITTING. STRAIGHT VERTICAL DOWNCOMER RUN SHALL BE A MINIMUM OF SIX FEET.
8. REMOVABLE SPOOL PIECE TO FACILITATE SPRAY NOZZLE REMOVAL.
9. ICN INTERLOCK ON LFP-VSL-00001 LVL HI HI WILL CLOSE VALVES LFP-YC-1117, -1132, GFR-YC-2001, AND STOP INFLOW TO LFP-VSL-00001.
10. FULL PORT BALL VALVE REQUIRED FOR GLASS FORMERS.
11. LFP-VSL-00001 IS REQUIRED TO BE A MINIMUM OF SEISMIC CATEGORY SC-IV, HOWEVER SEISMIC CATEGORY SC-III ANCHORAGE IS REQUIRED. ANCHOR SHALL PREVENT VESSEL MOVEMENT THAT COULD DAMAGE CO-LOCATED SAFETY SIGNIFICANT COMPONENTS.
12. THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-LAW-M6-LFP-00001, REV 5. THIS DRAWING INCLUDES INFORMATION FROM 24590-LAW-M6N-20-00002, -00004, 24590-LAW-M6N-LFP-00015, -00025, -00027, -00030, -00033, AND 24590-LAW-M6LN-LFP-00001.

HOLD/OPEN ITEMS:

NONE

REFERENCES:

1. 24590-LAW-3YD-LFP-00001, SYSTEM DESCRIPTION FOR LOW ACTIVITY WASTE MELTER FEED PROCESS SYSTEM (LFP).
2. 24590-CM-POA-MH00-00001-08-00381, P&ID LAW MIXER #1 (SYSTEM 600).

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 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.

DRAWING INDEX

DWG NO	TITLE
24590-LAW-M6-LFP-00001001	LAW MELTER 1 FEED PROCESS SYSTEM LFP-VSL-00001
24590-LAW-M6-LFP-00001002	LAW MELTER 1 FEED PROCESS SYSTEM LFP-VSL-00001
24590-LAW-M6-LFP-00001003	LAW MELTER 1 FEED PROCESS SYSTEM LFP-VSL-00002
24590-LAW-M6-LFP-00001004	LAW MELTER 1 FEED PROCESS SYSTEM LFP-VSL-00002
24590-LAW-M6-LFP-00001005	LAW MELTER 1 FEED PROCESS SYSTEM LFP-BULGE-00001
24590-LAW-M6-LFP-00001006	LAW MELTER 1 FEED PROCESS SYSTEM LFP-BULGE-00001

REVISION HISTORY

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR CONSTRUCTION, SEE NOTE 12	KLK	APP	SPK	TJH	2/15/11

QUALITY DESIGNATOR: Q

ISSUED BY: WTP PDC

ISSUE STAMP

	PROJECT No.	24590
	SITE	HANFORD
	AREA	200E
	BUILDING No.	20

	BY	DATE
ORIGINATOR	[illegible]	02/08/11
CHECKER	APP	02/08/11
APPROVER	[illegible]	2/15/11
REVIEWER	[illegible]	2/14/11

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO

ADR NO. 24590-LAW-ADR-M-01-004 REV: 3

E&NS SCREENING REQUIRED? [X] YES [ ] NO | E&NS INITIAL IF YES DEE

BECHTEL

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

P&ID - LAW
LAW MELTER FEED PROCESS SYSTEM
MELTER 1 FEED PREPARATION
LFP-VSL-00001

SCALE: NONE

24590-LAW-M6-LFP-00001001

REV 0

E SIZE - 44x34
COMPUTER GENERATED - MANUAL
DESIGN CHANGES NOT PERMITTED

SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREG-002

FORM E_SDN.DGN 02/2009

PLOTTED BY: nnnmcm11 2/9/2011 10:31:03 AM

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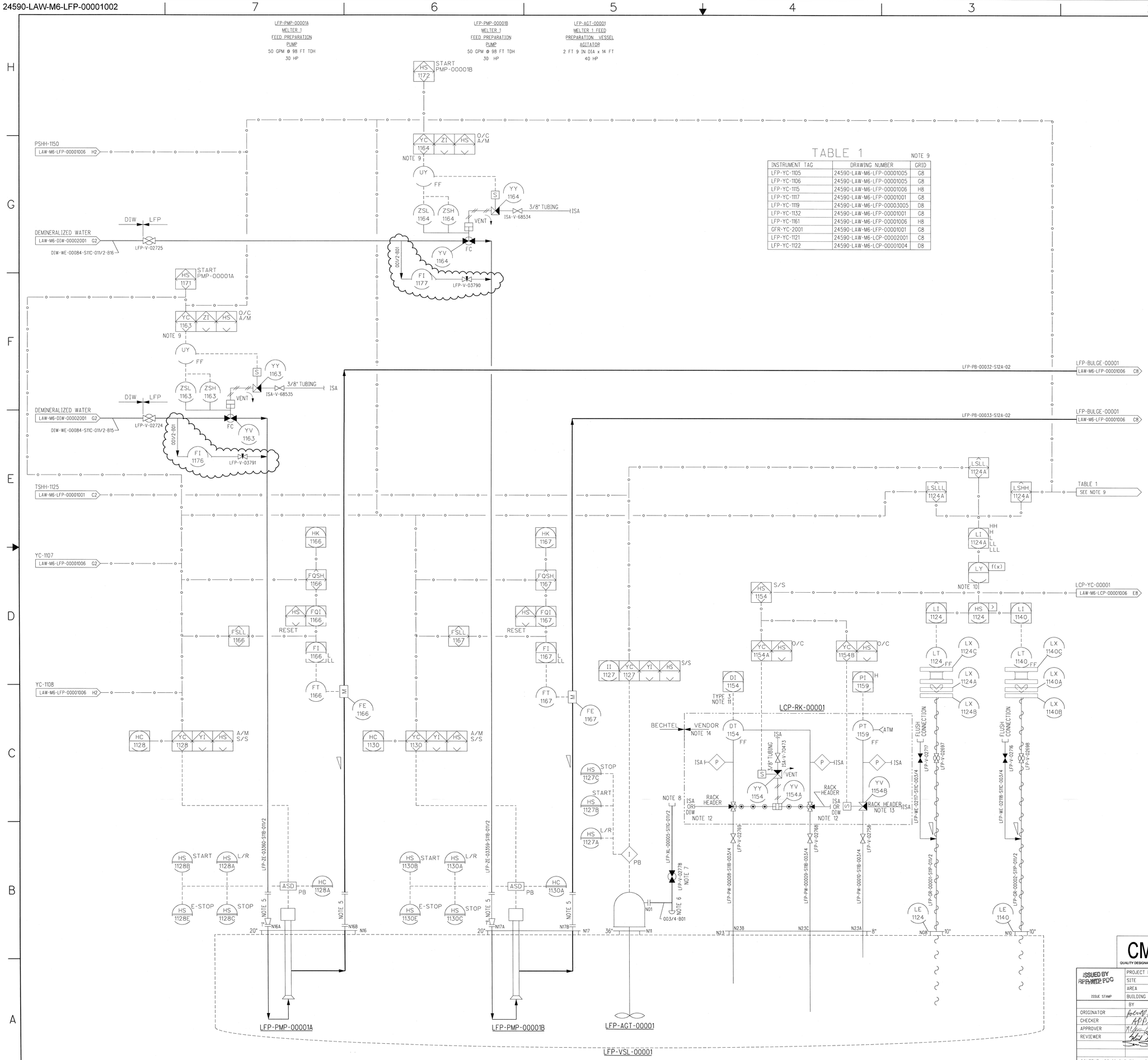

TABLE 1

NOTE 9

INSTRUMENT TAG	DRAWING NUMBER	GRID
LFP-YC-1105	24590-LAW-M6-LFP-00001005	G8
LFP-YC-1106	24590-LAW-M6-LFP-00001005	G8
LFP-YC-1115	24590-LAW-M6-LFP-00001006	H8
LFP-YC-1117	24590-LAW-M6-LFP-00001001	G8
LFP-YC-1119	24590-LAW-M6-LFP-00003005	D8
LFP-YC-1132	24590-LAW-M6-LFP-00001001	G8
LFP-YC-1161	24590-LAW-M6-LFP-00001006	H8
GFR-YC-2001	24590-LAW-M6-LFP-00001001	G8
LFP-YC-1121	24590-LAW-M6-LCP-00002001	C8
LFP-YC-1122	24590-LAW-M6-LCP-00001004	D8

NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
2. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
3. THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV, UNLESS OTHERWISE NOTED.
4. ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, UNLESS OTHERWISE NOTED.
5. REMOVABLE SPOOL TO FACILITATE PUMP REMOVAL.
6. OIL COLLECTION LEG EXTENDS MIN 3 IN BELOW DRAIN/REFILL NOZZLE.
7. LOCATE VALVE, ABOVE ELEVATION 28FT, FOR ACCESS.
8. THIS CONNECTION ALLOWS MAINTENANCE ACCESS FROM 28 FT FLOOR ELEVATION FOR AGITATOR OIL CHANGE.
9. ON HIGH HIGH LEVEL DETECTION (LFP-LSHH-1124A), VALVES LISTED IN TABLE 1 WILL CLOSE AND STOP INFLOW TO LFP-VSL-00001.
10. FUNCTION CONVERTS TANK LEVEL IN INCHES TO GALLONS.
11. DENSITY TRANSMITTER SENDS A DIFFERENTIAL PRESSURE VALUE. A CALCULATION IS USED TO DETERMINE DENSITY.
12. FOR ISA AND DIW SUPPLY, SEE 24590-LAW-M6-LCP-00001006, LCP-RK-00001 COORDINATE C6.
13. FOR ISA SUPPLY, SEE 24590-LAW-M6-LCP-00001006, LCP-RK-00001 COORDINATE D7.
14. ROUTING OF VENDOR TUBING WILL BE IDENTIFIED BY C&I PER 24590-WTP-CPG-ENG-0142.
15. THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND IN PART SUPERSEDES 24590-LAW-M6-LFP-00001, REV 5. THIS DRAWING INCLUDES INFORMATION FROM 24590-LAW-M6N-20-00001, 24590-LAW-M6N-LFP-00033, AND 24590-LAW-M6PR-LFP-00001.

HOLD/OPEN ITEMS:

NONE

REFERENCES:

1. 24590-LAW-3YD-LFP-00001, SYSTEM DESCRIPTION FOR LOW ACTIVITY WASTE MELTER FEED PROCESS SYSTEM (LFP).

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 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.

CM
QUALITY DESIGNATOR

REVISION HISTORY

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR CONSTRUCTION, SEE NOTE 15					2/15/11

ISSUED BY RPP-WTP PDC
ISSUE STAMP

PROJECT No.	24590	
SITE	HANFORD	
AREA	200E	
BUILDING No.	20	
ORIGINATOR		02/09/11
CHECKER		2/10/11
APPROVER		2/15/11
REVIEWER		2/14/11
		2/10/11

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. 24590-LAW-ADR-M-01-004 REV: 3
EMS SCREENING REQUIRED? [X] YES [ ] NO EMS INITIAL IF YES DEW

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

P&ID - LAW
LAW MELTER FEED PROCESS SYSTEM
MELTER 1 FEED PREPARATION
LFP-VSL-00001

SCALE: NONE
24590-LAW-M6-LFP-00001002
REV 0

SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREQ-002

'E' SIZE - 44x34
COMPUTER GENERATED - MANUAL DESIGN CHANGES NOT PERMITTED

2/10/2011 9:52:08 AM

FORM E_SDN.DGN 02/2009

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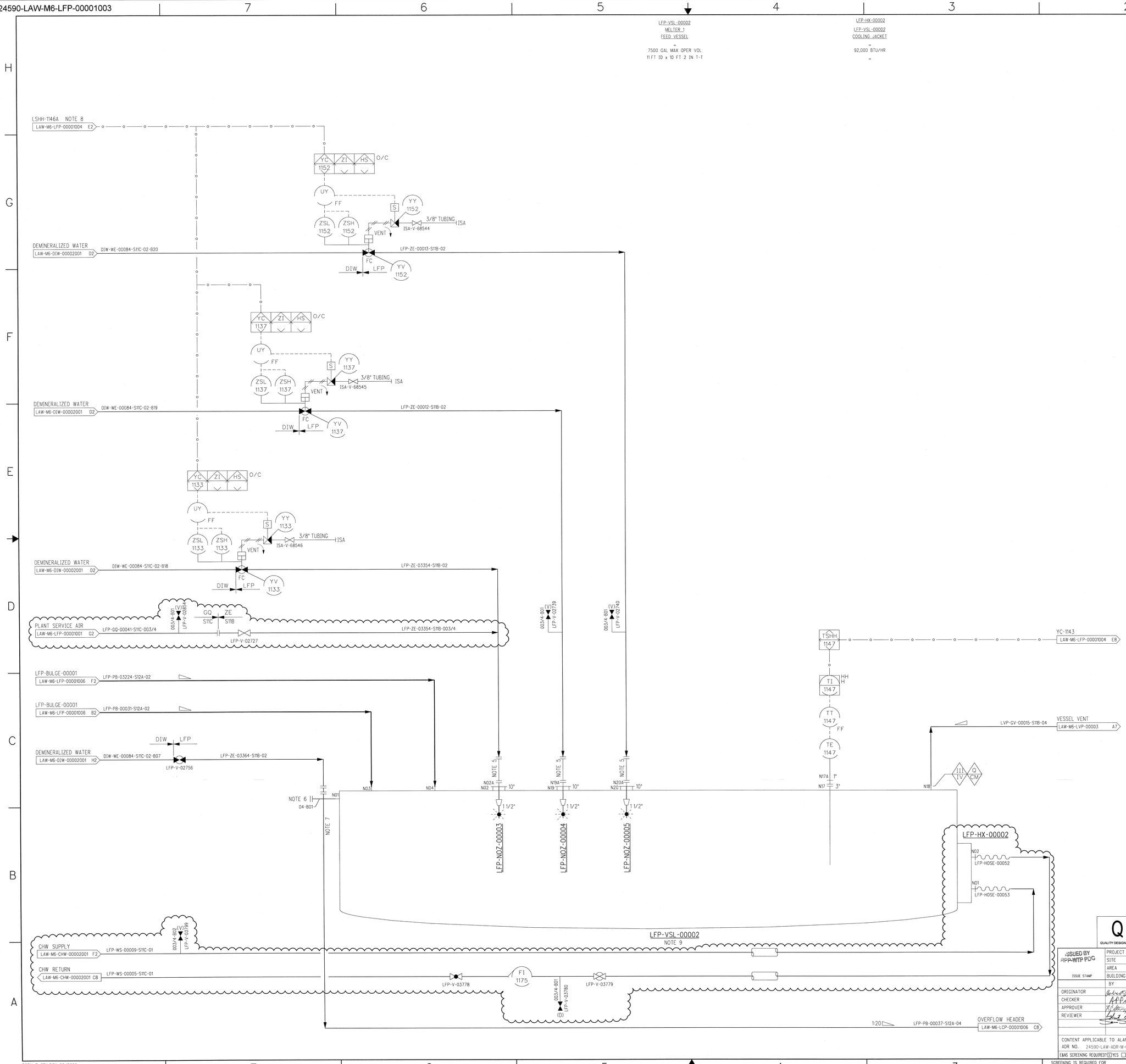

NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGENDS, AND GENERAL SLOPE REQUIREMENTS.
2. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
3. THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV, UNLESS OTHERWISE NOTED.
4. ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, UNLESS OTHERWISE NOTED.
5. REMOVABLE SPOOL TO FACILITATE SPRAY NOZZLE REMOVAL.
6. A CROSS PIPE FITTING WILL BE USED. REMOVABLE PIECE IS TO FACILITATE INSPECTION OF OVERFLOW DOWNCOMER.
7. FOR VESSEL LFP-VSL-00002, HORIZONTAL DISTANCE BETWEEN DOWNCOMER PIPE AND VESSEL SHELL SHALL BE AS SHORT AS POSSIBLE, NOT EXCEEDING SIX PIPE DIAMETERS. CONNECT DEMINERALIZED WATER LINE AT THE TOP FLANGE CONNECTION OF THE CROSS FITTING. STAIGHT VERTICAL DOWNCOMER RUN SHALL BE A MINIMUM OF SIX FEET. SLOPE IS NOT REQUIRED AT VESSEL NOZZLE CONNECTION.
8. ICN INTERLOCK ON LFP-VSL-00002 LVL HI HI WILL CLOSE VALVES LFP-YC-1133, -1137, -1152.
9. LFP-VSL-00002 IS REQUIRED TO BE A MINIMUM OF SEISMIC CATEGORY SC-IV, HOWEVER SEISMIC CATEGORY SC-III ANCHORAGE IS REQUIRED. ANCHORAGE SHALL PREVENT VESSEL MOVEMENT THAT COULD DAMAGE CO-LOCATED SAFETY SIGNIFICANT COMPONENTS.
10. THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-LAW-M6-LFP-00001, REV 5. THIS DRAWING INCLUDES INFORMATION FROM 24590-LAW-M6N-20-00004, 24590-LAW-M6N-LFP-00015, AND -00033.

HOLD/OPEN ITEMS:

NONE

REFERENCES:

1. 24590-LAW-3YD-LFP-00001, SYSTEM DESCRIPTION FOR LOW ACTIVITY WASTE MELTER FEED PROCESS SYSTEM (LFP).

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 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.

Q
QUALITY DESIGNATOR

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR CONSTRUCTION, SEE NOTE 10					

REVISION HISTORY

ISSUED BY RPP-WTP PDC

ISSUE STAMP

PROJECT No.	24590	
SITE	HANFORD	
AREA	200E	
BUILDING No.	20	
	BY	DATE
ORIGINATOR		02/09/11
CHECKER		02/09/11
APPROVER		2/15/11
REVIEWER		2/14/11

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. 24590-LAW-ADR-M-01-004 REV: 3
ENS SCREENING REQUIRED? [X] YES [ ] NO | ENS INITIAL IF YES

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

P&ID - LAW
LAW MELTER FEED PROCESS SYSTEM
MELTER 1 FEED VESSEL
LFP-VSL-00002

SCALE: NONE

24590-LAW-M6-LFP-00001003

REV 0

SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREG-002

"E" SIZE - 44x34
COMPUTER GENERATED - MANUAL DESIGN CHANGES NOT PERMITTED

FORM E_SDN.DGN 02/2009

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24590-LAW-M6-LFP-00001004

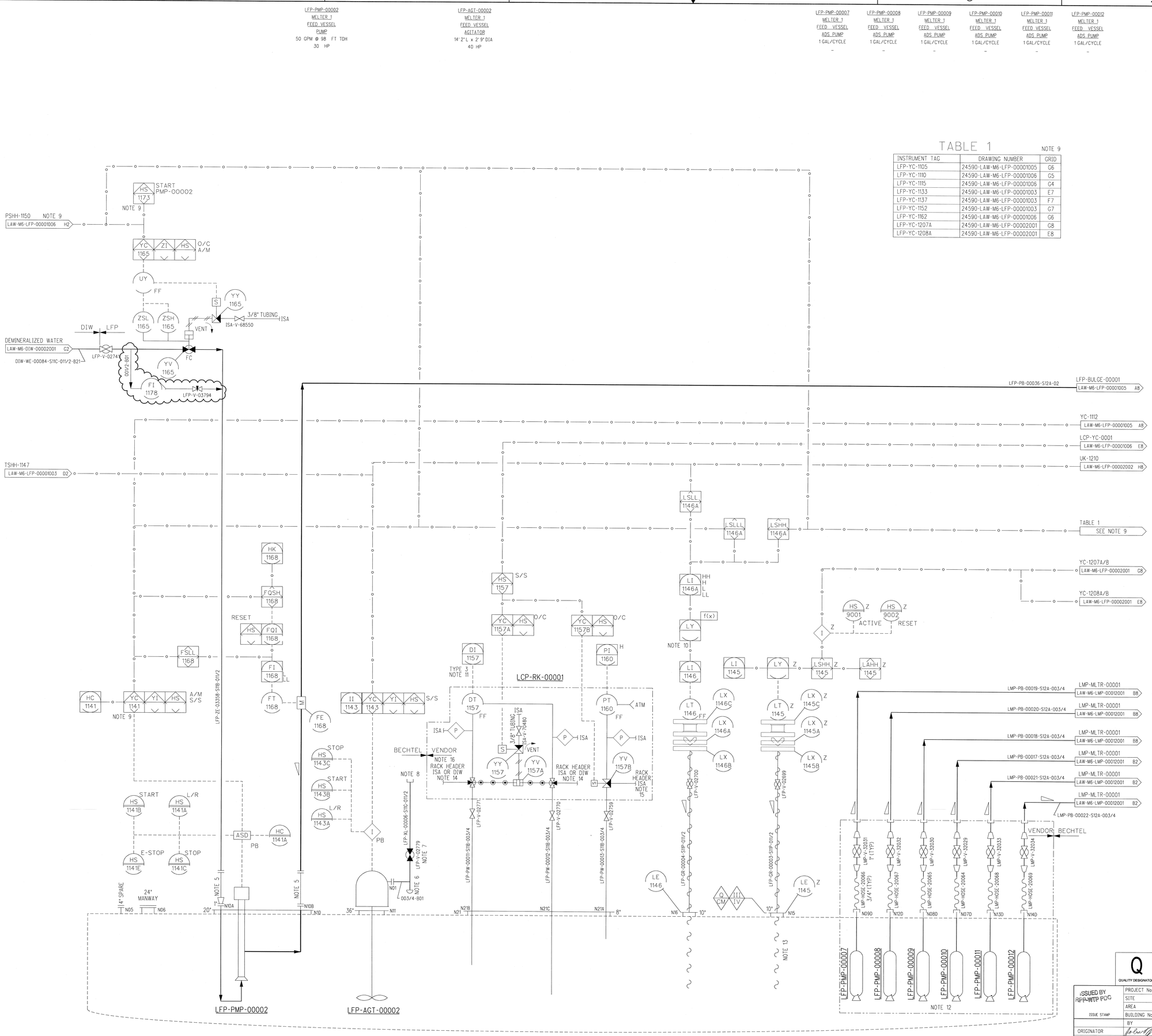

TABLE 1

NOTE 9

INSTRUMENT TAG	DRAWING NUMBER	GRID
LFP-YC-1105	24590-LAW-M6-LFP-00001005	G6
LFP-YC-1110	24590-LAW-M6-LFP-00001006	G5
LFP-YC-1115	24590-LAW-M6-LFP-00001006	G4
LFP-YC-1133	24590-LAW-M6-LFP-00001003	E7
LFP-YC-1137	24590-LAW-M6-LFP-00001003	F7
LFP-YC-1152	24590-LAW-M6-LFP-00001003	G7
LFP-YC-1162	24590-LAW-M6-LFP-00001006	G6
LFP-YC-1207A	24590-LAW-M6-LFP-00002001	G8
LFP-YC-1208A	24590-LAW-M6-LFP-00002001	E8

NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
2. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
3. THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV, UNLESS OTHERWISE NOTED.
4. ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, UNLESS OTHERWISE NOTED.
5. REMOVABLE SPOOL TO FACILITATE PUMP REMOVAL.
6. OIL COLLECTION LEG EXTENDS MIN 3 IN BELOW DRAIN/REFILL NOZZLE.
7. LOCATE VALVE, FOR ACCESS, ABOVE ELEVATION 28'-0".
8. THIS CONNECTION ALLOWS MAINTENANCE ACCESS FROM 28 FT FLOOR ELEVATION FOR AGITATOR OIL CHANGE.
9. ICN INTERLOCK ON LFP-VSL-00002 LVL HIHI WILL CLOSE VALVES LISTED ON TABLE 1.
10. FUNCTION CONVERTS TANK LEVEL IN INCHES TO GALLONS.
11. DENSITY TRANSMITTER SENDS A DIFFERENTIAL PRESSURE VALUE. A CALCULATION IS USED TO DETERMINE DENSITY.
12. FOR ADS PUMP CONTROLS AND ADDITIONAL VESSEL INSTRUMENTATION, SEE DRAWINGS 24590-LAW-M6-LFP-00002002, -00002003, -00002004, -00002005, -00002006, AND -00002007.
13. RADAR CONE IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-III.
14. FOR ISA AND DIW SUPPLY SEE 24590-LAW-M6-LCP-00001006 COORDINATE C6.
15. FOR ISA SUPPLY SEE 24590-LAW-M6-LCP-00001006 COORDINATE D7.
16. ROUTING OF VENDOR SUPPLIED TUBING WILL BE IDENTIFIED BY C&I PER 24590-WTP-GPG-ENG-0142.
17. THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-LAW-M6-LFP-00001, REV 5. THIS DRAWING INCLUDES INFORMATION FROM 24590-LAW-M6N-20-00001, 24590-LAW-M6N-LFP-00023, -00025, -00033 AND 24590-LAW-M6PR-LFP-00001.

HOLD/OPEN ITEMS:

NONE

REFERENCES:

1. 24590-LAW-3YD-LFP-00001, SYSTEM DESCRIPTION FOR LOW ACTIVITY WASTE MELTER FEED PROCESS SYSTEM (LFP).

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 under authorities of the AEA. Outside DOE facilities, pursuant to 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.

QUALITY DESIGNATOR: Q

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR CONSTRUCTION, SEE NOTE 17		APP			2/15/11

REVISION HISTORY

ISSUED BY RPP-WTP PDC

ISSUE STAMP

PROJECT No.	24590	
SITE	HANFORD	
AREA	200E	
BUILDING No.	20	
	BY	DATE
ORIGINATOR		02/11/11
CHECKER		02/11/11
APPROVER		2/15/11
REVIEWER		2/14/11 2/11/11

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO

ADR NO. 24590-LAW-ADR-M-01-004 REV: 2

EMS SCREENING REQUIRED? [X] YES [ ] NO EMS INITIAL IF YES

BECHTEL

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

P&ID - LAW
LAW MELTER FEED PROCESS SYSTEM
MELTER 1 FEED VESSEL
LFP-VSL-00002

SCALE: NONE

24590-LAW-M6-LFP-00001004

REV 0

SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREG-002

E SIZE - 44x34
COMPUTER GENERATED - MANUAL DESIGN CHANGES NOT PERMITTED

FORM E_SDN.DGN 02/2009

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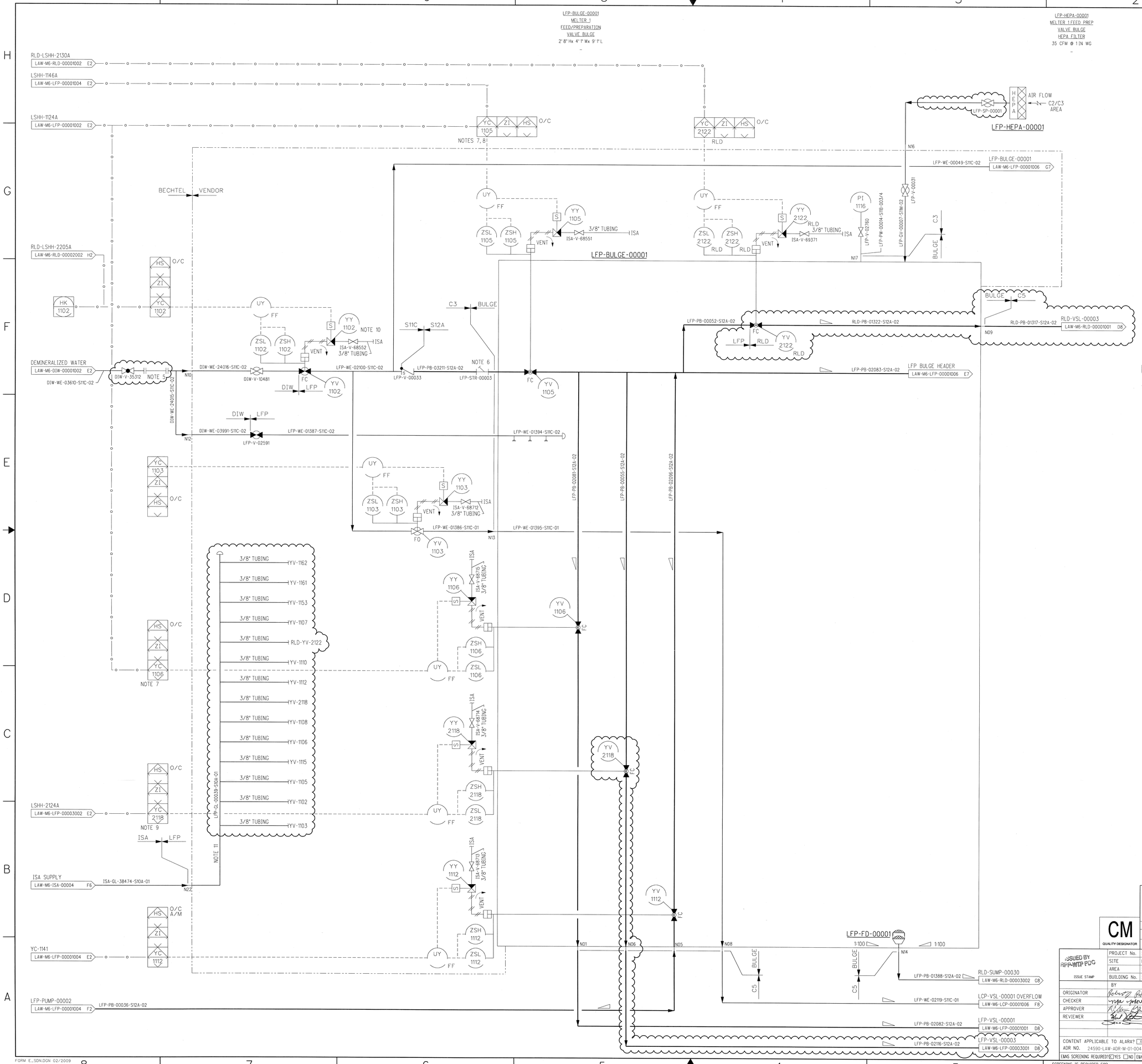

NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
2. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
3. THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV, UNLESS OTHERWISE NOTED.
4. ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, UNLESS OTHERWISE NOTED.
5. SPOOL PIECE CONNECTION FOR THE ADDITION OF PRESSURIZED WATER/CHEMICALS TO CLEAR LINE PLUG UPS. THE SPOOL LENGTH SHALL ACCOMMODATE THE LENGTH OF A TEE WITH FLANGES MATCHING THE PIPE SIZE.
6. POSITION STRAINER (WITHOUT STRAINER INTERNALS) WITH THE PORT IN THE UP POSITION TO ALLOW FOR LINE CLEANING.
7. ICN INTERLOCK ON LFP-VSL-00001 LEVEL HI HI WILL CLOSE VALVE LFP-YV-1105/-1106 AND STOP PUMPS.
8. ICN INTERLOCK ON LFP-VSL-00002 LEVEL HI HI WILL CLOSE VALVE LFP-YV-1105.
9. ICN INTERLOCK ON LFP-VSL-00003 LEVEL HI HI WILL CLOSE VALVE LFP-YV-2118 AND STOP PUMP.
10. FOR ISA SUPPLY, SEE THIS DRAWING.
11. FOR YV'S NOT ON THIS DRAWING, SEE CONNECTIONS ON 24590-LAW-M6-LFP-00001006.
12. THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-LAW-M6-LFP-00001, REV 5. THIS DRAWING INCLUDES INFORMATION FROM 24590-LAW-M6LN-20-00002, 24590-LAW-M6LN-LFP-00003, 24590-LAW-M6N-LFP-00016, -00026, AND -00033.

HOLD/OPEN ITEMS:

NONE

REFERENCES:

1. 24590-LAW-3YD-LFP-00001, SYSTEM DESCRIPTION FOR LOW ACTIVITY WASTE MELTER FEED PROCESS SYSTEM (LFP).

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 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.

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR CONSTRUCTION, SEE NOTE 12	RLK	MTO	SFK SGS	PH RCL	2/15/11

CM — QUALITY DESIGNATOR

REVISION HISTORY

ISSUED BY RPP-WTP PDC — ISSUE STAMP

PROJECT No.	24590	
SITE	HANFORD	
AREA	200E	
BUILDING No.	20	
	BY	DATE
ORIGINATOR	Robert Rider	02/09/11
CHECKER	Max Johnson	2/9/11
APPROVER	Kelly Lang	2/15/11
REVIEWER	Dan Cole	2/14/11

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. 24590-LAW-ADR-M-01-004 REV: 3
EMS SCREENING REQUIRED? [X] YES [ ] NO EMS INITIAL IF YES DCK

BECHTEL

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

P&ID - LAW
LAW MELTER FEED PROCESS SYSTEM MELTER 1 FEED PREPARATION AND FEED LFP-BULGE-00001

SCALE: NONE

24590-LAW-M6-LFP-00001005 — REV 0

SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREG-002

"E" SIZE: 44x34
COMPUTER GENERATED - MANUAL DESIGN CHANGES NOT PERMITTED

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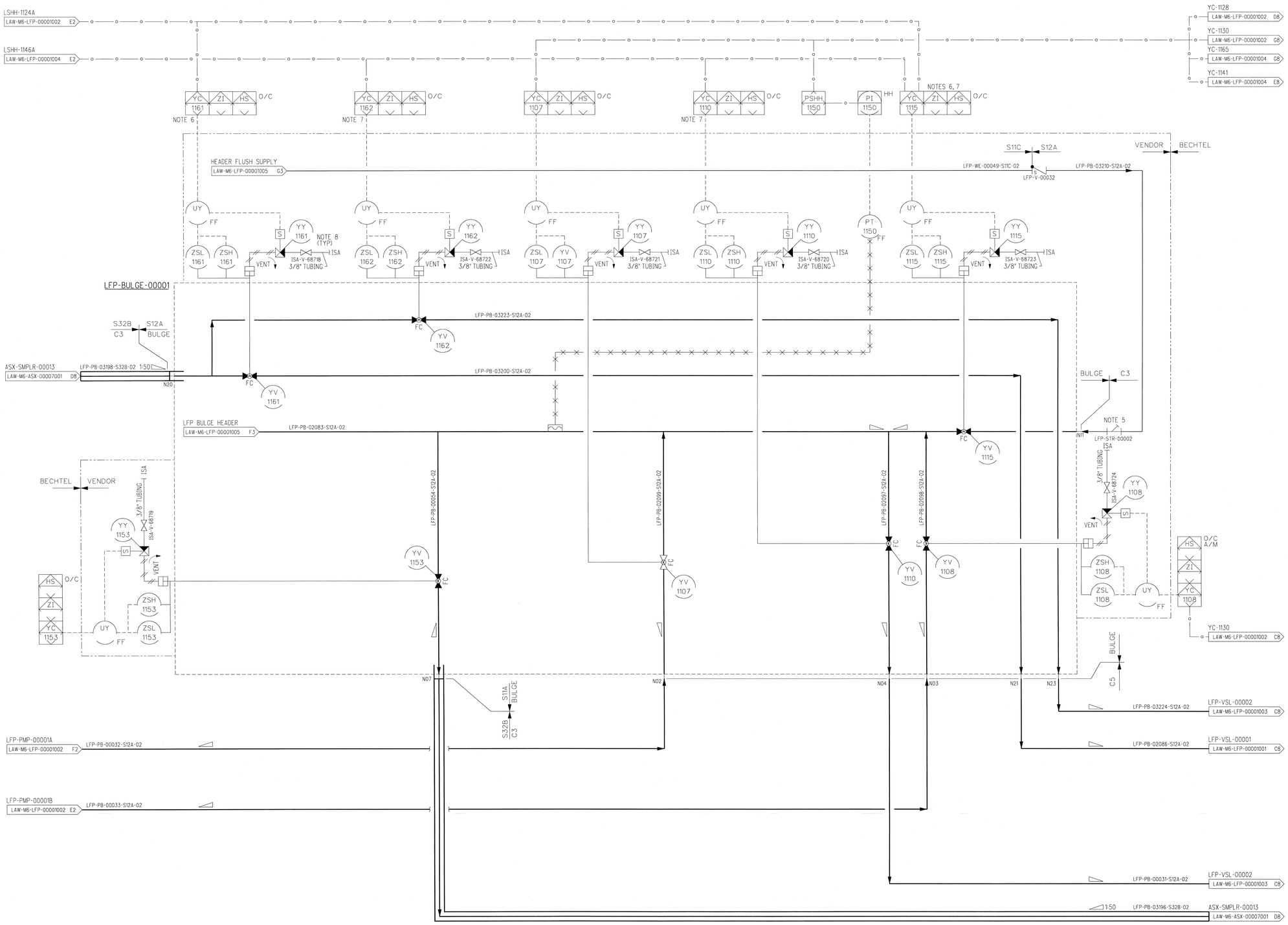
PLOTTED BY: eewebb

FORM E_SDN.DGN 02/2009



NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
2. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
3. THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV, UNLESS OTHERWISE NOTED.
4. ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, UNLESS OTHERWISE NOTED.
5. POSITION STRAINER (WITHOUT STRAINER INTERNALS) WITH THE PORT IN THE UP POSITION TO ALLOW FOR LINE CLEANING.
6. ICN INTERLOCK ON LFP-VSL-00001 LEVEL HI HI WILL CLOSE VALVES LFP-YV-1115, -1161, AND STOP PUMPS.
7. ICN INTERLOCK ON LFP-VSL-00002 LEVEL HI HI WILL CLOSE VALVES LFP-YV-1110, -1115, -1162.
8. SEE 24590-LAW-M6-LFP-00001005 FOR ISA SUPPLY.
9. THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-LAW-M6-LFP-00001, REV 5. THIS DRAWING INCLUDES INFORMATION FROM 24590-LAW-M6N-LFP-00033.

HOLD/OPEN ITEMS:

NONE

REFERENCES:

1. 24590-LAW-3YD-LFP-00001, SYSTEM DESCRIPTION FOR LOW ACTIVITY WASTE MELTER FEED PROCESS SYSTEM (LFP).

Please note that source, special nuclear, and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA) are regulated by the U.S. Department of Energy (DOE) and are exempt from regulatory by DOE acting pursuant to its AEA authority. DOE asserts that, pursuant to AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained on this drawing/schedules is provided for process description purposes only.

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR CONSTRUCTION, SEE NOTE 9					2/16/11

CM — QUALITY DESIGNATOR

REVISION HISTORY

ISSUED BY RFP-WTP PDC

ISSUE STAMP

PROJECT No.	24590	
SITE	HANFORD	
AREA	200E	
BUILDING No.	20	
	BY	DATE
ORIGINATOR		02/16/11
CHECKER		02/16/11
APPROVER		2/16/11
REVIEWER		2/16/11

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO

ADR NO. 24590-LAW-ADR-M-01-004 REV: 3

EMS SCREENING REQUIRED? [X] YES [ ] NO EMS INITIAL IF YES DEK

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

P&ID - LAW
LAW MELTER FEED PROCESS SYSTEM MELTER 1 FEED PREPARATION AND FEED
LFP-BULGE-00001

SCALE: NONE

24590-LAW-M6-LFP-00001006

REV 0

FORM E_SDN.DGN 02/2009

SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREG-002

"E" SIZE - 44x34
COMPUTER GENERATED - MANUAL DESIGN CHANGES NOT PERMITTED

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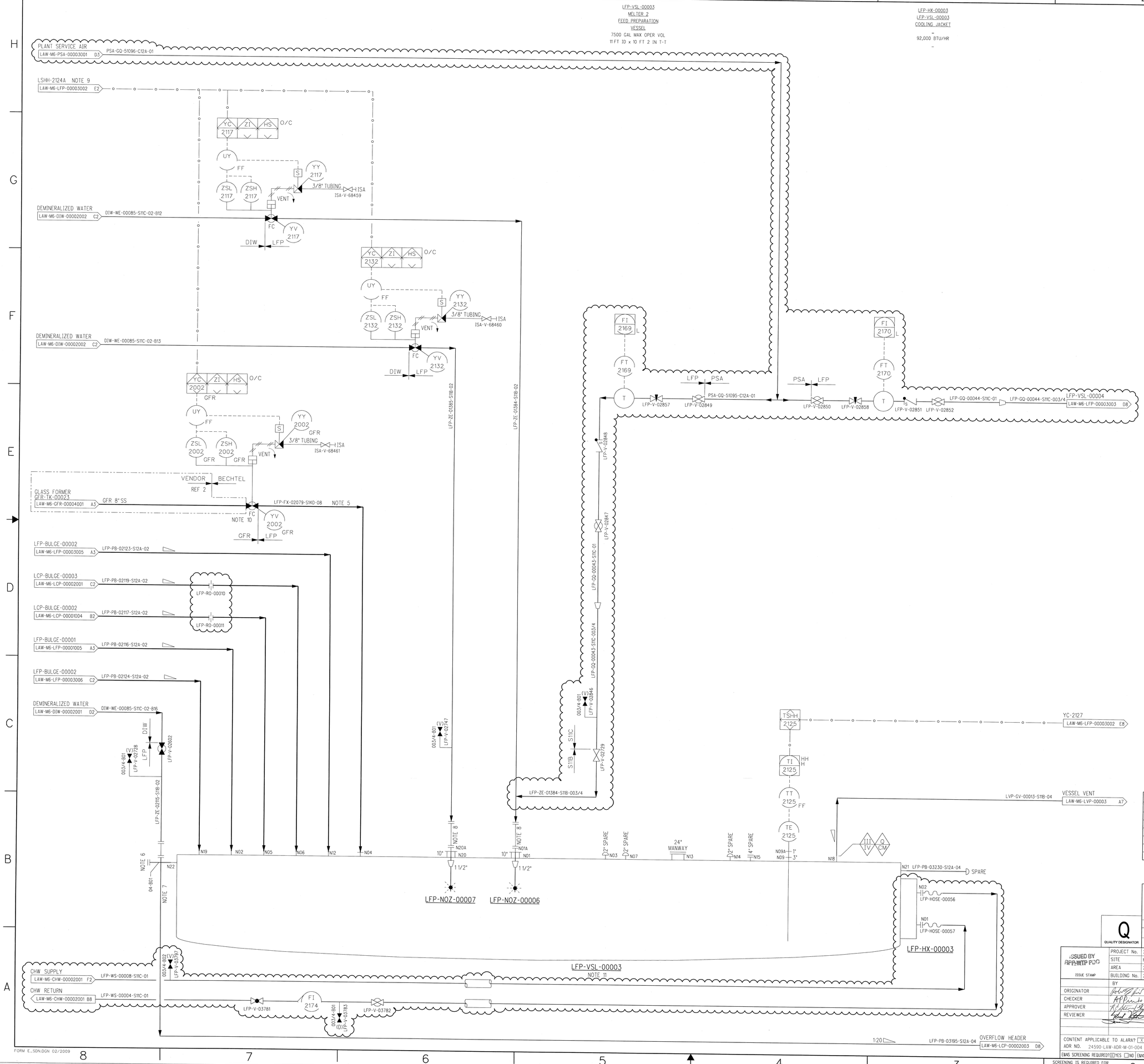

NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
2. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
3. THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV, UNLESS OTHERWISE NOTED.
4. ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, UNLESS OTHERWISE NOTED.
5. MINIMUM ANGLE OF PIPE IS 60 DEGREES FROM HORIZONTAL.
6. A CROSS PIPE FITTING WILL BE USED. REMOVABLE SPOOL PIECE IS TO FACILITATE INSPECTION OF OVERFLOW DOWNCOMER.
7. FOR VESSEL LFP-VSL-00003, MAXIMUM HORIZONTAL DISTANCE BETWEEN DOWNCOMER PIPE AND VESSEL SHELL SHALL NOT BE MORE THAN FIVE PIPE DIAMETERS. CONNECT DEMINERALIZED WATER LINE AT THE TOP FLANGE CONNECTION OF THE CROSS FITTING. STRAIGHT VERTICAL DOWNCOMER RUN SHALL BE A MINIMUM OF SIX FEET.
8. REMOVABLE SPOOL PIECE TO FACILITATE SPRAY NOZZLE REMOVAL.
9. ICN INTERLOCK ON FRP-VSL-00003 LVL HI HI WILL CLOSE VALVES LCP-YC-2117, -2132, GFR-YC-2002, AND STOP INFLOW TO LFP-VSL-00003.
10. FULL PORT BALL VALVE IS REQUIRED FOR GLASS FORMERS.
11. LFP-VSL-00003 IS REQUIRED TO BE A MINIMUM OF SEISMIC CATEGORY SC-IV, HOWEVER SEISMIC CATEGORY SC-III ANCHORAGE IS REQUIRED. ANCHORAGE SHALL PREVENT VESSEL MOVEMENT THAT COULD DAMAGE CO-LOCATED SAFETY SIGNIFICANT COMPONENTS.
12. THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-LAW-M6-LFP-00003, REV 5. THIS DRAWING INCLUDES INFORMATION FROM 24590-LAW-M6N-20-00002, -00004, 24590-LAW-M6LN-LFP-00002, 24590-LAW-M6N-LFP-00015, -00025, -00027, -00031, -00035, AND 24590-WTP-FC-P-07-0362.

HOLD/OPEN ITEMS:

NONE

REFERENCES:

1. 24590-LAW-3YD-LFP-00001, SYSTEM DESCRIPTION FOR LOW ACTIVITY WASTE MELTER FEED PROCESS SYSTEM (LFP).
2. 24590-CM-POA-~~MHDD~~-MHCC-00001-08-00380, VENDOR SUPPLIED SKID. DTM 2-24-11

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 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.

DRAWING INDEX

DWG NO	TITLE
24590-LAW-M6-LFP-00003001	LAW MELTER 2 FEED PROCESS SYSTEM LFP-VSL-00003
24590-LAW-M6-LFP-00003002	LAW MELTER 2 FEED PROCESS SYSTEM LFP-VSL-00003
24590-LAW-M6-LFP-00003003	LAW MELTER 2 FEED PROCESS SYSTEM LFP-VSL-00004
24590-LAW-M6-LFP-00003004	LAW MELTER 2 FEED PROCESS SYSTEM LFP-VSL-00004
24590-LAW-M6-LFP-00003005	LAW MELTER 2 FEED PROCESS SYS LFP-BULGE-00002
24590-LAW-M6-LFP-00003006	LAW MELTER 2 FEED PROCESS SYS LFP-BULGE-00002

REVISION HISTORY

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR CONSTRUCTION, SEE NOTE 12		AFD	SPK	DSK	KGK 2/15/11

QUALITY DESIGNATOR: Q

ISSUED BY RPP-WTP PDC
ISSUE STAMP

	PROJECT No.	24590
	SITE	HANFORD
	AREA	200E
	BUILDING No.	20

	BY	DATE
ORIGINATOR		02/04/11
CHECKER	AFD	2/10/11
APPROVER		2/15/11
REVIEWER		2/14/11 2/15/11

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. 24590-LAW-ADR-M-01-004 REV: 3
EMS SCREENING REQUIRED? [X] YES [ ] NO EMS INITIAL IF YES DEK

BECHTEL

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

P&ID - LAW
LAW MELTER FEED PROCESS SYSTEM
MELTER 2 FEED PREPARATION
LFP-VSL-00003

SCALE: NONE

24590-LAW-M6-LFP-00003001 REV 0

E-SIZE - 44x34
COMPUTER GENERATED - MANUAL DESIGN CHANGES NOT PERMITTED

SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREG-002

FORM E_SDN.DGN 02/2009

PLOTTED BY: mr jones C:\Work\mr jones\dms0383\LAW\M6LFP00003001.dgn

2/10/2011 10:37:11 AM

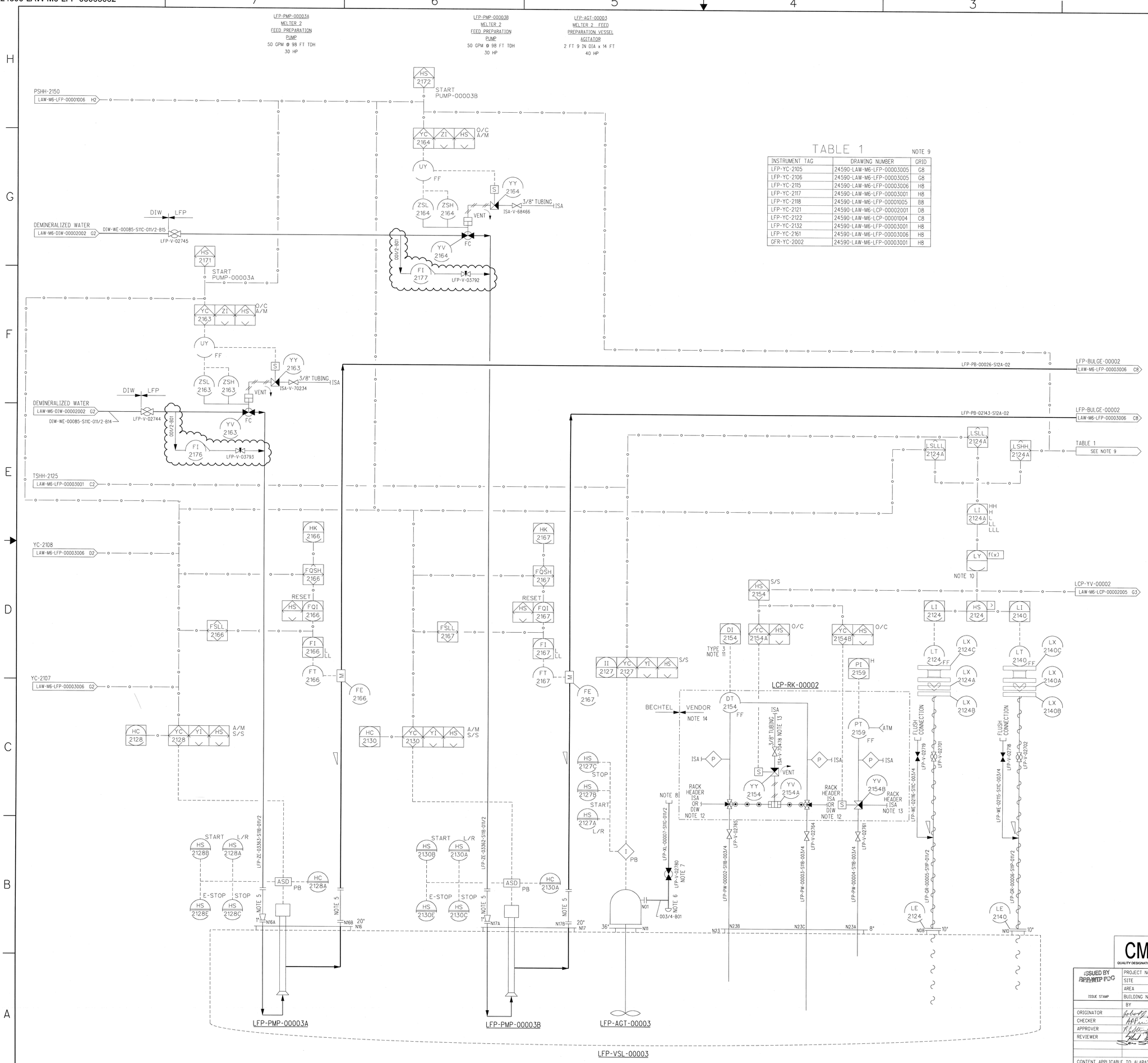

TABLE 1

NOTE 9

INSTRUMENT TAG	DRAWING NUMBER	GRID
LFP-YC-2105	24590-LAW-M6-LFP-00003005	G8
LFP-YC-2106	24590-LAW-M6-LFP-00003005	G8
LFP-YC-2115	24590-LAW-M6-LFP-00003006	H8
LFP-YC-2117	24590-LAW-M6-LFP-00003001	H8
LFP-YC-2118	24590-LAW-M6-LFP-00001005	B8
LFP-YC-2121	24590-LAW-M6-LCP-00002001	D8
LFP-YC-2122	24590-LAW-M6-LCP-00001004	C8
LFP-YC-2132	24590-LAW-M6-LFP-00003001	H8
LFP-YC-2161	24590-LAW-M6-LFP-00003006	H8
GFR-YC-2002	24590-LAW-M6-LFP-00003001	H8

NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
2. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
3. THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV, UNLESS OTHERWISE NOTED.
4. ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, UNLESS OTHERWISE NOTED.
5. REMOVABLE SPOOL TO FACILITATE PUMP REMOVAL.
6. OIL COLLECTION LEG EXTENDS MIN 3 IN BELOW DRAIN/REFILL NOZZLE.
7. LOCATE VALVE, FOR ACCESS, ABOVE ELEVATION 28'-0".
8. THIS CONNECTION ALLOWS MAINTENANCE ACCESS FROM 28 FT FLOOR ELEVATION FOR AGITATOR OIL CHANGE.
9. ON HIGH LEVEL DETECTION (LFP-LSHH-2124A), VALVES LISTED IN TABLE 1 WILL CLOSE AND STOP INFLOW TO LFP-VSL-00003.
10. FUNCTION CONVERTS TANK LEVEL IN INCHES TO GALLONS.
11. DENSITY TRANSMITTER SENDS A DIFFERENTIAL PRESSURE VALUE. A CALCULATION IS USED TO DETERMINE DENSITY.
12. FOR ISA AND DIW SUPPLY SEE 24590-LAW-M6-LCP-00002005 COORDINATE B6.
13. FOR ISA SUPPLY SEE 24590-LAW-M6-LCP-00002005 COORDINATE B7.
14. ROUTING OF VENDOR SUPPLIED TUBING WILL BE IDENTIFIED BY C&I PER 24590-WTP-GPG-ENG-0142.
15. THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-LAW-M6-LFP-00003, REV 5. THIS DRAWING INCLUDES INFORMATION FROM 24590-LAW-M6N-20-00001, -00002, 24590-LAW-M6N-LFP-00015, -00021, -00023, -00025, -00026, -00027, -00031, 24590-LAW-M6PR-LFP-00001, AND 24590-WTP-FC-P-07-0362.

HOLD/OPEN ITEMS:

NONE

REFERENCES:

1. 24590-LAW-3YD-LFP-00001, SYSTEM DESCRIPTION FOR LOW ACTIVITY WASTE MELTER FEED PROCESS SYSTEM (LFP).

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 contractors at DOE-owned nuclear facilities exercise control 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.

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR CONSTRUCTION, SEE NOTE 15	SJR	AHP	SJC	RVW	2/10/11

REVISION HISTORY

CM QUALITY DESIGNATOR

ISSUED BY RPP-WTP PDC

ISSUE STAMP

PROJECT No.	24590	
SITE	HANFORD	
AREA	200E	
BUILDING No.	20	

	BY	DATE
ORIGINATOR		02/10/11
CHECKER		02/10/11
APPROVER		2/10/11
REVIEWER		2/10/11

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO

ADR NO. 24590-LAW-ADR-M-01-004 REV: 3

EMS SCREENING REQUIRED? [X] YES [ ] NO EMS INITIAL IF YES

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

P&ID - LAW
LAW MELTER FEED PROCESS SYSTEM
MELTER 2 FEED PREPARATION
LFP-VSL-00003

SCALE: NONE

24590-LAW-M6-LFP-00003002

REV 0

SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREG-002

'E' SIZE - 44x34
COMPUTER GENERATED - MANUAL DESIGN CHANGES NOT PERMITTED

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PLOTTED BY: mrjones

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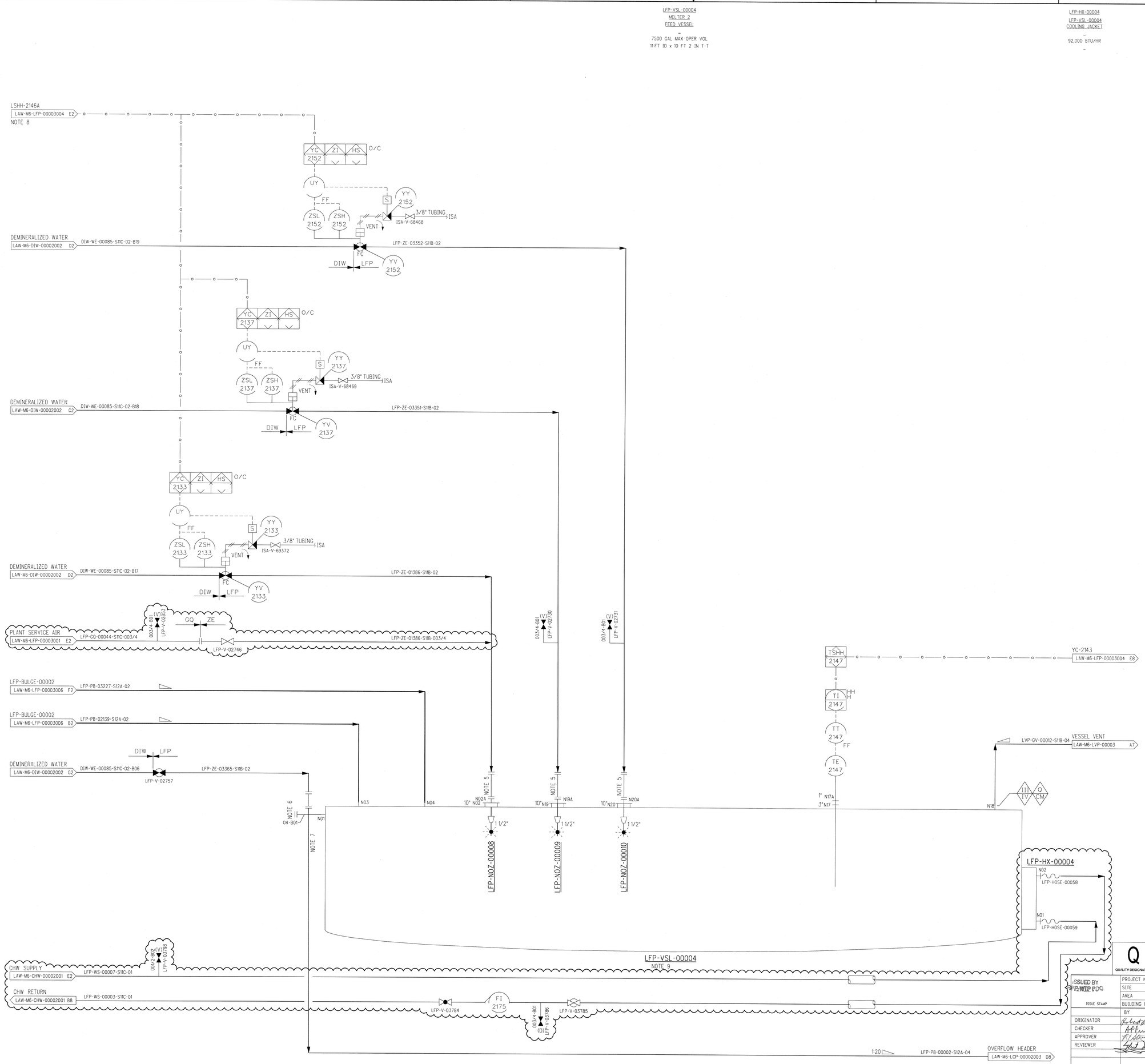

NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
2. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
3. THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV, UNLESS OTHERWISE NOTED.
4. ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, UNLESS OTHERWISE NOTED.
5. REMOVABLE SPOOL PIECE TO FACILITATE SPRAY NOZZLE REMOVAL.
6. A CROSS PIPE FITTING WILL BE USED. REMOVABLE PIECE IS TO FACILITATE INSPECTION OF OVERFLOW DOWNCOMER.
7. FOR VESSEL LFP-VSL-00002, HORIZONTAL DISTANCE BETWEEN DOWNCOMER PIPE AND VESSEL SHELL SHALL BE AS SHORT AS POSSIBLE, NOT EXCEEDING SIX PIPE DIAMETERS. CONNECT DEMINERALIZED WATER LINE AT THE TOP FLANGE CONNECTION OF THE CROSS FITTING. STAIGHT VERTICAL DOWNCOMER RUN SHALL BE A MINIMUM OF SIX FEET. SLOPE IS NOT REQUIRED AT VESSEL NOZZLE CONNECTION.
8. ICN INTERLOCK ON LFP-VSL-00004 ~~LVC~~ LEVEL Relation HI HI WILL CLOSE VALVES YC-2152, -2137, -2133.
9. LFP-VSL-00004 IS REQUIRED TO BE A MINIMUM OF SEISMIC CATEGORY SC-IV, HOWEVER SEISMIC CATEGORY SC-III ANCHORAGE IS REQUIRED. ANCHORAGE SHALL PREVENT VESSEL MOVEMENT THAT COULD DAMAGE CO-LOCATED SAFETY SIGNIFICANT COMPONENTS.
10. THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-LAW-M6-LFP-00003, REV 5. THIS DRAWING INCLUDES INFORMATION FROM 24590-LAW-M6N-20-00004, 24590-LAW-M6N-LFP-00015, AND -00035,

HOLD/OPEN ITEMS:

NONE

REFERENCES:

1. 24590-LAW-3YD-LFP-00001, SYSTEM DESCRIPTION FOR LOW ACTIVITY WASTE MELTER FEED PROCESS SYSTEM (LFP).

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 pursuant to the AEA. Regulation of DOE facilities pursuant to AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at its facilities. Any reference to radioactivity contained herein on radionuclides is provided for process description purposes only.

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR CONSTRUCTION, SEE NOTE 10	RDK	AFP	SPK DJH	RDK	2/15/11

REVISION HISTORY

Q QUALITY DESIGNATOR

ISSUED BY ~~WTP PDC~~ ISSUE STAMP

PROJECT No.	24590	
SITE	HANFORD	
AREA	200E	
BUILDING No.	20	

	BY	DATE
ORIGINATOR	Robert K. Baker	02/09/11
CHECKER	AFPowers	02/09/11
APPROVER	R. Allen Oyler	2/15/11
REVIEWER	Fred Dietz	2/14/11 2/15/11

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO

ADR NO. 24590-LAW-ADR-M-01-004 REV: 3

EMS SCREENING REQUIRED? [X] YES [ ] NO EMS INITIAL IF YES DEK

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

P&ID - LAW
LAW MELTER FEED PROCESS SYSTEM
MELTER 2 FEED VESSEL
LFP-VSL-00004

SCALE: NONE

24590-LAW-M6-LFP-00003003

REV 0

SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREQ-002

"E" SIZE - 44x34
COMPUTER GENERATED - MANUAL DESIGN CHANGES NOT PERMITTED

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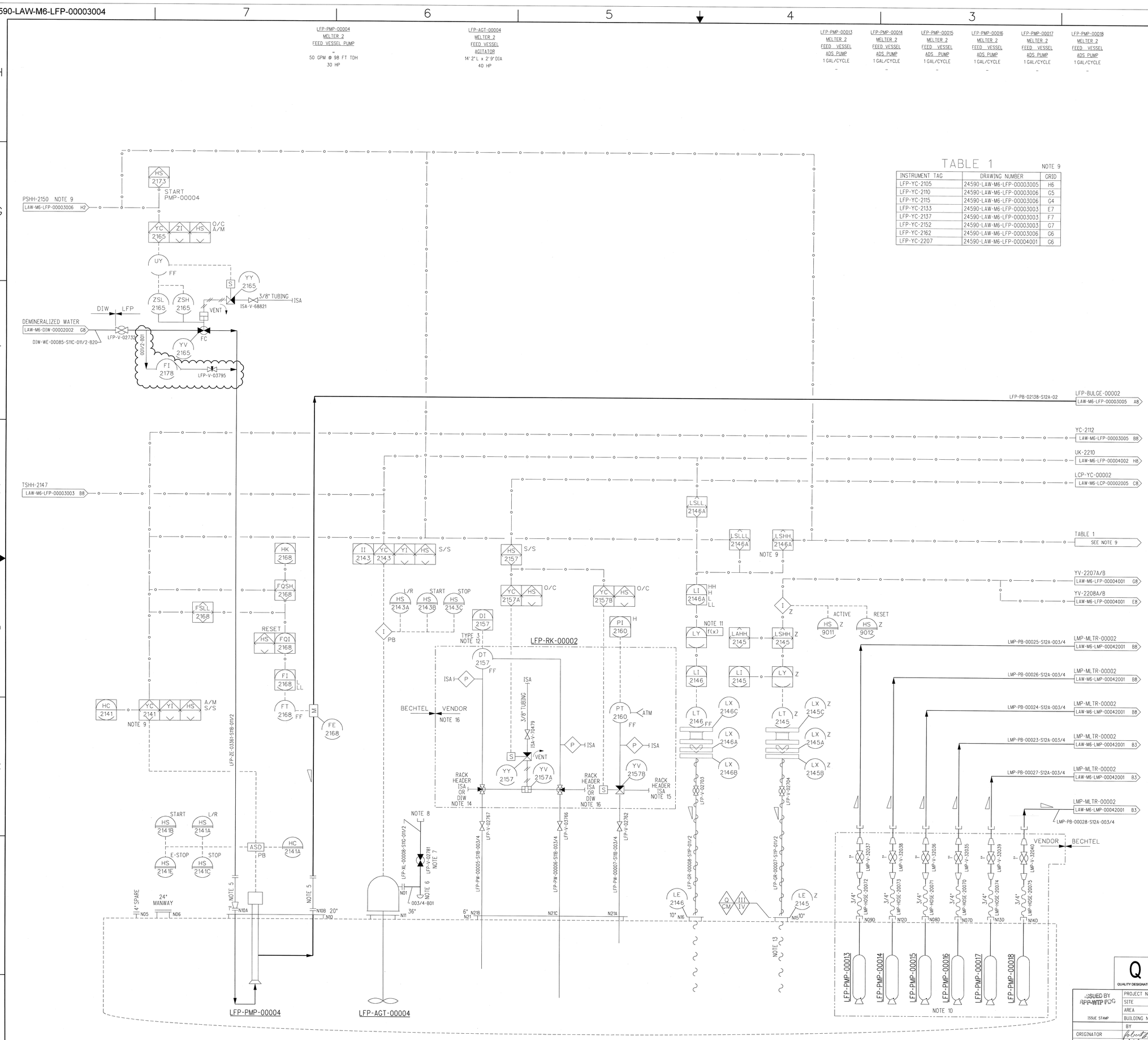
PLOTTED BY: erwebb

FORM E_SDN.DGN 02/2009



NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
2. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
3. THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV, UNLESS OTHERWISE NOTED.
4. ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, UNLESS OTHERWISE NOTED.
5. REMOVABLE SPOOL PIECE TO FACILITATE PUMP REMOVAL.
6. OIL COLLECTION LEG EXTENDS MIN 3 IN BELOW DRAIN/REFILL NOZZLE.
7. LOCATE VALVE, FOR ACCESS, ABOVE ELEVATION 28'-0".
8. THIS CONNECTION ALLOWS MAINTENANCE ACCESS FROM 28 FT FLOOR ELEVATION FOR AGITATOR OIL CHANGE.
9. ICN INTERLOCK ON VSL-00004 LVL HI HI WILL CLOSE VALVES LISTED IN TABLE 1.
10. FOR ADS PUMP CONTROLS AND ADDITIONAL VESSEL INSTRUMENTATION, SEE DRAWINGS 24590-LAW-M6-LFP-00004002, -00004003, -00004004, -00004005, -00004006, AND -00004007.
11. FUNCTION CONVERTS TANK LEVEL IN INCHES TO GALLONS.
12. DENSITY TRANSMITTER SENDS A DIFFERENTIAL PRESSURE VALUE. A CALCULATION IS USED TO DETERMINE DENSITY.
13. RADAR CONE IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-III.
14. FOR ISA AND DIW SUPPLY SEE 24590-LAW-M6-LCP-00002005 COODINATE B6.
15. FOR ISA SUPPLY SEE 24590-LAW-M6-LCP-00002005 COORDINATE B7.
16. ROUTING OF VENDOR SUPPLIED TUBING WILL BE IDENTIFIED BY C&I PER 24590-WTP-GPG-ENG-0142.
17. THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-LAW-M6-LFP-00003, REV 5. THIS DRAWING INCLUDES INFORMATION FROM 24590-LAW-M6N-20-00001, 24590-LAW-M6N-LFP-00023, -00025, -00035, AND 24590-LAW-M6PR-LFP-00001.

TABLE 1

NOTE 9

INSTRUMENT TAG	DRAWING NUMBER	GRID
LFP-YC-2105	24590-LAW-M6-LFP-00003005	H6
LFP-YC-2110	24590-LAW-M6-LFP-00003006	G5
LFP-YC-2115	24590-LAW-M6-LFP-00003006	G4
LFP-YC-2133	24590-LAW-M6-LFP-00003003	E7
LFP-YC-2137	24590-LAW-M6-LFP-00003003	F7
LFP-YC-2152	24590-LAW-M6-LFP-00003003	G7
LFP-YC-2162	24590-LAW-M6-LFP-00003006	G6
LFP-YC-2207	24590-LAW-M6-LFP-00004001	G6

HOLD/OPEN ITEMS:

NONE

REFERENCES:

1. 24590-LAW-3YD-LFP-00001, SYSTEM DESCRIPTION FOR LOW ACTIVITY WASTE MELTER FEED PROCESS SYSTEM (LFP).

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 AEA, it has sole and exclusive responsibility and authority regarding regulation of special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR CONSTRUCTION, SEE NOTE 17		AFP	SJPC DOE	RJH	2/15/11

REVISION HISTORY

Q QUALITY DESIGNATOR

ISSUED BY RPP-WTP PDC

PROJECT No.	24590	
SITE	HANFORD	
AREA	200E	
BUILDING No.	20	

ISSUE STAMP

	BY	DATE
ORIGINATOR		01/10/11
CHECKER		02/11/11
APPROVER		2/15/11
REVIEWER		2/14/11

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO

ADR NO. 24590-LAW-ADR-M-01-004 REV: 3

EMS SCREENING REQUIRED? [X] YES [ ] NO EMS INITIAL IF YES

BECHTEL

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

P&ID - LAW
LAW MELTER FEED PROCESS SYSTEM
MELTER 2 FEED VESSEL
LFP-VSL-00004

SCALE: NONE

24590-LAW-M6-LFP-00003004

REV 0

SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREQ-002

'E' SIZE - 44x34
COMPUTER GENERATED - MANUAL DESIGN CHANGES NOT PERMITTED

FORM E_SDN.DGN 02/2009

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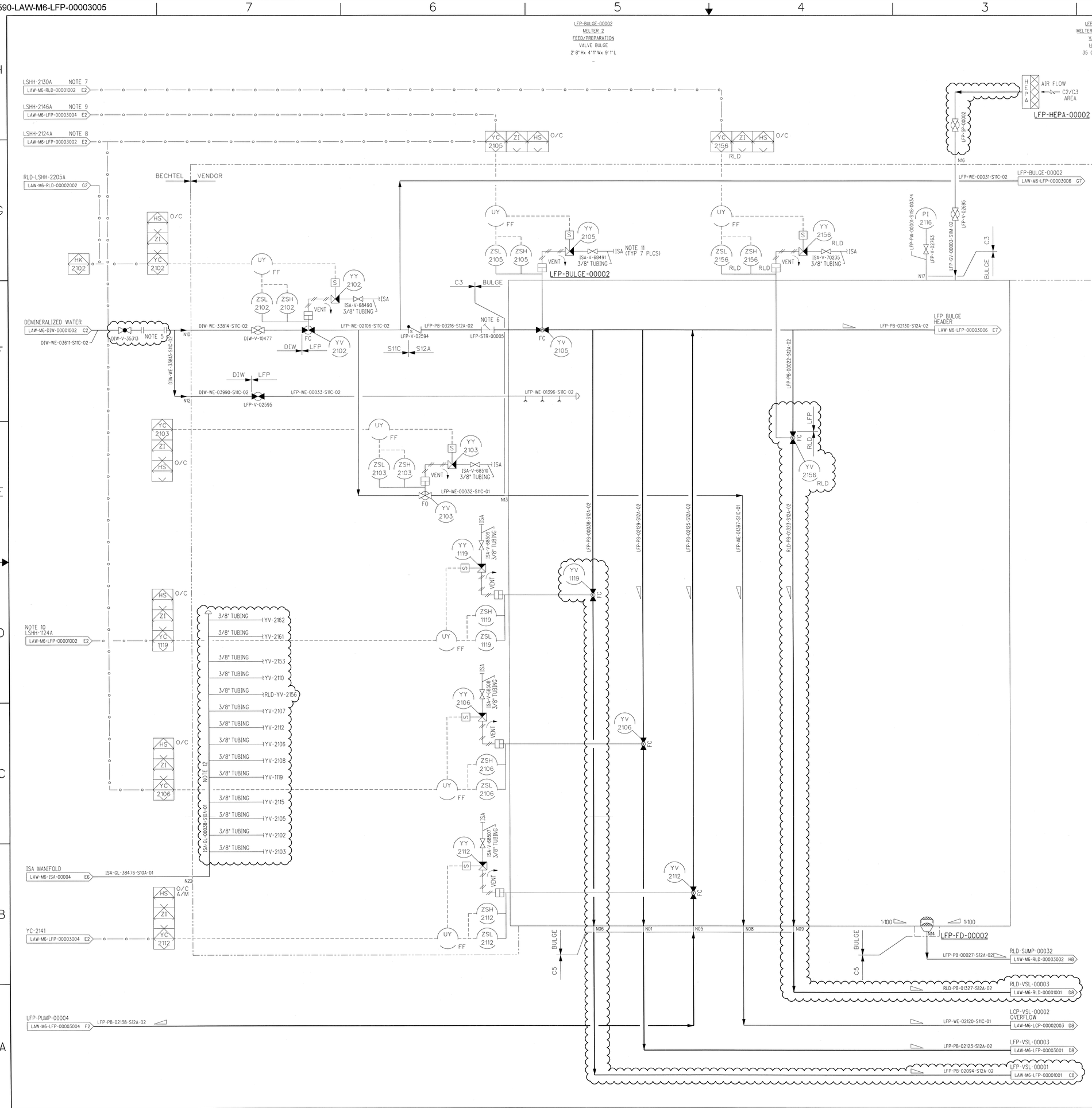


NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
2. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
3. THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV, UNLESS OTHERWISE NOTED.
4. ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, UNLESS OTHERWISE NOTED.
5. SPOOL PIECE CONNECTION FOR THE ADDITION OF PRESSURIZED WATER/CHEMICALS TO CLEAR LINE PLUG UPS. THE SPOOL LENGTH SHALL ACCOMMODATE THE LENGTH OF A TEE WITH FLANGES MATCHING THE PIPE SIZE.
6. POSITION STRAINER (WITHOUT STRAINER INTERNALS) WITH THE PORT IN THE UP POSITION TO ALLOW FOR LINE CLEANING.
7. PLANT WASH VESSEL HIGH HIGH LEVEL CLOSES VALVES RLD-YV-2105, -2108, -2117, -2109, -2106, -2118, -2120, -2121, -2122, -2123, -2156, -2173, -2174; STOPS RLD-PMP-00004, -00025, -00026, -00027, -00028, -00031, -00032, AND CLOSES NLD-YV-2018.
8. ICN INTERLOCK ON LFP-VSL-00003 LEVEL HI HI WILL CLOSE VALVES YV-2105, YV-2106, AND STOP PUMPS.
9. ICN INTERLOCK ON LFP-VSL-00004 LEVEL HI HI WILL CLOSE VALVE YV-2105.
10. ICN INTERLOCK ON LFP-VSL-00001 LEVEL HI HI WILL CLOSE VALVE YV-1119 AND STOP PUMP.
11. FOR ISA SUPPLY, SEE THIS DRAWING.
12. FOR YV'S NOT ON THIS DRAWING, SEE CONNECTIONS ON 24590-LAW-M6-LFP-00003006.
13. THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-LAW-M6-LFP-00003, REV 5. THIS DRAWING INCLUDES INFORMATION FROM 24590-LAW-M6N-LFP-00015, -00016, -00026, -00035, AND 24590-LAW-M6LN-20-00002.

HOLD/OPEN ITEMS:

NONE

REFERENCES:

1. 24590-LAW-3YD-LFP-00001, SYSTEM DESCRIPTION FOR LOW ACTIVITY WASTE MELTER FEED PROCESS SYSTEM (LFP).

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 and not regulated by the Nuclear Regulatory Commission. Pursuant to 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.

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR CONSTRUCTION, SEE NOTE 13					2/15/11

CM
QUALITY DESIGNATOR

REVISION HISTORY

ISSUED BY RPP-WTP PDC

ISSUE STAMP		
PROJECT No.	24590	
SITE	HANFORD	
AREA	200E	
BUILDING No.	20	
	BY	DATE
ORIGINATOR		02/02/11
CHECKER		2/9/11
APPROVER		2/15/11
REVIEWER		2/14/11

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. 24590-LAW-ADR-M-01-004 REV: 3
EMS SCREENING REQUIRED? [X] YES [ ] NO | EMS INITIAL IF YES

BECHTEL

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

P&ID - LAW
LAW MELTER FEED
PROCESS SYSTEM MELTER 2
FEED PREPARATION AND FEED
LFP-BULGE-00002

SCALE: NONE

24590-LAW-M6-LFP-00003005

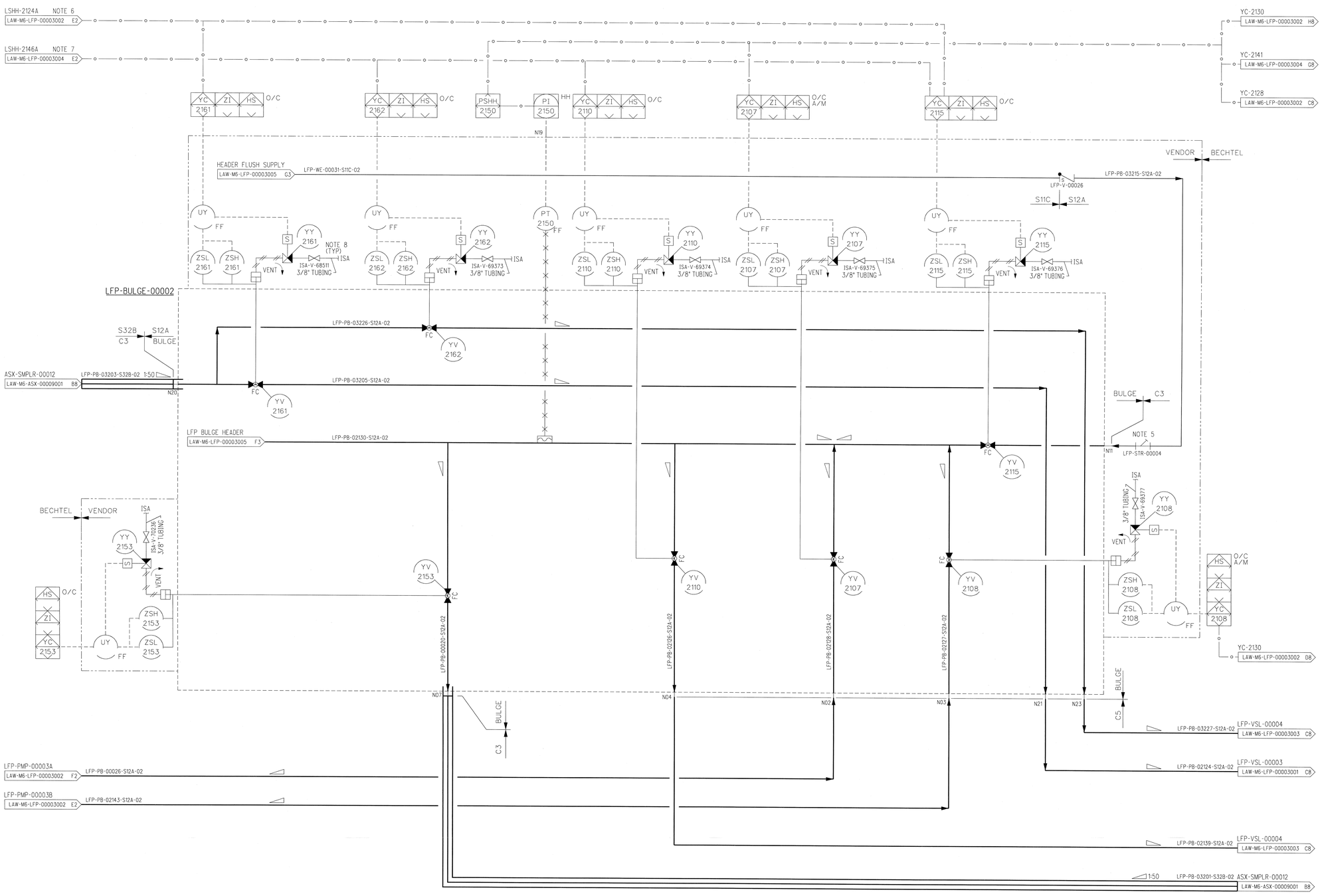
REV 0

SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREQ-002

"E" SIZE - 44x34
COMPUTER GENERATED - MANUAL DESIGN CHANGES NOT PERMITTED

FORM E_SDN.DGN 02/2009

PLOTTED BY: mr jones C:\Work\mr jones\dms03838\LAWMELFP00003005.dgn 2/9/2011 4:11:58 PM



NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
2. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
3. THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV, UNLESS OTHERWISE NOTED.
4. ALL LINES ON SHOWN THIS DRAWING SHALL BE FREE DRAINING, UNLESS OTHERWISE NOTED.
5. POSITION STRAINER (WITHOUT STRAINER INTERNALS) WITH THE STRAINER PORT IN THE UP POSITION TO ALLOW FOR LINE CLEANING.
6. ICN INTERLOCK ON LFP-VSL-00003 LEVEL HI HI WILL CLOSE VALVES YV-2161, YV-2115, AND STOP PUMPS.
7. ICN INTERLOCK ON LFP-VSL-00004 LEVEL HI HI WILL CLOSE VALVES YV-2162, YV-2110, YV-2107, AND STOP PUMPS.
8. SEE 24590-LAW-M6-LFP-00003005 FOR ISA SUPPLY.
9. THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-LAW-M6-LFP-00003, REV 5. THIS DRAWING INCLUDES INFORMATION FROM 24590-LAW-M6N-LFP-00035.

HOLD/OPEN ITEMS:

NONE

REFERENCES:

1. 24590-LAW-3YD-LFP-00001, SYSTEM DESCRIPTION FOR LOW ACTIVITY WASTE MELTER FEED PROCESS SYSTEM (LFP).

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 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.

CM
QUALITY DESIGNATOR

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR CONSTRUCTION, SEE NOTE 9					2/16/11

REVISION HISTORY

ISSUED BY APP-WTP PDC
ISSUE STAMP

PROJECT No.	24590
SITE	HANFORD
AREA	200E
BUILDING No.	20

	BY	DATE
ORIGINATOR	Robert T. Parker	02/14/11
CHECKER	Inga Johnson	02/16/11
APPROVER		2/16/11
REVIEWER		2/16/11
		2/16/11
		2/16/11

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. 24590-LAW-ADR-M-01-004 REV: 3
E&NS SCREENING REQUIRED? [X] YES [ ] NO E&NS INITIAL IF YES

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

P&ID - LAW
LAW MELTER FEED PROCESS SYSTEM MELTER 2 FEED PREPARATION AND FEED
LFP-BULGE-00002

SCALE: NONE
24590-LAW-M6-LFP-00003006
REV 0

SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREQ-002

"E" SIZE - 44x34
COMPUTER GENERATED - MANUAL DESIGN CHANGES NOT PERMITTED

FORM E_SDN.DGN 02/2009

PLOTTED BY: cmreed C:\Work\cmcorey\dms03838\LAWM6LFP00003006.dgn 2/16/2011 8:25:39 AM

Table III.10.E.B – LAW Vitrification Plant Tank Systems Description

Dangerous and/or Mixed Waste Tank Systems Name	Unit Designation	Engineering Description (Drawing Nos, Specification Nos, etc.)	Narrative Description, Tables & Figures	Maximum Capacity (gallons)
LAW Concentrate Receipt Process System LCP-VSL-00001 (LAW Melter 1 Concentrate Receipt Vessel) LCP-VSL-00002 (LAW Melter 2 Concentrate Receipt Vessel)	LCP	**24590-LAW** -M5-V17T-P0001, Rev 0 -M5-V17T-P0002, Rev 0 -M6-LCP-00001001, Rev 0 -M6-LCP-00001002, Rev 0 -M6-LCP-00001003, Rev 0 -M6-LCP-00001004, Rev 0 -M6-LCP-00001005, Rev 0 -M6-LCP-00001006, Rev 0 -M6-LCP-00002001, Rev 0 -M6-LCP-00002002, Rev 0 -M6-LCP-00002003, Rev 0 -M6-LCP-00002004, Rev 0 -MV-LCP-P0001, Rev 0 -MV-LCP-P0002, Rev 0 -MVD-LCP-P0004, Rev 1 -MVD-LCP-P0005, Rev 1 -N1D-LCP-P0001, Rev 1 -P1-P01T-00002, Rev 5 -P1-P01T-00011, Rev 6	Section 4.1.3.1; Tables 4-3 and 4-6; and Figures C1-1 and C1-3 of Operating Unit Group 10, Addendum C of this Permit.	LCP-VSL-00001 = 18,130 LCP-VSL-00002 = 18,130
LAW Melter Feed Process System LFP-VSL-00001 (Melter 1 Feed Preparation Vessel) LFP-VSL-00002 (Melter 1 Feed Vessel) LFP-VSL-00003 (Melter 2 Feed Preparation Vessel)	LFP	**24590-LAW** -M5-V17T-P0001, Rev 0 -M5-V17T-P0002, Rev 0 ~~-M6-LFP-P0001, Rev 2~~ -M6-LFP-00001001, Rev 0 -M6-LFP-00001002, Rev 0 -M6-LFP-00001003, Rev 0 -M6-LFP-00001004, Rev 0 -M6-LFP-00001005, Rev 0 -M6-LFP-00001006, Rev 0	Section 4.1.3.1; Tables 4-3 and 4-6; and Figures C1-1 and C1-3 of Operating Unit Group 10, Addendum C of this Permit.	LFP-VSL-00001 = 9,123 LFP-VSL-00002 = 9,123 LFP-VSL-00003 = 9,123 LFP-VSL-00004 = 9,123

Table III.10.E.B – LAW Vitrification Plant Tank Systems Description

Dangerous and/or Mixed Waste Tank Systems Name	Unit Designation	Engineering Description (Drawing Nos, Specification Nos, etc.)	Narrative Description, Tables & Figures	Maximum Capacity (gallons)
LFP-VSL-00004 (Melter 2 Feed Vessel)		~~-M6-LFP-P0003, Rev 2~~ M6-LFP-00003001, Rev 0 M6-LFP-00003002, Rev 0 M6-LFP-00003003, Rev 0 M6-LFP-00003004, Rev 0 M6-LFP-00003005, Rev 0 M6-LFP-00003006, Rev 0 -MV-LFP-P0001, Rev 0 -MV-LFP-P0002, Rev 0 -MV-LFP-P0004, Rev 0 -MV-LFP-P0005, Rev 0 -MVD-LFP-P0007, Rev 1 -MVD-LFP-P0008, Rev 1 -MVD-LFP-P0010, Rev 1 -MVD-LFP-P0011, Rev 1 -P1-P01T-00002, Rev 5 -N1D-LFP-00004, Rev 2 -N1D-LFP-00006, Rev 0		
LAW Secondary Off-gas/Vessel Vent Process System LVP-TK-00001 (LAW Caustic Collection Tank)	LVP	**24590-LAW** -M5-V17T-P0011, Rev 1 -P1-P01T-00004, Rev 3 -MT-LVP-00004, Rev 1 -MTD-LVP-P0001, Rev 0 -N1D-LVP-00002, Rev 2	Section 4.1.3.3; Tables 4-3 and 4-6; and Figures C1-1 and C1-3 of Operating Unit Group 10, Addendum C of this Permit.	LVP-TK-00001= 14,232
LAW Primary Off-gas Process System LOP-VSL-00001 (LAW Melter 1 SBS Condensate Vessel)	LOP	**24590-LAW** -M5-V17T-P0007, Rev 0 -M5-V17T-P0008, Rev 0 -M6-LOP-P0001, Rev 2	Section 4.1.3.3; Tables 4-3 and 4-6; and Figures C1-1 and C1-3 of Operating Unit Group 10, Addendum C of this Permit.	LOP-VSL-00001 = 9,056 LOP-VSL-00002 = 9,056

Table III.10.E.L - LAW Vitrification Plant Tank Systems Secondary Containment Systems, Including Sumps, Bulges, Autosamplers, and Floor Drains

Sump or Drain Line I.D.# & Room Location	Maximum Sump (gallons) or Drain Line (gallons per minute) Capacity	Sump Type/Nominal Operating Volume (gallons)	Sump or Drain Line Dimensions[a] (inches) & Materials of Construction	Engineering Description (Drawing Nos., Specifications Nos., etc.)
Drain Line ID# = LCP-FD-00002 L-0123 (LCP-BULGE-00002 Drain, El. +3')	N/A	N/A	2" Dia. 316L	**24590-LAW** -M6-LCP-00001004, Rev 0
Drain Line ID# = RLD-WS-20037-S11B-01 L-0123 (Melter 1 Encasement Assembly Drain, El. +3')	N/A	N/A	1" Dia. 316L	**24590-LAW** -M6-LMP-00012, Rev 5
Drain Line ID# = LFP-FD-00001 L-0123 (LFP-BULGE-00001 Drain, El. +3)	N/A	N/A	2" Dia. 316L	**24590-LAW** ~~-M6-LFP-P0001, Rev 2~~ -M6-LFP-00001005, Rev 0
Drain Line ID# = LOP-FD-00002 L-0124 (LOP-BULGE-00002 Drain, El. +3)	N/A	N/A	2" Dia. 6 Mo	**24590-LAW** -M6-LOP-P0002, Rev 2
Drain Line ID# = LCP-FD-00003 L-0124 (LCP-BULGE-00003 Drain, El. +3)	N/A	N/A	2" Dia. 316L	**24590-LAW** -M6-LCP-00002001, Rev 0
Drain Line ID# = LFP-FD-00002 L-0124 (LFP-BULGE-00002 Drain, El. +3)	N/A	N/A	2" Dia. 316L	**24590-LAW** ~~-M6-LFP-P0003, Rev 2~~ -M6-LFP-00003005, Rev 0

1
2

Table III.10.E.B – LAW Vitrification Plant Tank Systems Description

Dangerous and/or Mixed Waste Tank Systems Name	Unit Designation	Engineering Description (Drawing Nos, Specification Nos, etc.)	Narrative Description, Tables & Figures	Maximum Capacity (gallons)
LAW Concentrate Receipt Process System LCP-VSL-00001 (LAW Melter 1 Concentrate Receipt Vessel) LCP-VSL-00002 (LAW Melter 2 Concentrate Receipt Vessel)	LCP	**24590-LAW** -M5-V17T-P0001, Rev 0 -M5-V17T-P0002, Rev 0 -M6-LCP-00001001, Rev 0 -M6-LCP-00001002, Rev 0 -M6-LCP-00001003, Rev 0 -M6-LCP-00001004, Rev 0 -M6-LCP-00001005, Rev 0 -M6-LCP-00001006, Rev 0 -M6-LCP-00002001, Rev 0 -M6-LCP-00002002, Rev 0 -M6-LCP-00002003, Rev 0 -M6-LCP-00002004, Rev 0 -MV-LCP-P0001, Rev 0 -MV-LCP-P0002, Rev 0 -MVD-LCP-P0004, Rev 1 -MVD-LCP-P0005, Rev 1 -N1D-LCP-P0001, Rev 1 -P1-P01T-00002, Rev 5 -P1-P01T-00011, Rev 6	Section 4.1.3.1; Tables 4-3 and 4-6; and Figures C1-1 and C1-3 of Operating Unit Group 10, Addendum C of this Permit.	LCP-VSL-00001 = 18,130 LCP-VSL-00002 = 18,130
LAW Melter Feed Process System LFP-VSL-00001 (Melter 1 Feed Preparation Vessel) LFP-VSL-00002 (Melter 1 Feed Vessel) LFP-VSL-00003 (Melter 2 Feed Preparation Vessel)	LFP	**24590-LAW** -M5-V17T-P0001, Rev 0 -M5-V17T-P0002, Rev 0 -M6-LFP-00001001, Rev 0 -M6-LFP-00001002, Rev 0 -M6-LFP-00001003, Rev 0 -M6-LFP-00001004, Rev 0 -M6-LFP-00001005, Rev 0 -M6-LFP-00001006, Rev 0	Section 4.1.3.1; Tables 4-3 and 4-6; and Figures C1-1 and C1-3 of Operating Unit Group 10, Addendum C of this Permit.	LFP-VSL-00001 = 9,123 LFP-VSL-00002 = 9,123 LFP-VSL-00003 = 9,123 LFP-VSL-00004 = 9,123

Table III.10.E.B – LAW Vitrification Plant Tank Systems Description

Dangerous and/or Mixed Waste Tank Systems Name	Unit Designation	Engineering Description (Drawing Nos, Specification Nos, etc.)	Narrative Description, Tables & Figures	Maximum Capacity (gallons)
LFP-VSL-00004 (Melter 2 Feed Vessel)		-M6-LFP-00003001, Rev 0 -M6-LFP-00003002, Rev 0 -M6-LFP-00003003, Rev 0 -M6-LFP-00003004, Rev 0 -M6-LFP-00003005, Rev 0 -M6-LFP-00003006, Rev 0 -MV-LFP-P0001, Rev 0 -MV-LFP-P0002, Rev 0 -MV-LFP-P0004, Rev 0 -MV-LFP-P0005, Rev 0 -MVD-LFP-P0007, Rev 1 -MVD-LFP-P0008, Rev 1 -MVD-LFP-P0010, Rev 1 -MVD-LFP-P0011, Rev 1 -P1-P01T-00002, Rev 5 -N1D-LFP-00004, Rev 2 -N1D-LFP-00006, Rev 0		
LAW Secondary Off-gas/Vessel Vent Process System LVP-TK-00001 (LAW Caustic Collection Tank)	LVP	**24590-LAW** -M5-V17T-P0011, Rev 1 -P1-P01T-00004, Rev 3 -MT-LVP-00004, Rev 1 -MTD-LVP-P0001, Rev 0 -N1D-LVP-00002, Rev 2	Section 4.1.3.3; Tables 4-3 and 4-6; and Figures C1-1 and C1-3 of Operating Unit Group 10, Addendum C of this Permit.	LVP-TK-00001= 14,232
LAW Primary Off-gas Process System LOP-VSL-00001 (LAW Melter 1 SBS Condensate Vessel)	LOP	**24590-LAW** -M5-V17T-P0007, Rev 0 -M5-V17T-P0008, Rev 0 -M6-LOP-P0001, Rev 2 -M6-LOP-P0002, Rev2	Section 4.1.3.3; Tables 4-3 and 4-6; and Figures C1-1 and C1-3 of Operating Unit Group 10, Addendum C of this Permit.	LOP-VSL-00001 = 9,056 LOP-VSL-00002 = 9,056

Table III.10.E.L - LAW Vitrification Plant Tank Systems Secondary Containment Systems, Including Sumps, Bulges, Autosamplers, and Floor Drains

Sump or Drain Line I.D.# & Room Location	Maximum Sump (gallons) or Drain Line (gallons per minute) Capacity	Sump Type/Nominal Operating Volume (gallons)	Sump or Drain Line Dimensions[a] (inches) & Materials of Construction	Engineering Description (Drawing Nos., Specifications Nos., etc.)
Drain Line ID# = LCP-FD-00002 L-0123 (LCP-BULGE-00002 Drain, El. +3')	N/A	N/A	2" Dia. 316L	**24590-LAW** -M6-LCP-00001004, Rev 0
Drain Line ID# = RLD-WS-20037-S11B-01 L-0123 (Melter 1 Encasement Assembly Drain, El. +3')	N/A	N/A	1" Dia. 316L	**24590-LAW** -M6-LMP-00012, Rev 5
Drain Line ID# = LFP-FD-00001 L-0123 (LFP-BULGE-00001 Drain, El. +3)	N/A	N/A	2" Dia. 316L	**24590-LAW** -M6-LFP-00001005, Rev 0
Drain Line ID# = LOP-FD-00002 L-0124 (LOP-BULGE-00002 Drain, El. +3)	N/A	N/A	2" Dia. 6 Mo	**24590-LAW** -M6-LOP-P0002, Rev 2
Drain Line ID# = LCP-FD-00003 L-0124 (LCP-BULGE-00003 Drain, El. +3)	N/A	N/A	2" Dia. 316L	**24590-LAW** -M6-LCP-00002001, Rev 0
Drain Line ID# = LFP-FD-00002 L-0124 (LFP-BULGE-00002 Drain, El. +3)	N/A	N/A	2" Dia. 316L	**24590-LAW** -M6-LFP-00003005, Rev 0

Quarter Ending June 30, 2012 24590-PTF-PCN-ENV-12-003

Hanford Facility RCRA Permit Modification Notification Form

Part III, Operating Unit 10

Waste Treatment and Immobilization Plant

Index

Page 2 of 3: Hanford Facility RCRA Permit, Part III, Operating Unit 10, Waste Treatment and Immobilization Plant

Replace Piping and Instrumentation Diagrams (P&ID) for the PTF Cesium Nitric Acid Recovery Process (CNP) System Vessels (CNP-VSL-00001, CNP-VSL-00003, CNP-VSL-00004) and Transfer Ejectors, Utility Rack (PSA-RK-00009), and Pulse Jet Mixers (PJM); for the PTF Pulse Jet Ventilation (PJV) System Utility Services Plant Wash Rack (PWD-RK-00020); and for the PTF Vessel Vent Process (PVP) System High Efficiency Mist Eliminators (HEME) in Appendix 8.2 of the Dangerous Waste Permit (DWP).

Submitted by Co-Operator:		Reviewed by ORP Program Office:	
Donna Busche	6/20/12		7/26/12
D. M. Busche	Date	D. L. Noyes	Date

Quarter Ending June 30, 2012 24590-PTF-PCN-ENV-12-003

Hanford Facility RCRA Permit Modification Notification Form

Unit:	Permit Part:
Waste Treatment and Immobilization Plant	**Part III, Operating Unit 10**

Description of Modification:

The purpose of this Class 1 prime modification is to update the P&ID drawings for the PTF CNP Eluate Contingency Storage Vessel (CNP-VSL-00003), Cesium Evaporator Eluate Lute Pot (CNP-VSL-00001), Cesium Evaporator Recovered Nitric Acid Vessel (CNP-VSL-00004) and Transfer Ejectors (CNP-EJCTR-00012, -00013, and -00037), PSA Utility Rack (PSA RK-00009), and PJMs (CNP-PJM-00013, -00014, -00015, -00016, and -00166), and for the PTF PJV Plant Wash Rack (PWD-RK-00020), and the PTF PVP HEMEs (PVP-HEME-00001A/B/C) in Appendix 8.2 of the DWP.

The following P&ID drawings are being submitted to replace the documents currently in Appendix 8.2. The increase in the number of P&ID drawings submitted results from converting source drawing into three or four drawings to provide a clearer representation of the system.

Appendix 8.2			
Replace:		With:	24590-PTF-M6-CNP-00001001, Rev. 0
	24590-PTF-M6-CNP-00001, Rev. 2		24590-PTF-M6-CNP-00001002, Rev. 0
			24590-PTF-M6-CNP-00001003, Rev. 0
			24590-PTF-M6-CNP-00002001, Rev. 0
	24590-PTF-M6-CNP-00002, Rev. 2		24590-PTF-M6-CNP-00002002, Rev. 0
			24590-PTF-M6-CNP-00002003, Rev. 0
			24590-PTF-M6-CNP-00003001, Rev. 0
	24590-PTF-M6-CNP-00003, Rev. 3		24590-PTF-M6-CNP-00003002, Rev. 0
			24590-PTF-M6-CNP-00003003, Rev. 0
			24590-PTF-M6-CNP-00003004, Rev. 0
	24590-PTF-M6-PJV-00004, Rev. 3		24590-PTF-M6-PJV-00004001, Rev. 0
	24590-PTF-M6-PVP-00018001, Rev. 0		24590-PTF-M6-PVP-00018001, Rev. 1

This modification requests Ecology approval and incorporation into the permit the specific changes to the above DWP documents. Conversion from one to multiple drawings expands the drawings to provide more detail; revision clouds are used to show changes.

Revisions are the result of ongoing design (changes from vendor preliminary date to vendor detailed design), quality/seismic flag changes, and general criteria from design verification review. The following identifies the significant changes that have been incorporated:

Significant changes common to most or all P&IDs are summarized below:

- Converted some drawings from a single sheet to multi-sheet drawings
- Modified, deleted, and added notes, holds, and references
- Modified, identified, and added support/utility system lines, valves, in-line components, instruments, and logic controls
- Incorporated changes from documentation identified in the Notes section on each drawing

Quarter Ending June 30, 2012 24590-PTF-PCN-ENV-12-003

This modification requests Ecology approval and incorporation of the following outstanding change document(s) into the permit. Although not yet incorporated into the revised documents included in this PCN, the listed outstanding change document(s) are intended to be incorporated into the permit:

24590-PTF-M6-PJV-00004001:

- 24590-PTF-M6LN-PJV-00004

In accordance with Permit Condition III.10.C.2.e, the permit modification may include page changes to the Permit, attachments, and permit application supporting documentation. Necessary permit changes are attached to this PCN. Ecology is requested to approve the attached permit changes and incorporate the changes in the next revision of the WTP DWP.

See attached.

WAC 173-303-830 Modification Class:	Class 1	Class [1]1	Class 2	Class 3
Please mark the Modification Class:		X		

Enter relevant WAC 173-303-830, Appendix I Modification citation number: NA

Enter wording of WAC 173-303-830, Appendix I Modification citation:

In accordance with WAC 173-303-830(4)(d)(i), this modification notification is requested to be reviewed and approved as a Class [1]1 modification. WAC 173-303-830(4)(d)(ii)(A) states, "Class 1 modifications apply to minor changes that keep the permit current with routine changes to the facility or its operation. These changes do not substantially alter the permit conditions or reduce the capacity of the facility to protect human health or the environment. In the case of Class 1 modifications, the director may require prior approval."

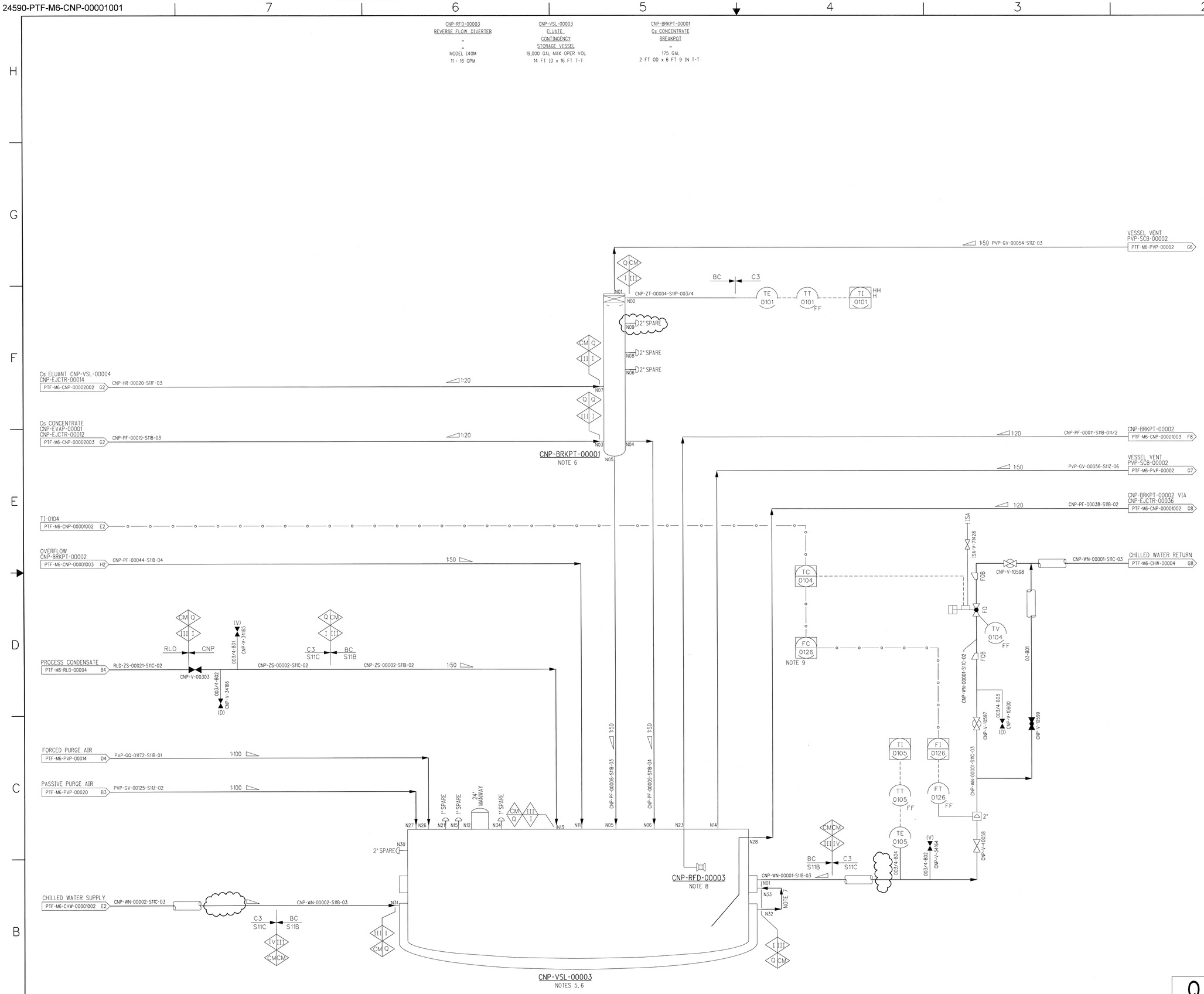
Modification Approved/Concur: ☑ Yes ☐ Denied (state reason below)

Reason for denial:

Reviewed by Ecology:

A. Carlson 8/15/12

A. Carlson Date



NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
2. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
3. THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I, UNLESS OTHERWISE NOTED.
4. ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, EXCEPT BLACK CELL LINES WHICH ARE SELF DRAINING, UNLESS OTHERWISE NOTED.
5. PLANT SERVICE AIR FOR REVERSE FLOW DIVERTERS AND PULSE JET MIXERS ARE SHOWN ON 24590-PTF-M6-CNP-00003.
6. WASH RINGS ARE SHOWN ON 24590-PTF-M6-CNP-00005 AND 24590-PTF-M6-CXP-00007.
7. COOLING CROSS-OVER LINE SUPPLIED BY VESSEL VENDOR.
8. THE REVERSE FLOW DIVERTER AND ASSOCIATED DISCHARGE PIPING (INSIDE THE VESSEL) UP TO THE VESSEL NOZZLE IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-III.
9. FLOW CONTROL CASCADES TO TEMPERATURE CONTROL TO LIMIT MAXIMUM FLOW TO SET POINT OF 60 GPM.
10. THIS DRAWING IS CONVERTED FROM A SINGLE DRAWING TO MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-PTF-M6-CNP-00001 REV 3. THIS DRAWING INCLUDES INFORMATION FROM: 24590-PTF-M6N-CNP-00006, 24590-PTF-M6LN-CNP-00002, 24590-PTF-M6PN-CNP-00001, 24590-PTF-M6N-M8OT-00080, 24590-PTF-M6N-10-00001, AND FURTHER MODIFIED.

HOLD/OPEN ITEMS:

NONE

REFERENCES:

1. 24590-PTF-3YD-CNP-00001, SYSTEM DESCRIPTION FOR THE CESIUM NITRIC ACID RECOVERY PROCESS - SYSTEM CNP.

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 regulation of DOE's AEA activities by regulators without jurisdiction 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.

DRAWING INDEX

DWG NO	TITLE
24590-PTF-M6-CNP-00001001	CESIUM NITRIC ACID RECOVERY PROCESS
24590-PTF-M6-CNP-00001002	CESIUM NITRIC ACID RECOVERY PROCESS
24590-PTF-M6-CNP-00001003	CESIUM NITRIC ACID RECOVERY PROCESS

Q
QUALITY DESIGNATOR

REVISION HISTORY

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR CONSTRUCTION, SEE NOTE 10		JSK	JD		3/1/12

ISSUED BY RPP-WTP PDC
INIT DATE
ISSUE STAMP

PROJECT No.	24590	
SITE	HANFORD	
AREA	200E	
BUILDING No.	10	

	BY	DATE
ORIGINATOR		31 AUG 11
CHECKER		8/31/11
APPROVER		3/1/12
REVIEWER		8/31/11
		3-01-12

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. 24590-PTF-ADR-M-02-040 REV: 3
SAFETY SCREEN REQUIRED? [X] YES [ ] NO EMAS INITIAL IF YES

BECHTEL
RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

P&ID - PTF
CESIUM NITRIC ACID RECOVERY PROCESS SYSTEM ELUATE CONTINGENCY CNP-VSL-00003

SCALE: NONE
24590-PTF-M6-CNP-00001001
REV 0

SAFETY SCREEN IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREG-002

"E" SIZE - 44x34
COMPUTER GENERATED - MANUAL CHANGES NOT PERMITTED

R11479045

FORM E_SDN.DGN 02/2003

8/31/2011 8:22:04 AM

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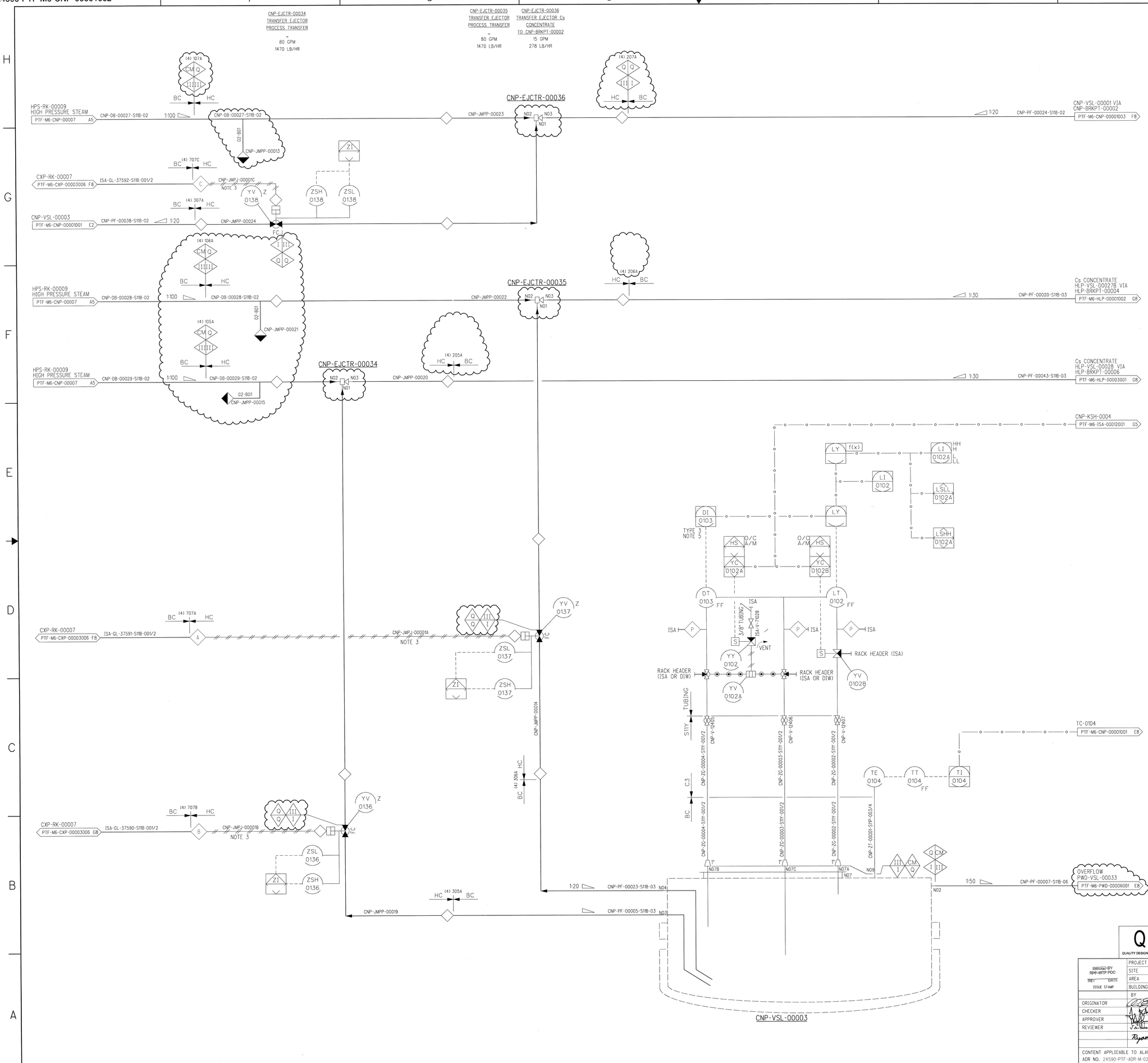

NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
2. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
3. THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I, UNLESS OTHERWISE NOTED. THE PRESSURE BOUNDARY FOR ALL FLEXIBLE PNEUMATIC JUMPERS IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV.
4. ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, EXCEPT BLACK CELL LINES WHICH ARE SELF DRAINING, UNLESS OTHERWISE NOTED.
5. SEE 24590-PTF-M6-ISA-00008 FOR BUBBLER RACKS AND SYSTEM CONNECTIONS.
6. THIS DRAWING IS CONVERTED FROM A SINGLE DRAWING TO MULTI-SHEET DRAWING AND, IN PART, SUPERSEDES 24590-PTF-M6-CNP-00001 REV 3. THIS DRAWING INCLUDES INFORMATION FROM: 24590-PTF-M6LN-CNP-00002, 24590-PTF-M6N-M80T-00061, -00079, -00080, -00112, 24590-PTF-M6LN-M80T-00022, 24590-PTF-M6N-10-00011, AND FURTHER MODIFIED.

HOLD/OPEN ITEMS:

NONE

REFERENCES:

1. 24590-PTF-3YD-CNP-00001, SYSTEM DESCRIPTION FOR THE CESIUM NITRIC ACID RECOVERY PROCESS - SYSTEM CNP.

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 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.

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR CONSTRUCTION, SEE NOTE 6	CJ	JK	JD/RLC	JDG	3/1/12

REVISION HISTORY

Q QUALITY DESIGNATOR

ISSUED BY RPP-WTP PDC

	BY	DATE
ORIGINATOR	[signature]	10/12/11
CHECKER	[signature]	10/13/11
APPROVER	[signature]	3/1/12
REVIEWER	[signature]	2/27/12
	[signature]	01-MAR-12

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. 24590-PTF-ADR-M-02-040 REV: 3
SAFETY SCREEN REQUIRED? [X] YES [ ] NO EMS INITIAL IF YES: [ ]

PROJECT No. 24590
SITE HANFORD
AREA 200E
BUILDING No. 10

BECHTEL
RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

P&ID - PTF
CESIUM NITRIC ACID RECOVERY PROCESS SYSTEM ELUATE CONTINGENCY
CNP-VSL-00003

SCALE: NONE
24590-PTF-M6-CNP-00001002
REV 0

E SIZE - 44x34
COMPUTER GENERATED - MANUAL CHANGES NOT PERMITTED

SAFETY SCREEN IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREQ-002

R11479046

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PLOTTED BY: gpockes
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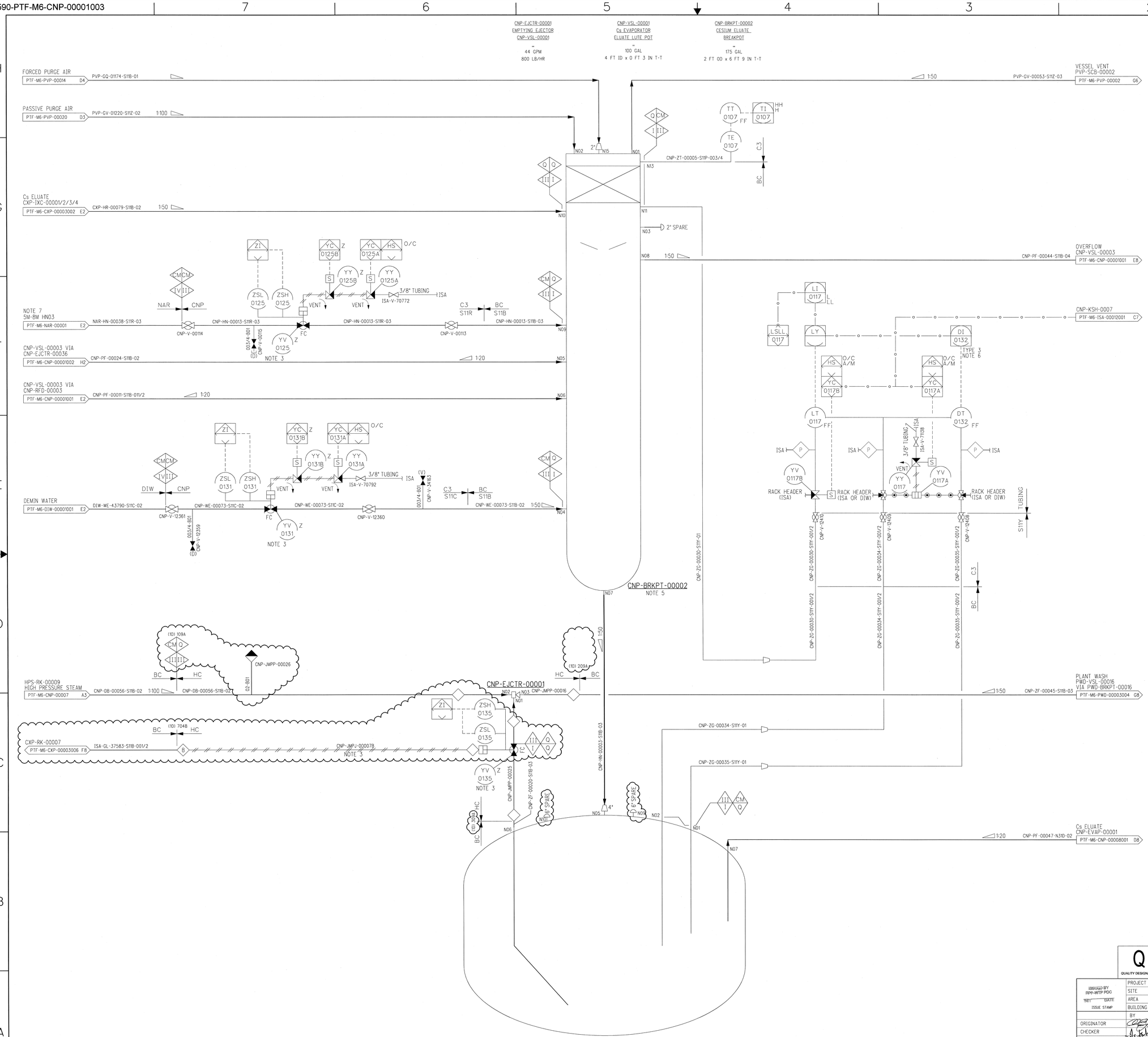

NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
2. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
3. THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I, UNLESS OTHERWISE NOTED. THE PRESSURE BOUNDARY FOR ALL FLEXIBLE PNEUMATIC JUMPERS IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV. VALVES YV-0125, YV-0131, AND YV-0135 ARE QUALITY LEVEL Q.
4. ALL LINES ON THIS DRAWING SHALL BE FREE DRAINING, EXCEPT BLACK CELL LINES WHICH ARE SELF DRAINING, UNLESS OTHERWISE NOTED.
5. WASH RINGS ARE SHOWN ON 24590-PTF-M6-CXP-00007.
6. SEE 24590-PTF-M6-ISA-00008 FOR BUBBLER RACKS AND SYSTEM CONNECTIONS.
7. THE 5M-8M NITRIC ACID IS USED TO CHARGE CNP-EVAP-00001 ON STARTUP.
8. THIS DRAWING IS CONVERTED FROM A SINGLE DRAWING TO MULTI-SHEET DRAWING AND, IN PART, SUPERSEDES 24590-PTF-M6-CNP-00001 REV 3. THIS DRAWING INCLUDES INFORMATION FROM: 24590-PTF-M6LN-CNP-00002, -00008, 24590-PTF-M6N-M80T-00079, -00080, -00112, 24590-PTF-M6N-10-00011, AND FURTHER MODIFIED.

HOLD/OPEN ITEMS:

NONE

REFERENCES:

1. 24590-PTF-3YD-CNP-00001, SYSTEM DESCRIPTION FOR THE CESIUM NITRIC ACID RECOVERY PROCESS - SYSTEM CNP.

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 AEA, it has sole and exclusive responsibility and authority regarding radiological aspects of source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR CONSTRUCTION, SEE NOTE 8	CJF	JK	JD	JH	3/1/12

REVISION HISTORY

Q
QUALITY DESIGNATOR

ISSUED BY RPP-WTP PDC
INIT. DATE
ISSUE STAMP

PROJECT No.	24590
SITE	HANFORD
AREA	200E
BUILDING No.	10

	BY	DATE
ORIGINATOR	[illegible]	28 OCT 11
CHECKER	[illegible]	10/26/11
APPROVER	[illegible]	3/1/12
REVIEWER	Sathini Dave	2/27/12
	Ryan Z Golik	3-01-12

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. 24590-PTF-ADR-M-02-040 REV: 3
SAFETY SCREEN REQUIRED? [X] YES [ ] NO | E&NS INITIAL IF YES-GW

BECHTEL

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

P&ID - PTF
CESIUM NITRIC ACID RECOVERY PROCESS SYSTEM ELUATE CONTINGENCY CNP-VSL-00001

SCALE: NONE

24590-PTF-M6-CNP-00001003

REV 0

R11479047

SAFETY SCREEN IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREG-002

'E' SIZE - 44x34
COMPUTER GENERATED - MANUAL CHANGES NOT PERMITTED

FORM E_SDN.DGN 02/2003

10/13/2011 9:21:53 AM

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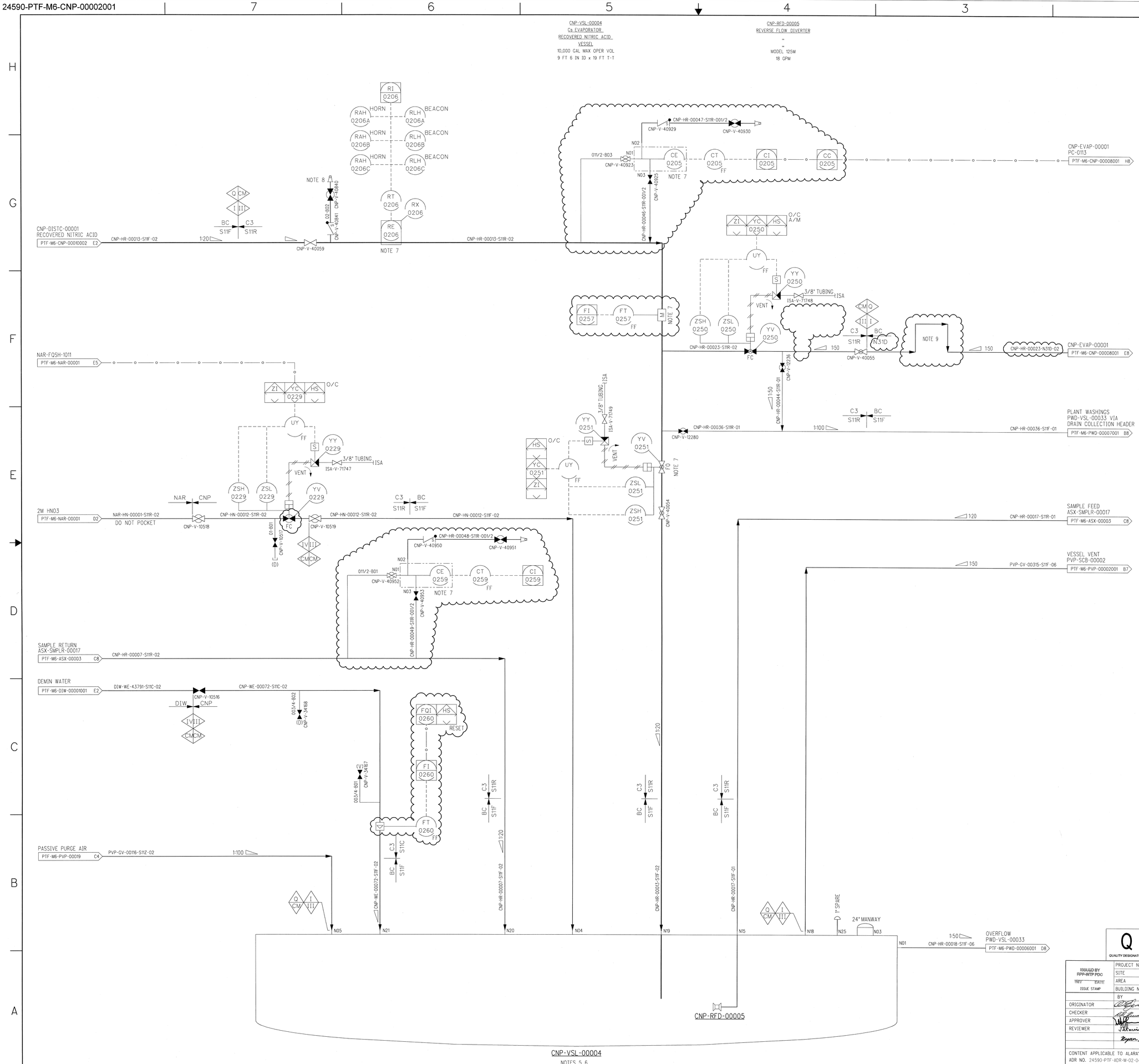

NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
2. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
3. THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-III, UNLESS OTHERWISE NOTED. THE PRESSURE BOUNDARY FOR NON-SAFETY INSTRUMENT SERVICE AIR (ISA) AND THE CORRESPONDING NON-SAFETY SOLENOID VALVES IT SUPPLIES IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV.
4. ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, EXCEPT BLACK CELL LINES WHICH ARE SELF-DRAINING, UNLESS OTHERWISE NOTED.
5. SEE 24590-PTF-M6-CNP-00004, FOR PLANT SERVICE AIR, REVERSE FLOW DIVERTER, AND PULSE JET MIXERS.
6. SEE 24590-PTF-M6-CXP-00007, FOR WASH RINGS.
7. PIPE INCLUDING RADIATION MONITOR RE-0206, CONDUCTIVITY ELEMENTS CE-0205, CE-0259, FT-0257, AND VALVE YV-0251 MUST BE IN POCKETED SECTION OF LINE. LINE IS FREE DRAINING RETURNING TO SAMPLED LINE. THE CONDUCTIVITY ELEMENT PROBE IS A RETRACTABLE TYPE WITH FLUSHING CAPABILITY.
8. CONNECTION PROVIDED FOR REAGENTS, PLANT WASH, AND SERVICE AIR.
9. MINIMUM HYDRAULIC SEAL HEIGHT IS 3 FEET 6 INCHES.
10. THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-PTF-M6-CNP-00002 REV 3. THIS DRAWING INCLUDES INFORMATION FROM 24590-PTF-M6N-CNP-00001, -00006, -00084, -00102, -00104, AND 24590-PTF-M6N-M80T-00080.

HOLD/OPEN ITEMS:

NONE

REFERENCES:

1. 24590-PTF-3YD-CNP-00001, SYSTEM DESCRIPTION FOR THE CESIUM NITRIC ACID RECOVERY PROCESS - SYSTEM CNP.

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 AEA, it has sole and exclusive responsibility and authority regarding radiation protection for such materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

DRAWING INDEX

DWG NO	TITLE
24590-PTF-M6-CNP-00002001	CNP SYS RECOVERED NITRIC ACID CNP-VSL-00004
24590-PTF-M6-CNP-00002002	CNP SYS RECOVERED NITRIC ACID CNP-VSL-00004
24590-PTF-M6-CNP-00002003	CNP SYS CS CONCENTRATE TRANSFER EJECTORS

REVISION HISTORY

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR CONSTRUCTION, SEE NOTE 10					10/13/11

QUALITY DESIGNATOR: Q

ISSUED BY RPP-WTP PDC

PROJECT No.	24590	
SITE	HANFORD	
AREA	200E	
BUILDING No.	10	

	BY	DATE
ORIGINATOR		23 SEP 11
CHECKER		10/7/11
APPROVER		10/13/11
REVIEWER	Sukumar Dave	10/11/11
	Ryan Zbella	10-12-11

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO

ADR NO. 24590-PTF-ADR-M-02-040 REV: 3

EMS SCREENING REQUIRED? [X] YES [ ] NO EMS INITIAL IF YES

SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREQ-002

"E" SIZE - 44x34
COMPUTER GENERATED - MANUAL DESIGN CHANGES NOT PERMITTED

BECHTEL

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

P&ID - PTF
CESIUM NITRIC ACID RECOVERY PROCESS SYSTEM
RECOVERED NITRIC ACID
CNP-VSL-00004

SCALE: NONE

24590-PTF-M6-CNP-00002001 REV 0

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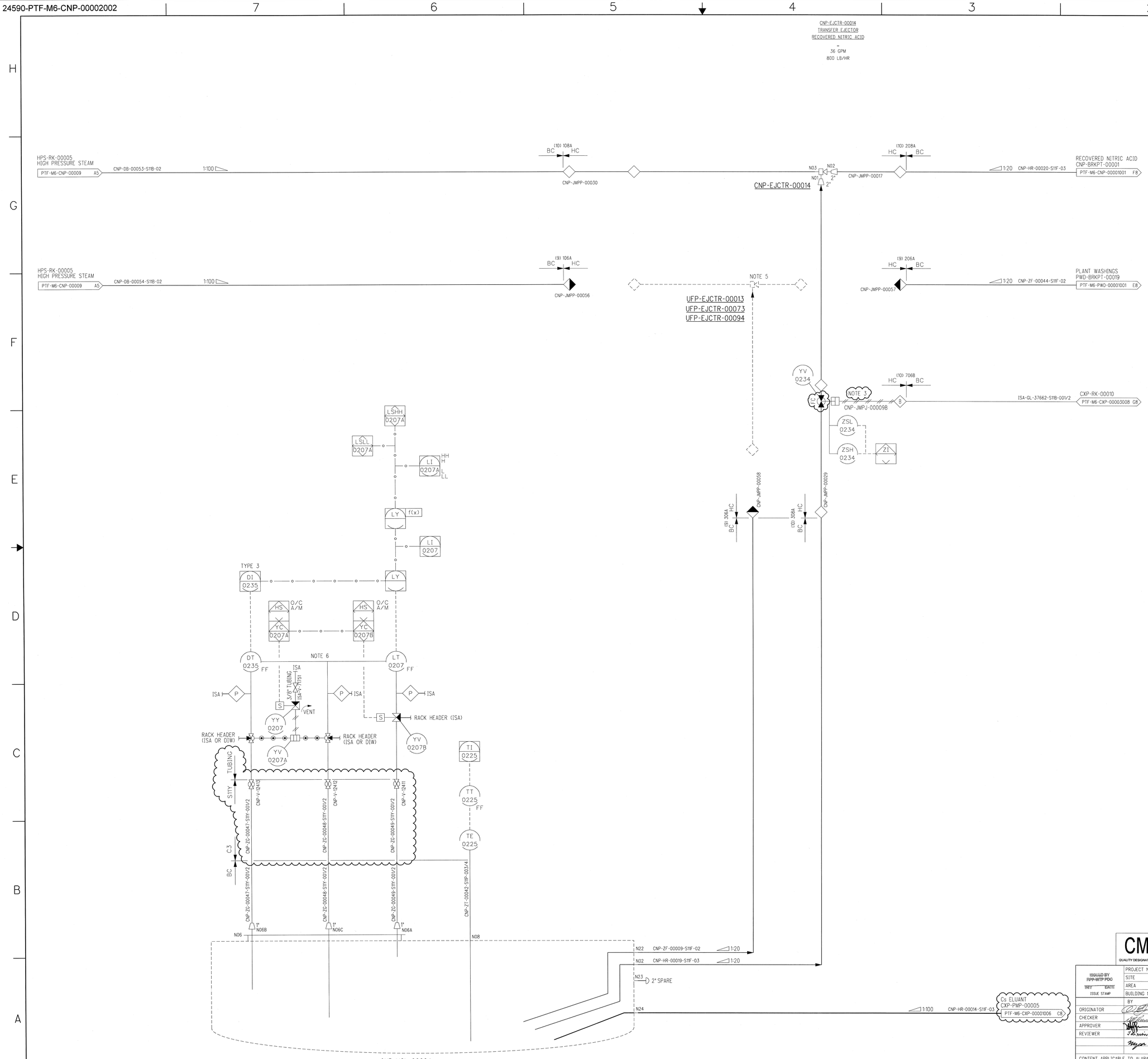
PLOTTED BY rriveros

FORM E_SDN.DGN 02/2009



NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
2. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
3. THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-III, UNLESS OTHERWISE NOTED. THE PRESSURE BOUNDARY FOR ALL FLEXIBLE PNEUMATIC JUMPERS IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV. THE PRESSURE BOUNDARY FOR NON-SAFETY INSTRUMENT SERVICE AIR (ISA) AND THE CORRESPONDING NON-SAFETY SOLENOID VALVES IT SUPPLIES IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV.
4. ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, EXCEPT BLACK CELL LINES WHICH ARE SELF-DRAINING, UNLESS OTHERWISE NOTED.
5. FOR EMPTYING CNP-VSL-00004, ONE OF THE THREE TRANSFERABLE PERMEATE VESSEL EMPTYING EJECTORS (UFP-EJCTR-00013/73/94) WILL BE USED.
6. SEE 24590-PTF-M6-ISA-00008, FOR BUBBLER RACKS AND SYSTEM CONNECTIONS.
7. THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-PTF-M6-CNP-00002 REV 3. THIS DRAWING INCLUDES INFORMATION FROM 24590-PTF-M6N-M80T-00079, 00080, -00112, AND 24590-PTF-M6N-10-00011.

HOLD/OPEN ITEMS:

NONE

REFERENCES:

1. 24590-PTF-3YD-CNP-00001, SYSTEM DESCRIPTION FOR THE CESIUM NITRIC ACID RECOVERY PROCESS - SYSTEM CNP.

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 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.

CM
QUALITY DESIGNATOR

REVISION HISTORY

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR CONSTRUCTION, SEE NOTE 7					10/13/11

ISSUED BY RPP-WTP PDC
INIT DATE
ISSUE STAMP

PROJECT No.	24590	
SITE	HANFORD	
AREA	200E	
BUILDING No.	10	

	BY	DATE
ORIGINATOR		10/12/11
CHECKER		10/12/11
APPROVER		10/13/11
REVIEWER		10/12/11
		10-12-11

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. 24590-PTF-ADR-M-02-040 REV: 3
EMS SCREENING REQUIRED? [X] YES [ ] NO EMS INITIAL IF YES

BECHTEL

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

P&ID - PTF
CESIUM NITRIC ACID RECOVERY PROCESS SYSTEM
RECOVERED NITRIC ACID
CNP-VSL-00004

SCALE: NONE

24590-PTF-M6-CNP-00002002

REV 0

R11432655

10/12/2011 7:59:27 AM

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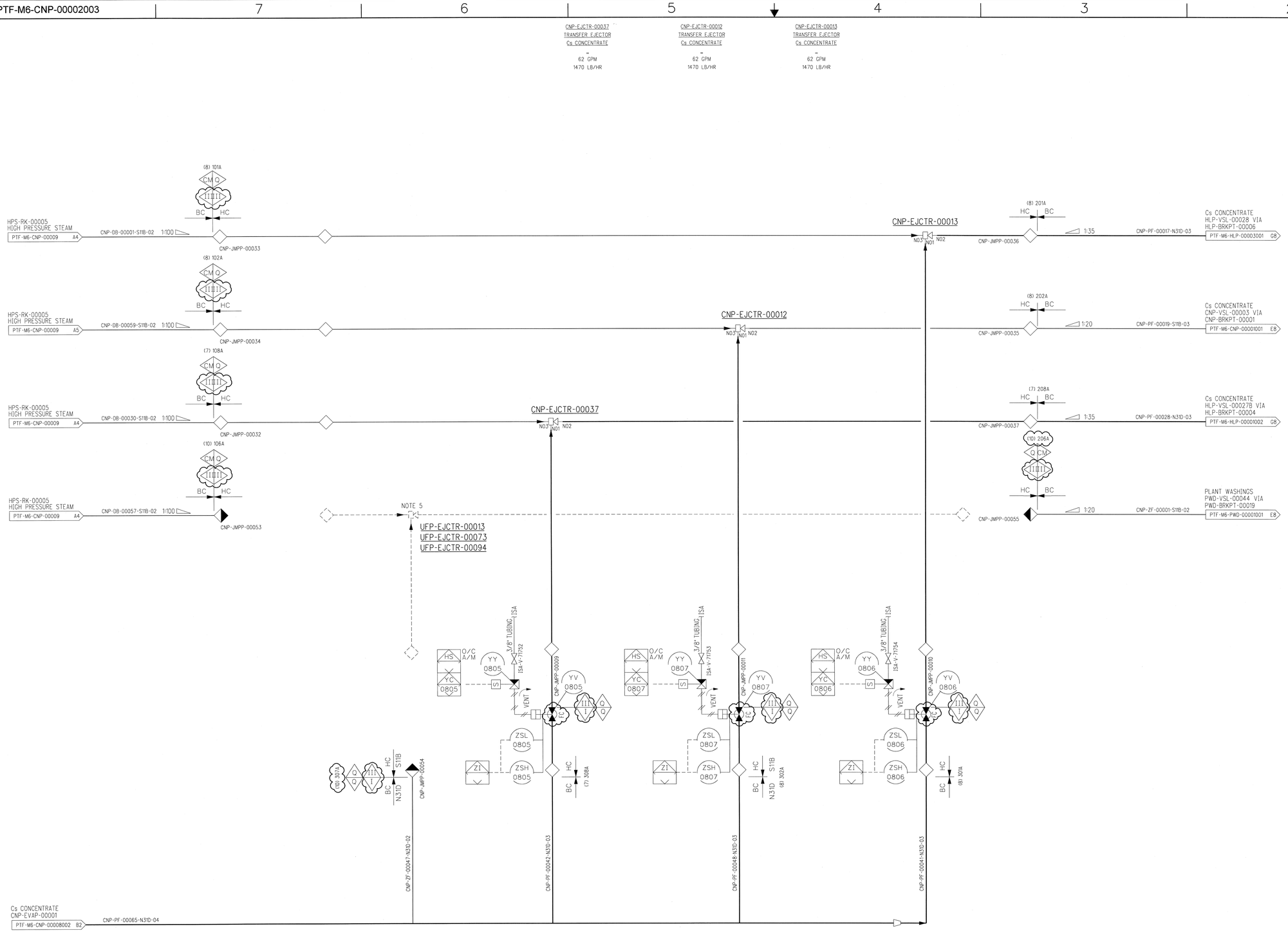
PLOTTED BY: spoakes

FORM E_SDN.DGN 02/2009

"E" SIZE - 44x34
COMPUTER GENERATED - MANUAL DESIGN CHANGES NOT PERMITTED

SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREQ-002



NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
2. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
3. THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-III, UNLESS OTHERWISE NOTED. THE PRESSURE BOUNDARY FOR NON-SAFETY INSTRUMENT SERVICE AIR (ISA) AND THE CORRESPONDING NON-SAFETY SOLENOID VALVES IT SUPPLIES IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV.
4. ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, EXCEPT BLACK CELL LINES WHICH ARE SELF-DRAINING, UNLESS OTHERWISE NOTED.
5. FOR EMPTYING CNP-EVAP-00001, ONE OF THE THREE TRANSFERABLE PERMEATE VESSEL EMPTYING EJECTORS UFP-EJCTR-00013, -00073, -00094, WILL BE USED.
6. THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-PTF-M6-CNP-00002 REV 3. THIS DRAWING INCLUDES INFORMATION FROM 24590-PTF-M6N-M80T-00080, 24590-PTF-M6N-10-00011, AND 24590-PTF-M6N-CNP-00110.

HOLD/OPEN ITEMS:

NONE

REFERENCES:

1. 24590-PTF-3YD-CNP-00001, SYSTEM DESCRIPTION FOR THE CESIUM NITRIC ACID RECOVERY PROCESS - SYSTEM CNP.

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 section 11(e)(2) of the AEA preserves exclusive federal 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.

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR CONSTRUCTION, SEE NOTE 6	DEJ				10/13/11

REVISION HISTORY

Q
QUALITY DESIGNATOR

ISSUED BY RPP-WTP PDC
INIT DATE
ISSUE STAMP

PROJECT No.	24590	
SITE	HANFORD	
AREA	200E	
BUILDING No.	10	
	BY	DATE
ORIGINATOR		27 SEPT 11
CHECKER		10/7/11
APPROVER		10/13/11
REVIEWER		10/11/11
		10-12-11

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. 24590-PTF-ADR-M-02-040 REV: 3
E&NS SCREENING REQUIRED? [X] YES [ ] NO E&NS INITIAL IF YES

BECHTEL

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

P&ID - PTF
CESIUM NITRIC ACID RECOVERY PROCESS SYSTEM
CS CONCENTRATE TRANSFER EJECTORS

SCALE: NONE

24590-PTF-M6-CNP-00002003

REV 0

R11432656

FORM E_SDN.DGN 02/2009

SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREQ-002

'E' SIZE - 44x34
COMPUTER GENERATED - MANUAL DESIGN CHANGES NOT PERMITTED

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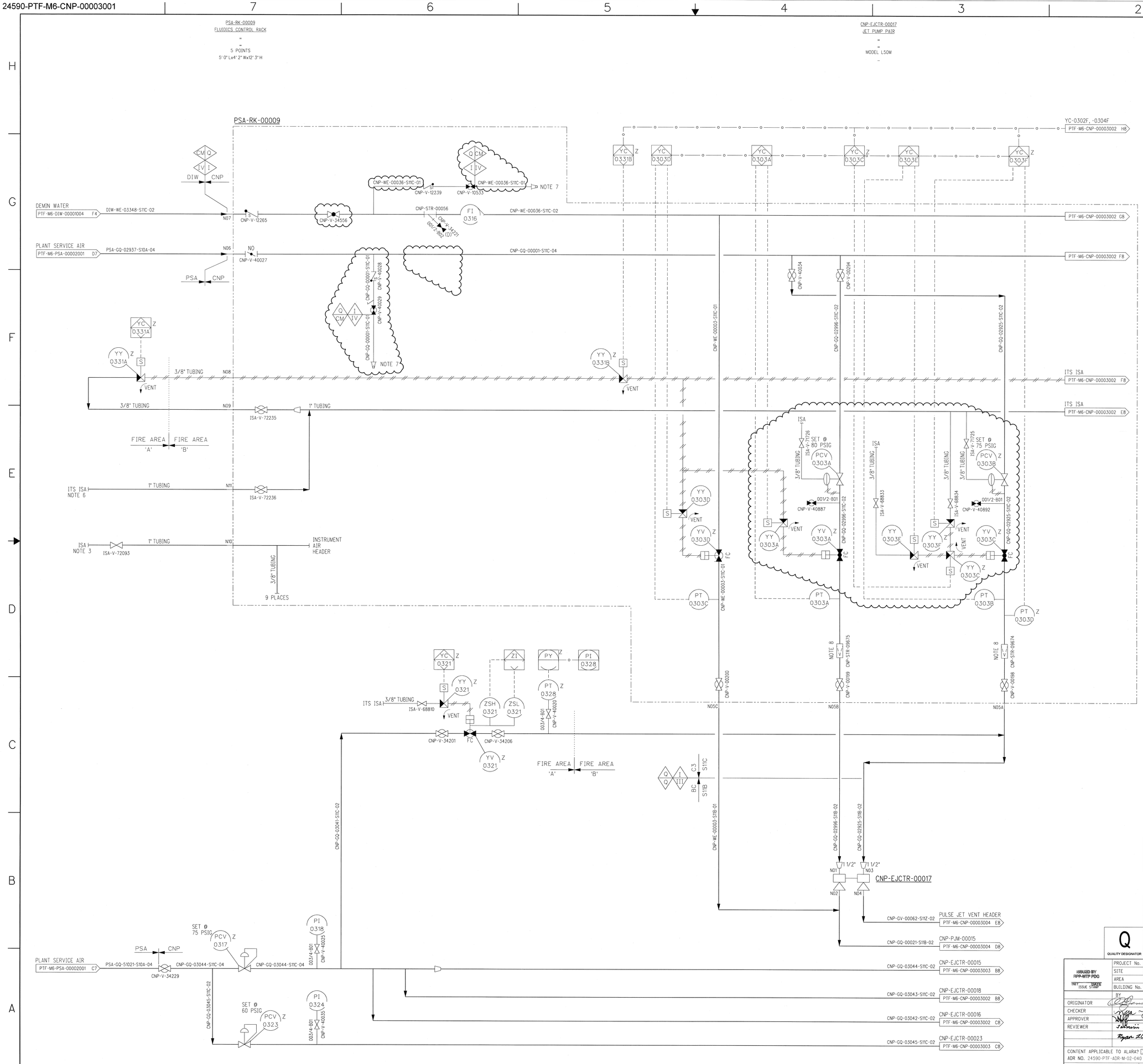

NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
2. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
3. THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I, UNLESS OTHERWISE NOTED. THE PRESSURE BOUNDARY FOR THE NON-SAFETY INSTRUMENT AIR SUPPLY, AND CORRESPONDING NON-SAFETY SOLENOID IT SUPPLIES IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV.
4. ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, EXCEPT BLACK CELL LINES WHICH ARE SELF-DRAINING, UNLESS OTHERWISE NOTED.
5. FOR PROCESS INFORMATION SEE DRAWING 24590-PTF-M6-CNP-00001001.
6. ALL TUBING OUTSIDE RACK TO BE FIELD RUN. TUBING ROUTING, SPECIFICATION OF ADDITIONAL IN-TUBING DEVICES, AND TAGGING OF IN-TUBING DEVICES WITHIN THE RACK TO BE DONE IN ACCORDANCE WITH C&I INSTALLATION DETAILS AND DESIGN GUIDE 24590-WTP-GPG-ENG-0142.
7. CONNECTION PROVIDED FOR REAGENTS, PLANT WASH, AND SERVICE AIR.
8. STRAINER IS PERMANENTLY INSTALLED.
9. THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-PTF-M6-CNP-00003 REV 4. THIS DRAWING INCLUDES INFORMATION FROM 24590-PTF-M6LN-CNP-00009, 24590-M6LN-M80T-00017, -00033, 24590-PTF-M6N-M80T-00057, -00080, AND -00124.

HOLD/OPEN ITEMS:

NONE

REFERENCES:

1. 24590-PTF-3YD-CNP-00001, SYSTEM DESCRIPTION FOR THE CESIUM NITRIC ACID RECOVERY PROCESS - SYSTEM CNP.

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 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.

DRAWING INDEX

DWG NO	TITLE
24590-PTF-M6-CNP-00003001	CNP SYSTEM UTILITY RACK PSA-RK-00009
24590-PTF-M6-CNP-00003002	CNP SYSTEM UTILITY RACK PSA-RK-00009
24590-PTF-M6-CNP-00003003	CNP SYSTEM UTILITY RACK PSA-RK-00009
24590-PTF-M6-CNP-00003004	CNP SYSTEM UTILITY SERVICES CNP-VSL-00003 PJM

REVISION HISTORY

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR CONSTRUCTION, SEE NOTE 9	CEJ	MTJ	DJH	DJH	10/31/11

Q
QUALITY DESIGNATOR

ISSUED BY RPP-WTP PDC
INIT ISSUE STAMP DATE

PROJECT No.	24590	
SITE	HANFORD	
AREA	200E	
BUILDING No.	10	

	BY	DATE
ORIGINATOR	[signature]	27 OCT 11
CHECKER	Megan Johnson	10/27/11
APPROVER	[signature]	10/31/11
REVIEWER	Fadmin Dave	10/27/11
	Ryan Zlotek	10-27-11

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. 24590-PTF-ADR-M-02-040 REV: 3
EMS SCREENING REQUIRED? [X] YES [ ] NO EMS INITIAL IF YES

BECHTEL
RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

P&ID - PTF
CESIUM NITRIC ACID RECOVERY PROCESS SYSTEM UTILITY RACK PSA-RK-00009

SCALE: NONE
24590-PTF-M6-CNP-00003001
REV 0

R1114244657

SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREQ-002

'E' SIZE - 44x34
COMPUTER GENERATED - MANUAL DESIGN CHANGES NOT PERMITTED

FORM E_SDN.DGN 02/2009

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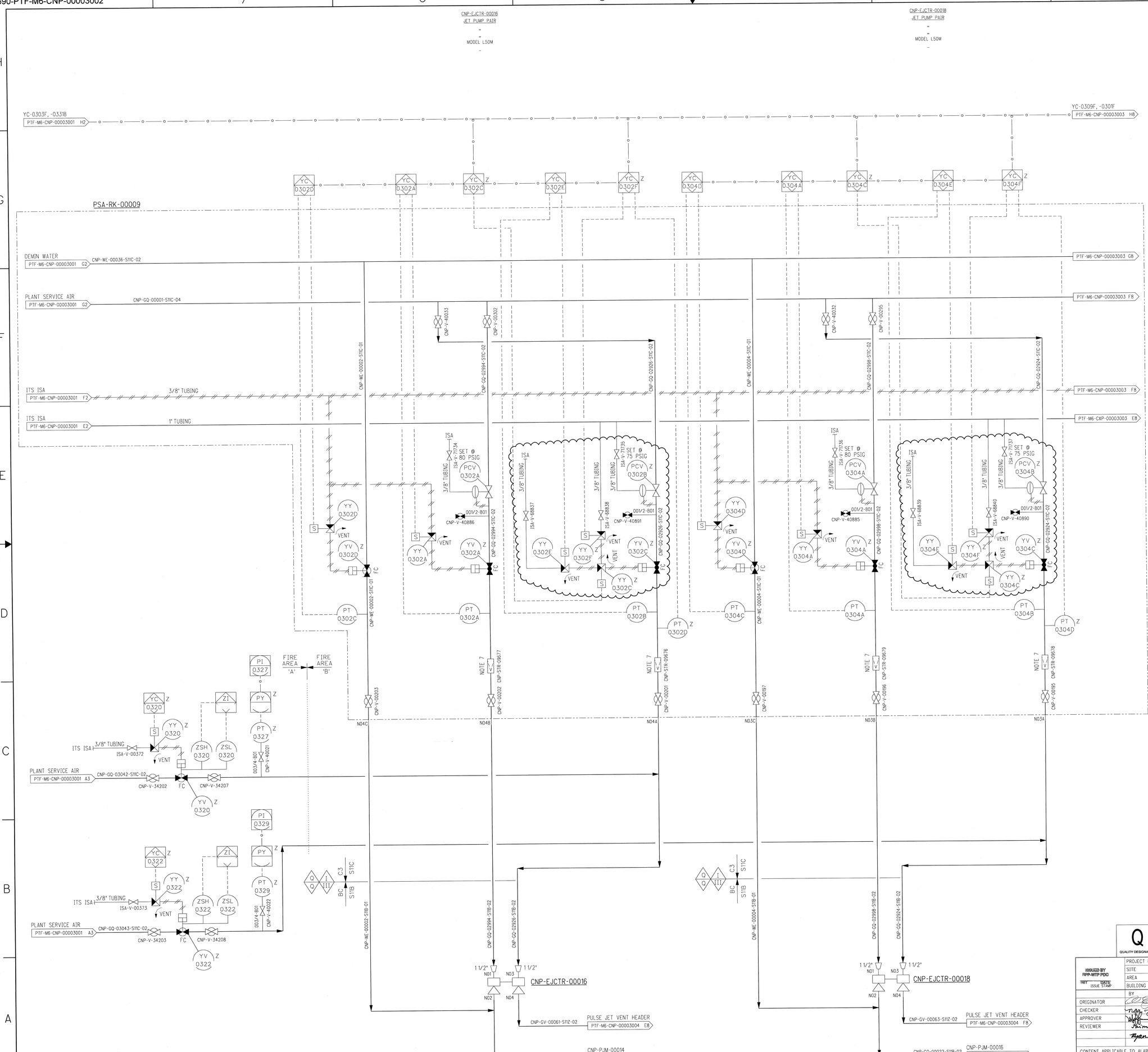

NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
2. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
3. THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I, UNLESS OTHERWISE NOTED. THE PRESSURE BOUNDARY FOR THE NON-SAFETY INSTRUMENT AIR SUPPLY, AND CORRESPONDING NON-SAFETY SOLENOID IT SUPPLIES IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV.
4. ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, EXCEPT BLACK CELL LINES WHICH ARE SELF-DRAINING, UNLESS OTHERWISE NOTED.
5. FOR PROCESS INFORMATION SEE DRAWING 24590-PTF-M6-CNP-00001001.
6. TUBING ROUTING, SPECIFICATION OF ADDITIONAL IN-TUBING DEVICES, AND TAGGING OF IN-TUBING DEVICES WITHIN THE RACK TO BE DONE IN ACCORDANCE WITH C&I INSTALLATION DETAILS AND DESIGN GUIDE 24590-WTP-GPG-ENG-0142.
7. STRAINER IS PERMANENTLY INSTALLED.
8. THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-PTF-M6-CNP-00003 REV 4. THIS DRAWING INCLUDES INFORMATION FROM 24590-PTF-M6LN-CNP-00009, 24590-M6LN-M80T-00017, 24590-PTF-M6N-M80T-00080, AND -00124.

HOLD/OPEN ITEMS:

NONE

REFERENCES:

1. 24590-PTF-3YD-CNP-00001, SYSTEM DESCRIPTION FOR THE CESIUM NITRIC ACID RECOVERY PROCESS - SYSTEM CNP.

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 under authority of the AEA. Bechtel National, Inc. pursuant to 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.

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR CONSTRUCTION, SEE NOTE 8					10/31/11

REVISION HISTORY

Q — QUALITY DESIGNATOR

ISSUED BY RPP-WTP PDO — INIT — DATE — ISSUE STAMP

PROJECT No.	24590	
SITE	HANFORD	
AREA	200E	
BUILDING No.	10	

	BY	DATE
ORIGINATOR		27 OCT 11
CHECKER		10/27/11
APPROVER		10/31/11
REVIEWER		10/27/11
		10-27-11

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO

ADR NO. 24590-PTF-ADR-M-02-040 REV: 3

ENAS SCREENING REQUIRED? [X] YES [ ] NO ENAS INITIAL IF YES

BECHTEL

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

P&ID - PTF
CESIUM NITRIC ACID RECOVERY PROCESS SYSTEM UTILITY RACK PSA-RK-00009

SCALE: NONE

24590-PTF-M6-CNP-00003002

REV 0

R1143458

'E' SIZE - 44x34
COMPUTER GENERATED - MANUAL DESIGN CHANGES NOT PERMITTED

SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREG-002

FORM E_SDN.DGN 02/2009

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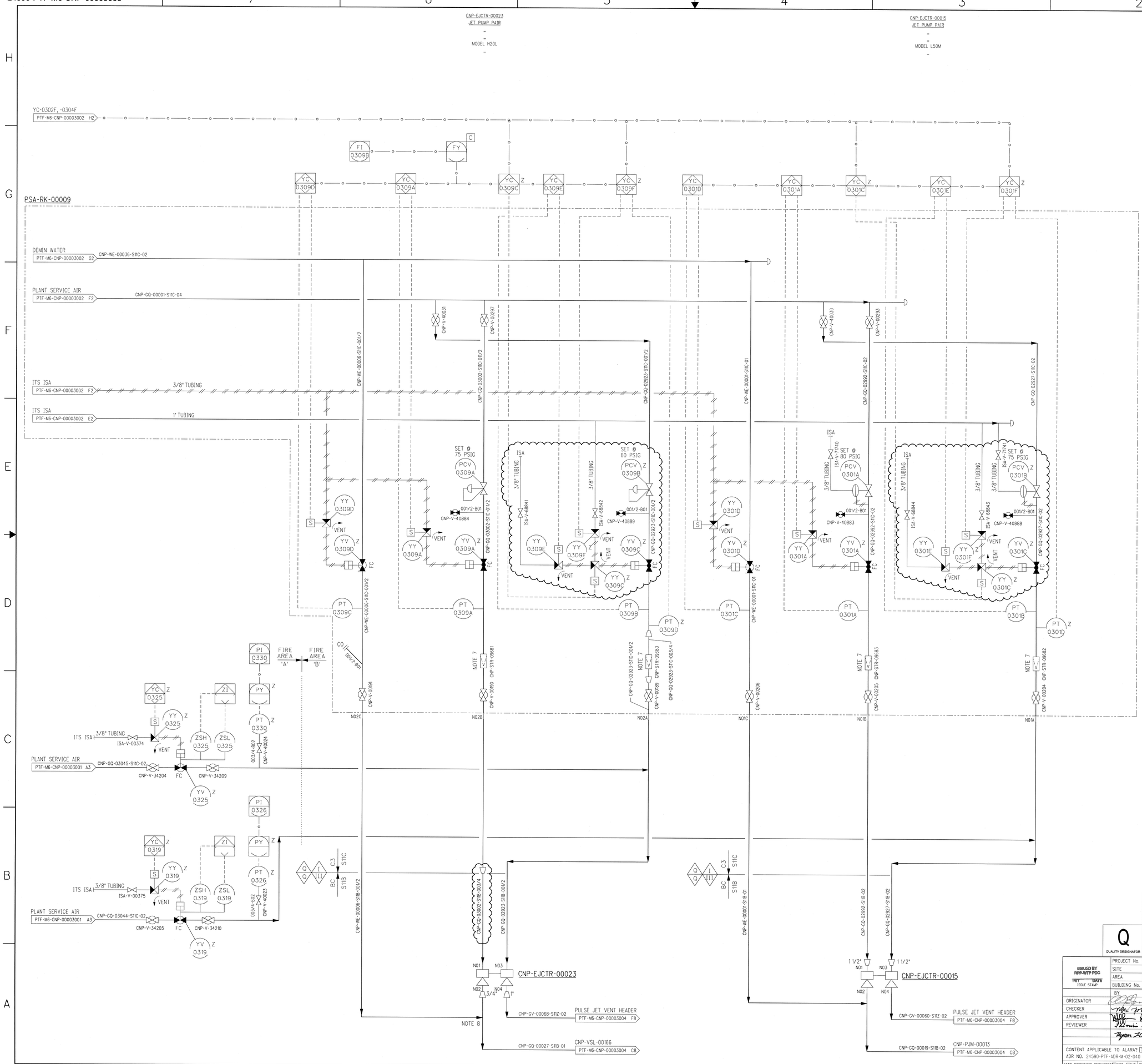

NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
2. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
3. THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-I, UNLESS OTHERWISE NOTED. THE PRESSURE BOUNDARY FOR THE NON-SAFETY INSTRUMENT AIR SUPPLY, AND CORRESPONDING NON-SAFETY SOLENOID IT SUPPLIES IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-IV.
4. ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, EXCEPT BLACK CELL LINES WHICH ARE SELF-DRAINING, UNLESS OTHERWISE NOTED.
5. FOR PROCESS INFORMATION SEE DRAWING 24590-PTF-M6-CNP-00001001.
6. TUBING ROUTING, SPECIFICATION OF ADDITIONAL IN-TUBING DEVICES, AND TAGGING OF IN-TUBING DEVICES WITHIN THE RACK TO BE DONE IN ACCORDANCE WITH C&I INSTALLATION DETAILS AND DESIGN GUIDE 24590-WTP-GPG-ENG-0142.
7. STRAINER IS PERMANENTLY INSTALLED.
8. A 45 DEGREE WYE PIPE FITTING SHALL BE USED AT THIS CONNECTION.
9. THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-PTF-M6-CNP-00003 REV 4. THIS DRAWING INCLUDES INFORMATION FROM 24590-PTF-M6LN-CNP-00009, 24590-M6LN-M80T-00017, 24590-PTF-M6N-10-00005, 24590-PTF-M6N-M80T-00080, AND -00124.

HOLD/OPEN ITEMS:

NONE

REFERENCES:

1. 24590-PTF-3YD-CNP-00001, SYSTEM DESCRIPTION FOR THE CESIUM NITRIC ACID RECOVERY PROCESS - SYSTEM CNP.

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 AEA, it has sole and exclusive responsibility and authority regarding radiation protection and control of these materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR CONSTRUCTION, SEE NOTE 9	CEF	JDT	JD	JH	10/31/11

REVISION HISTORY

Q
QUALITY DESIGNATOR

ISSUED BY RPP-WTP PDC
INIT DATE
ISSUE STAMP

PROJECT No.	24590	
SITE	HANFORD	
AREA	200E	
BUILDING No.	10	
	BY	DATE
ORIGINATOR		22 OCT 11
CHECKER		10/27/11
APPROVER		10/31/11
REVIEWER		10/27/11
		10-27-11

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. 24590-PTF-ADR-M-02-040 REV: 3
EMS SCREENING REQUIRED? [X] YES [ ] NO | EMS INITIAL IF YES

BECHTEL

RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

P&ID - PTF
CESIUM NITRIC ACID RECOVERY PROCESS SYSTEM UTILITY RACK PSA-RK-00009

SCALE: NONE

24590-PTF-M6-CNP-00003003

REV 0

R1143446 9

SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREQ-002

'E' SIZE - 44x34
COMPUTER GENERATED - MANUAL DESIGN CHANGES NOT PERMITTED

FORM E_SDN.DGN 02/2009

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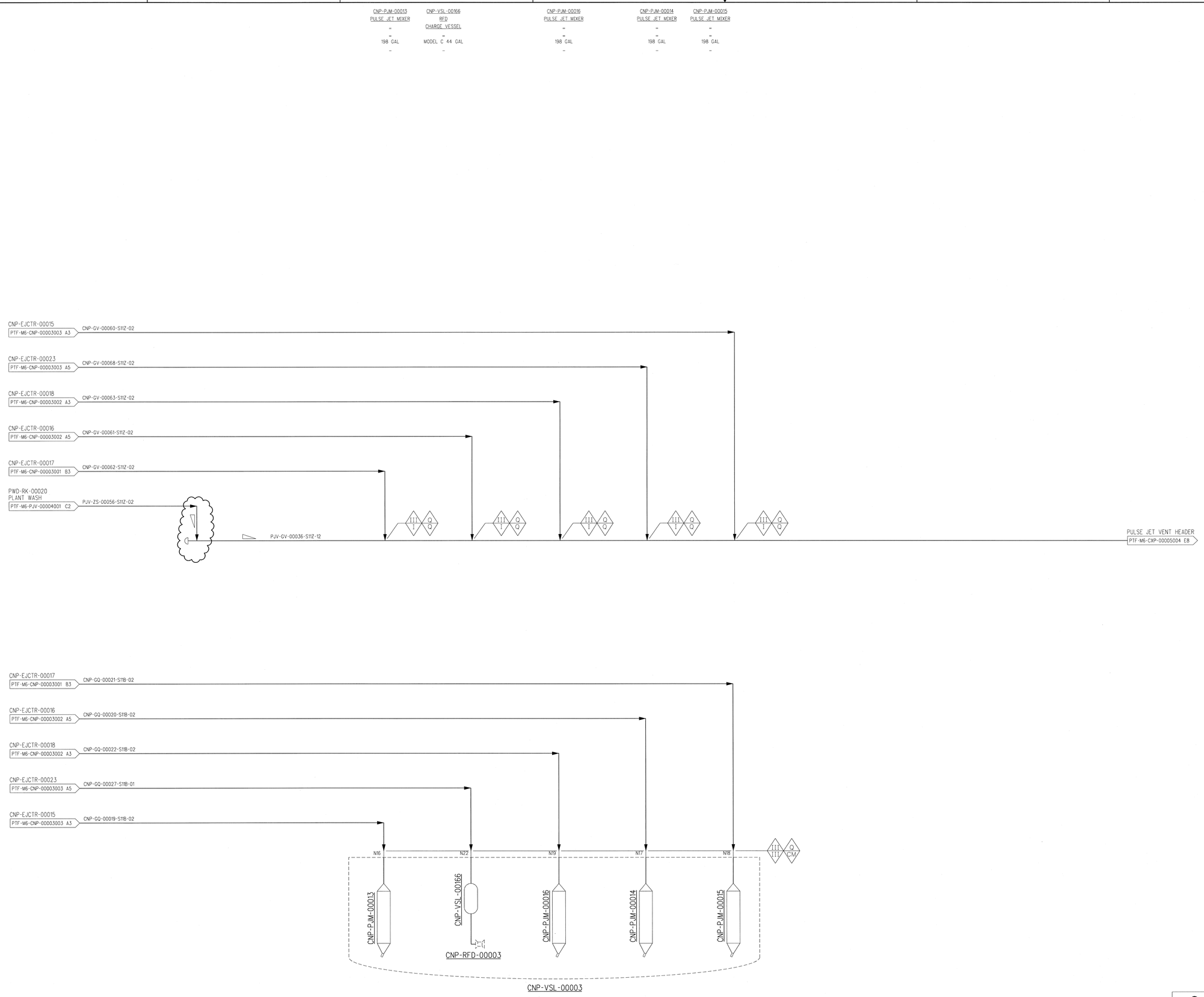

NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
2. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
3. THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL Q AND SEISMIC CATEGORY SC-III, UNLESS OTHERWISE NOTED.
4. ALL LINES SHOWN ON THIS DRAWING ARE LOCATED IN THE BLACK CELL AND SHALL BE SELF-DRAINING, UNLESS OTHERWISE NOTED.
5. FOR PROCESS INFORMATION SEE DRAWING 24590-PTF-M6-CNP-00001001.
6. THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWINGS AND, IN PART, SUPERSEDES 24590-PTF-M6-CNP-00003 REV 4. THIS DRAWING INCLUDES INFORMATION FROM 24590-PTF-M6N-M80T-00055, -00080, AND 24590-PTF-M6PR-10-00002.

HOLD/OPEN ITEMS:

NONE

REFERENCES:

1. 24590-PTF-3YD-CNP-00001, SYSTEM DESCRIPTION FOR THE CESIUM NITRIC ACID RECOVERY PROCESS - SYSTEM CNP.

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 pursuant to the AEA. Regulation of DOE facilities pursuant to 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.

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR CONSTRUCTION, SEE NOTE 6	RJW	MT	RJK	RJW	10/31/11

REVISION HISTORY

Q
QUALITY DESIGNATOR

ISSUED BY RPP-WTP PDC
INIT DATE
ISSUE STAMP

PROJECT No.	24590
SITE	HANFORD
AREA	200E
BUILDING No.	10

	BY	DATE
ORIGINATOR	[illegible]	10/26/11
CHECKER	[illegible]	10/26/11
APPROVER	[illegible]	10/31/11
REVIEWER	[illegible]	10/27/11
	[illegible]	10-27-11

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. 24590-PTF-ADR-M-02-040 REV: 3
EMS SCREENING REQUIRED? [X] YES [ ] NO | EMS INITIAL IF YES [illegible]

SCREENING IS REQUIRED FOR DRINKING TYPES IDENTIFIED IN 24590-WTP-GPP-SREG-002

RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

P&ID - PTF
CESIUM NITRIC ACID RECOVERY PROCESS SYSTEM VESSEL CNP-VSL-00003 PULSE JET MIXERS

SCALE: NONE

24590-PTF-M6-CNP-00003004

REV 0

R1143460

'E' SIZE - 44x34
COMPUTER GENERATED - MANUAL DESIGN CHANGES NOT PERMITTED

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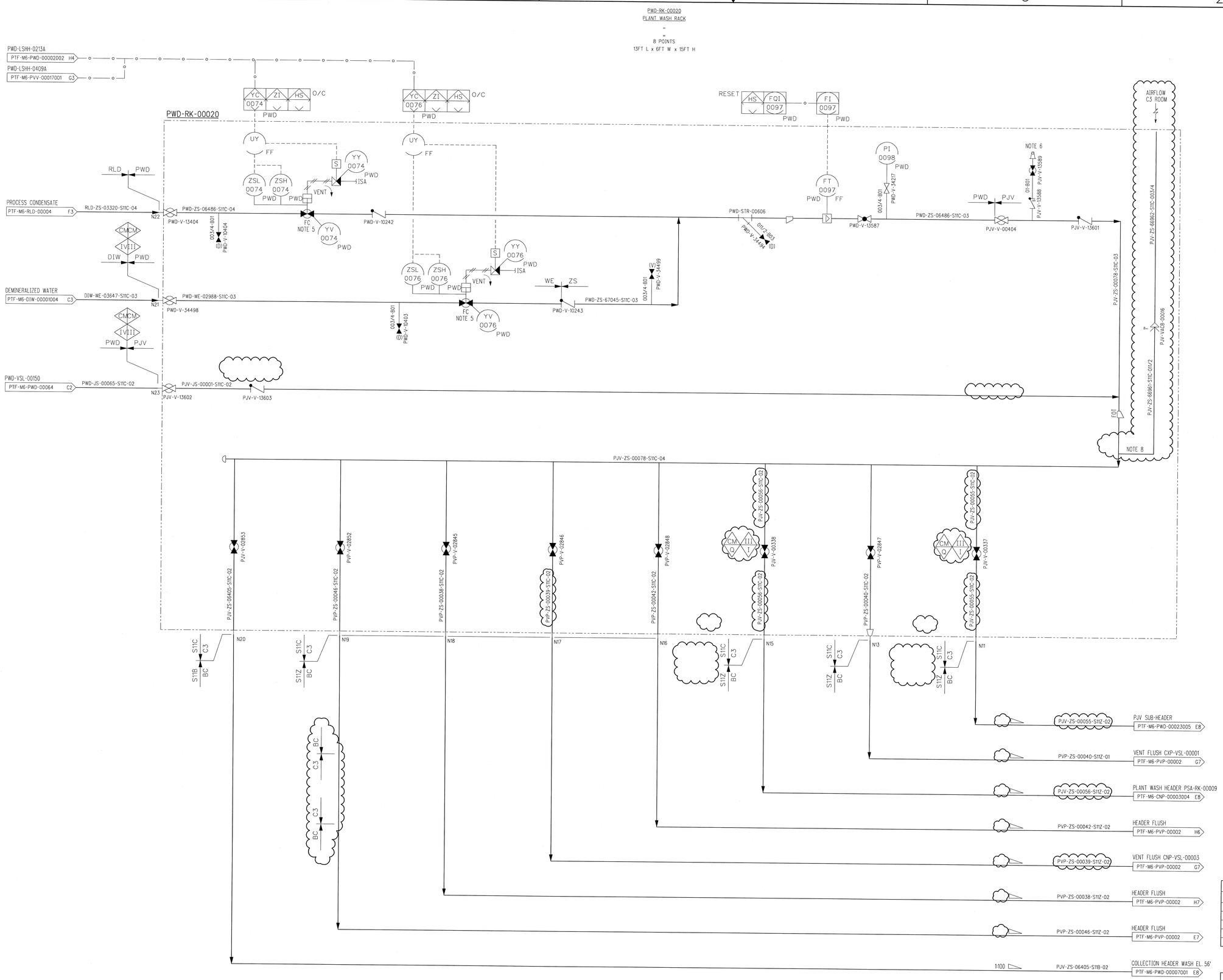
PLOTTED BY: ecweatb

FORM E_SDN.DGN 02/2009



NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
2. CONTENTS OF THIS DOCUMENT ARE DANGEROUS WASTE PERMIT AFFECTING.
3. THE PRESSURE BOUNDARY FOR ALL COMPONENTS ON THIS DRAWING IS QUALITY LEVEL CM AND SEISMIC CATEGORY SC-III, UNLESS OTHERWISE NOTED.
4. ALL LINES ON THIS DRAWING SHALL BE FREE DRAINING, EXCEPT BLACK CELL LINES WHICH ARE SELF-DRAINING, UNLESS OTHERWISE NOTED.
5. VALVES INTERLOCKED TO PREVENT MULTIPLE VALVE OPERATION.
6. REAGENT/PLANT WASH/AIR SHALL BE PROVIDED AT LOCAL UTILITY STATION.
7. BLACK CELL PIPING TO BE SUPPORTED FOR MAXIMUM WATERFALL AND FOR THE EXPECTED DYNAMIC FORCES DURING THE TRANSITION FROM A DRY PIPE TO A LIQUID-FULL PIPE.
8. PIPE TO BE CONNECTED TO HORIZONTAL RUN OF HEADER PIPE. ROUTE AIR INLET PIPING TO SAFE LOCATION.
9. THIS DRAWING SUPERSEDES 24590-PTF-M6-PJV-00004 REV 4. THIS DRAWING INCLUDES INFORMATION FROM 24590-PTF-M6N-PJV-00037, 24590-PTF-M6N-10-00004, -00010, 24590-PTF-M6N-M80T-00055, -00059, -00068, 24590-PTF-M6LN-PJV-00001, -00002, 24590-PTF-M6LN-M80T-00026, AND 24590-PTF-M6PR-10-00004.

HOLD/OPEN ITEMS:

NONE

REFERENCES:

1. 24590-PTF-3YD-PJV-00001, SYSTEM DESCRIPTION FOR THE PTF PULSE JET VENTILATION SYSTEM (PJV).

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 and its contractors. DOE is the sole and exclusive authority pursuant to 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.

DRAWING INDEX

DWG NO	TITLE
24590-PTF-M6-PJV-00004001	PJV SYS UTILITY SERVICES PWD-RK-00020

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
0	ISSUED FOR CONSTRUCTION, SEE NOTE 9		SJ			8/17/11

REVISION HISTORY

Q QUALITY DESIGNATOR

ISSUED BY RPP-WTP PDC — INIT DATE — ISSUE STAMP

PROJECT No.	24590	
SITE	HANFORD	
AREA	200E	
BUILDING No.	10	

	BY	DATE
ORIGINATOR		8/11/11
CHECKER		8/15/11
APPROVER		8/17/11
REVIEWER		8/16/11
		8/16/11

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. 24590-PTF-ADR-M-02-059 REV: 4
EMS SCREENING REQUIRED? [X] YES [ ] NO EMS INITIAL IF YES

BECHTEL
RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

P&ID-PTF
PULSE JET VENTILATION SYSTEM
UTILITY SERVICES
PLANT WASH RACK
PWD-RK-00020

SCALE: NONE

24590-PTF-M6-PJV-00004001

REV 0

E SIZE - 44x34
COMPUTER GENERATED - MANUAL DESIGN CHANGES NOT PERMITTED

SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREG-002

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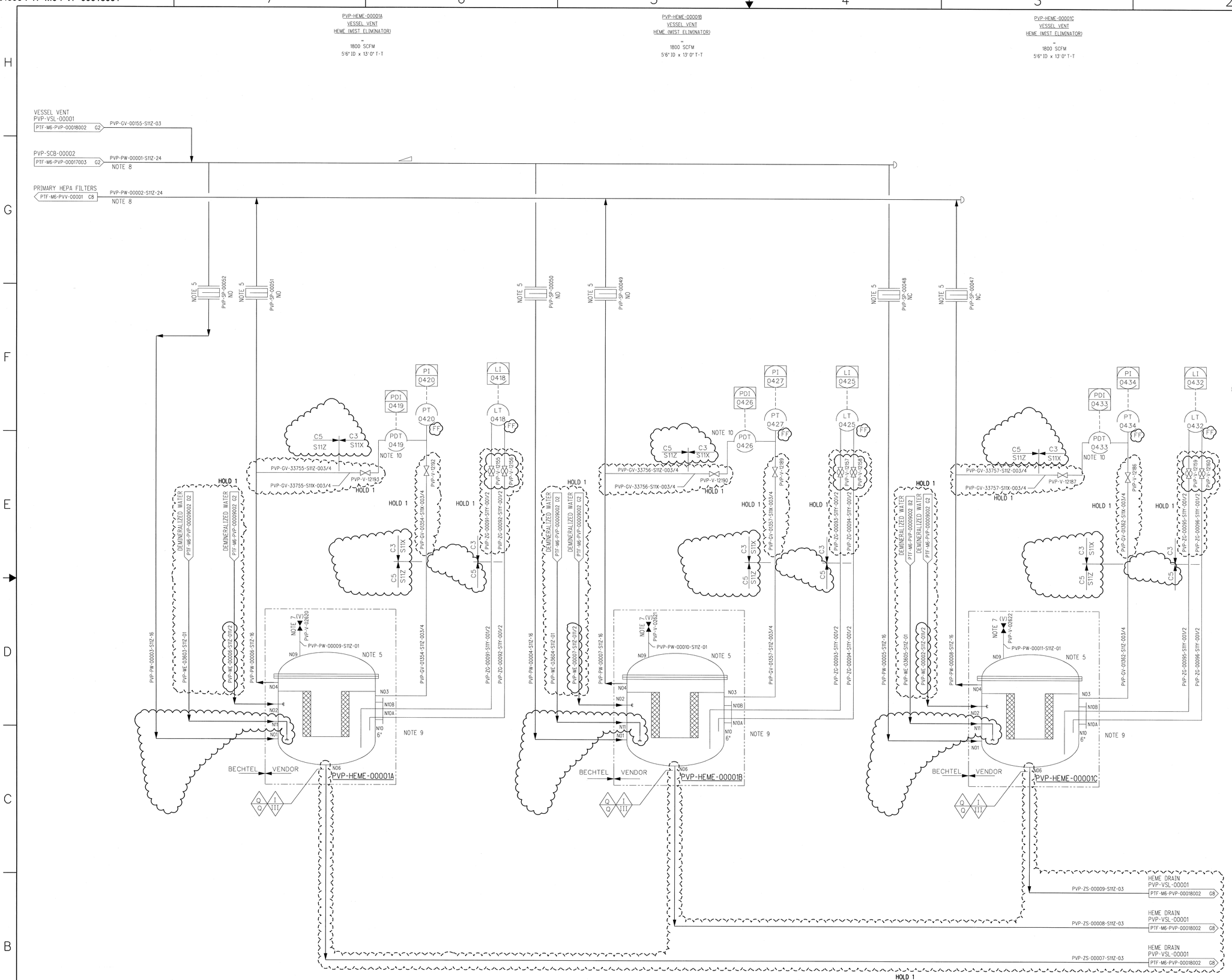
FORM E_SDN.DGN 02/2009

24590-PTF-M6-PVP-00018001



NOTES:

1. SEE DRAWINGS 24590-WTP-M6-50-00001 THROUGH 24590-WTP-M6-50-00008 FOR GENERAL NOTES, SYMBOLS AND LEGEND, AND GENERAL SLOPE REQUIREMENTS.
2. CONTENTS OF THIS DRAWING ARE DANGEROUS WASTE PERMIT AFFECTING.
3. THE PRESSURE BOUNDARY FOR ALL COMPONENTS SHOWN ON THIS DRAWING IS QUALITY LEVEL Q, AND SEISMIC CATEGORY SC-I, UNLESS OTHERWISE NOTED.
4. ALL LINES SHOWN ON THIS DRAWING SHALL BE FREE DRAINING, UNLESS OTHERWISE NOTED.
5. ALL EQUIPMENT AND COMPONENTS IN THE FILTER CAVE ARE REMOTELY OPERATED/MAINTAINED BY THE OVERHEAD CRANE.
6. HIGH EFFICIENCY MIST ELIMINATORS ARE THREE 50% CAPACITY VESSELS.
7. TOP VENTS ARE 1", 1/4-TURN VALVE BY VENDOR AND REMOTELY OPERATED IN THE FILTER CAVE.
8. HIGH EFFICIENCY MIST ELIMINATOR INLET VENT PIPING ELEVATION IS LOWER THAN OUTLET VENT PIPING.
9. SEE DRAWING 24590-PTF-M6-ISA-00009 FOR BUBBLER RACKS AND SYSTEM CONNECTIONS.
10. INSTRUMENT IDENTIFIED AS A BARCT INSTRUMENT.
11. THIS DRAWING IS CONVERTED FROM A SINGLE SHEET TO MULTI-SHEET DRAWING AND IN PART SUPERSEDES 24590-PTF-M6-PVP-00018, REV 2. THIS DRAWING INCLUDES INFORMATION FROM 24590-PTF-M6N-M80T-00036, -00037, 24590-PTF-M6N-PVP-00049, AND FURTHER MODIFIED TO UPDATE COMPARTMENT, QUALITY LEVEL AND SEISMIC BREAKS, CLARIFY SLOPING REQUIREMENTS; CORRECTED VESSEL NOZZLE N10 DESIGNATORS; REMOVE DESIGN HOLD; IDENTIFY BARCT INSTRUMENTATION; AND REFLECT CURRENT DRAFTING PRACTICES.
12. REVISION 1: REVISED DIW LINE SIZE, QUALITY AND SEISMIC LEVELS. ADDED/REVISED/DELETED HOLDS AND REFERENCES, AND INCORPORATED 24590-PTF-M6LN-M80T-00023, AND 24590-PTF-M6N-M80T-00093.

HOLD/OPEN ITEMS:

1. PENDING ISM REVIEW.

REFERENCES:

1. DELETED
2. 24590-PTF-3YD-PVP-00001, SYSTEM DESCRIPTION FOR THE PRETEATMENT VESSEL VENT PROCESS SYSTEM, PVP.

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 AEA, it has sole and exclusive responsibility and authority regarding regulation of source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

DRAWING INDEX

DWG NO	TITLE
24590-PTF-M6-PVP-00018001	PRETREATMENT VESSEL VENT PROCESS SYSTEM
24590-PTF-M6-PVP-00018002	PRETREATMENT VESSEL VENT PROCESS SYSTEM

Q
QUALITY DESIGNATOR

REVISION HISTORY

REV	DESCRIPTION	ORG	CHKD	RVWD	APVD	DATE
1	REVISED PER NOTE 12	AW	ST	RC		9/22/11
0	ISSUED FOR CONSTRUCTION SEE NOTE 11	CZ	PM	ES/CL	RS/JM	10/31/08

ISSUED BY RPP-WTP PDC
INIT DATE
ISSUE STAMP

PROJECT No.	24590	
SITE	HANFORD	
AREA	200E	
BUILDING No.	10	
	BY	DATE
ORIGINATOR	ZOOK, CHARLES (WGI)	10/27/08
CHECKER	MARTINELLI, PIETRO	10/28/08
APPROVER	STEVENS, ROBERT	10/31/08
REVIEWER	STRIEPER, EGBERT	10/28/08

CONTENT APPLICABLE TO ALARA? [X] YES [ ] NO
ADR NO. 24590-PTF-ADR-M-03-001 REV: 3
EMS SCREENING REQUIRED? [X] YES [ ] NO EMS INITIAL IF YES

BECHTEL
RIVER PROTECTION PROJECT
WASTE TREATMENT PLANT
2435 STEVENS CENTER PLACE
RICHLAND, WA 99354

CONTRACT No: DE-AC27-01RV14136

P&ID - PTF PRETREATMENT VESSEL VENT PROCESS SYSTEM HEMES TO PRIMARY HEPA FILTERS

SCALE: NONE
24590-PTF-M6-PVP-00018001
REV 1

SCREENING IS REQUIRED FOR DRAWING TYPES IDENTIFIED IN 24590-WTP-GPP-SREQ-002

"E" SIZE - 44x34
COMPUTER GENERATED - MANUAL DESIGN CHANGES NOT PERMITTED

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FORM E_SDN.DGN 02/2009

Table III.10.E.A – Pretreatment Plant Tank Systems Description

Dangerous and/or Mixed Waste Tank Systems Name	System Designation	Engineering Description (Drawing Nos., Specifications Nos., etc.)	Narrative Description, Tables & Figures	Maximum Capacity (gallons)
		-MVD-CXP-P0023, Rev 1 -N1D-CXP-P0003, Rev 1 -N1D-CXP-P0007, Rev 1 -P1-P01T-00001, Rev 7 -P1-P01T-00002, Rev 7 **24590-WTP** -3PS-G000-T0002, Rev 8 -3PS-MV00-T0001, Rev 4 -3PS-MV00-T0002, Rev 3 -3PS-MV00-T0003, Rev 3		
Cesium Nitric Acid Recovery Process System CNP-VSL-00001 (Cesium Evaporator Eluant Lute Pot) CNP-VSL-00003 (Eluate Contingency Storage Vessel) CNP-VSL-00004 (Cesium Evaporator Recovered Nitric Acid Vessel)	CNP	**24590-PTF** -M5-V17T-00014, Rev 2 ~~-M6-CNP-00001, Rev 2~~ -M6-CNP-00001001, Rev 0 -M6-CNP-00001002, Rev 0 -M6-CNP-00001003, Rev 0 ~~-M6-CNP-00002, Rev 2~~ -M6-CNP-00002001, Rev 0 -M6-CNP-00002002, Rev 0 -M6-CNP-00002003, Rev 0 ~~-M6-CNP-00003, Rev 3~~ -M6-CNP-00003001, Rev 0 -M6-CNP-00003002, Rev 0 -M6-CNP-00003003, Rev 0 -M6-CNP-00003004 Rev 0 -M6-CNP-00004, Rev 3 -M6-CNP-00005, Rev 2 -MV-CNP-P0001, Rev 1 -MV-CNP-P0002, Rev 1 -MV-CNP-P0005, Rev 0	Section 4.1.2.6; Tables 4-2 and 4-6; and Figures C1-1, C1-2, and C1-02A of Operating Unit Group 10, Addendum C of this Permit.	CNP-VSL-00001 = 109 CNP-VSL-00003 = 21,713 CNP-VSL-00004 = 11,115

Table III.10.E.A – Pretreatment Plant Tank Systems Description

Dangerous and/or Mixed Waste Tank Systems Name	System Designation	Engineering Description (Drawing Nos., Specifications Nos., etc.)	Narrative Description, Tables & Figures	Maximum Capacity (gallons)
		-MVD-PWD-P0012, Rev 3 -MV-PWD-P0001001, Rev 1 -MV-PWD-P0001002, Rev 1 -MV-PWD-P0003001 , Rev 1 -MV-PWD-P0003002, Rev 1 -MV-PWD-P0005, Rev 1 -MV-PWD-P0006, Rev 1 -MV-PWD-P0007, Rev 1 -MV-PWD-P0010, Rev 1 -N1D-PWD-P0001, Rev 1 -N1D-PWD-P0002, Rev 5 -N1D-PWD-P0003, Rev 3 -N1D-PWD-P0005, Rev 2 -N1D-PWD-P0006, Rev 2 -P1-P01T-00001, Rev 7 -P1-P01T-00006, Rev 4		
Pretreatment Vessel Vent Process System PVP-VSL-00001 (Vessel Vent HEME Drain Collection Vessel)	PVP	**24590-PTF** -M5-V17T-00021001, Rev 2 -M5-V17T-00021002, Rev 2 -M5-V17T-00021004, Rev 2 -M6-PVP-00002, Rev 3 -M6-PVP-00004001, Rev 0 -M6-PVP-00004002, Rev 0 -M6-PVP-P0009, Rev 0 -M6-PVP-00017001, Rev 0 -M6-PVP-00017002, Rev 0 -M6-PVP-00017003, Rev 0 -M6-PVP-00018001, Rev ~~0~~1 -M6-PVP-00018002, Rev 0 -MVD-PVP-P0001, Rev 0 -MV-PVP-P0002, Rev 1	Section 4.1.2.16; Tables 4-2 and 4-6; and Figures C1-1, C1-2, and C1-02A of Operating Unit Group 10, Addendum C of this Permit.	PVP-VSL-00001 = 1,969

Table III.10.G.A – Pretreatment Plant Miscellaneous Unit Systems

Miscellaneous Unit System Description[a]	Miscellaneous Unit System Designation	Description Drawings	Narrative Description, Tables, & Figures	Maximum Capacity (gallons)
FEP-RBLR-00001B (Waste Feed Evaporator Reboiler)		-MED-FEP-P0010, Rev 0 -N1D-FEP-P0007, Rev 1 -P1-P01T-00001, Rev 7 -P1-P01T-P0002, Rev 7 -P1-P01T-P0007, Rev 6	Operating Unit Group 10, Addendum C of this Permit.	
Cesium Nitric Acid Recovery Process System CNP-EVAP-00001 (Cesium Evaporator Separator Vessel)	CNP	**24590-PTF** -3PS-MEVV-T0002, Rev 4 -M5-V17T-00014, Rev 2 ~~-M6-CNP-00001, Rev 2~~ -M6-CNP-00001001, Rev 0 -M6-CNP-00001002, Rev 0 -M6-CNP-00001003, Rev 0 ~~-M6-CNP-00002, Rev 2~~ -M6-CNP-00002001, Rev 0 -M6-CNP-00002002, Rev 0 -M6-CNP-00002003, Rev 0 -M6-CNP-00008, Rev 2 -M6-CNP-00008001, Rev 0 -MV-CNP-P0001, Rev 0 -MV-CNP-P0002, Rev 1 -MV-CNP-P0005, Rev 0 -MVD-CNP-P0003, Rev 1 -MVD-CNP-P0010, Rev 0 -MWD-CNP-P0001, Rev 0 -N1D-CNP-P0005, Rev 1	Section 4.1.2.6.; Table C-8; and Figures C1-1, C1-2 and C1-02A of Operating Unit Group 10, Addendum C of this Permit.	CNP-EVAP-00001 = RESERVED

Table III.10.G.A – Pretreatment Plant Miscellaneous Unit Systems

Miscellaneous Unit System Description[a]	Miscellaneous Unit System Designation	Description Drawings	Narrative Description, Tables, & Figures	Maximum Capacity (gallons)
		-N1D-CNP-P0006, Rev 3 -N1D-CNP-P0009, Rev 1 -N1D-CNP-P0011, Rev 1 -P1-P01T-00001, Rev 7 -P1-P01T-P0002, Rev 7 -P1-P01T-00003, Rev 4 -P1-P01T-00004, Rev 6		
Cesium Nitric Acid Recovery Process System (Cont.) CNP-HX-00001 (Cesium Evaporator Concentrate Reboiler	CNP	**24590-PTF** -3PS-MEVV- T0002, Rev 4 -M5-V17T-P0014, Rev 2 ~~-M6-CNP-00001, Rev 2~~ -M6-CNP-00001001, Rev 0 -M6-CNP-00001002, Rev 0 -M6-CNP-00001003, Rev 0 ~~-M6-CNP-00002, Rev 2~~ -M6-CNP-00002001, Rev 0 -M6-CNP-00002002, Rev 0 -M6-CNP-00002003, Rev 0 -M6-CNP-00008, Rev 2 -MED-CNP-P0003, Rev 0 -MED-CNP-P0004, Rev 1 -MED-CNP-P0005. Rev 0 -MED-CNP-P0010, Rev 0 -P1-P01T-00001, Rev 7 -P1-P01T-P0002, Rev 7	Section 4.1.2.6.; Table C-8; and Figures C1-1, C1-2 and C1-02A of Operating Unit Group 10, Addendum C of this Permit.	N/A

Table III.10.G.A – Pretreatment Plant Miscellaneous Unit Systems

Miscellaneous Unit System Description[a]	Miscellaneous Unit System Designation	Description Drawings	Narrative Description, Tables, & Figures	Maximum Capacity (gallons)
		-P1-P01T-00003, Rev 4 -P1-P01T-00004, Rev 6		
Cesium Nitric Acid Recovery Process System (Cont.) CNP-DISTC-00001 (Cesium Evaporator Nitric Acid Rectifier Column)	CNP	**24590-PTF** -M5-V17T-00014, Rev 2 -M6-CNP-00010, Rev 2 -N1D-CNP-00001, Rev 1 -P1-P01T-00003, Rev 4 -3PS-MEVV- T0002, Rev 4	Section 4.1.2.6.; Table C-8; and Figures C1-1, C1-2 and C1-02A of Operating Unit Group 10, Addendum C of this Permit.	RESERVED
Cesium Nitric Acid Recovery Process System (Cont.) CNP-HX-00002 (Cesium Evaporator Primary Condenser) CNP-HX-00003 (Cesium Evaporator Inter-Condenser) CNP-HX-00004 (Cesium Evaporator After-Condenser)	CNP	**24590-PTF** -M5-V17T-00014, Rev 2 ~~-M6-CNP-00001, Rev 2~~ -M6-CNP-00001001, Rev 0 -M6-CNP-00001002, Rev 0 -M6-CNP-00001003, Rev 0 ~~-M6-CNP-00002, Rev 2~~ -M6-CNP-00002001, Rev 0 -M6-CNP-00002002, Rev 0 -M6-CNP-00002003, Rev 0 -M6-CNP-00008001, Rev 0 -M6-CNP-00010, Rev 2 -MED-CNP-P0003, Rev 0 -MED-CNP-P0004, Rev 0 -MED-CNP-P0005, Rev 0	Section 4.1.2.6.; Table C-8; and Figures C1-1, C1-2 and C1-02A of Operating Unit Group 10, Addendum C of this Permit.	N/A N/A N/A

Table III.10.G.A.i – Pretreatment Plant Vessel Vent Systems Associated with Pretreatment Plant Miscellaneous Unit Systems

Description	Designation	Description Drawings	Narrative Description, Tables & Figures
		-M6-PVP-00017002, Rev 0 -M6-PVP-00017003, Rev 0 -P1-P01T-P0002, Rev 7 -P1-P01T-00003, Rev 4 -P1-P01T-00004, Rev 6	
Pretreatment Vessel Vent Process System (Cont.) PVP-OXID-00001 (Vessel Vent VOC Oxidizer Unit)	PVP	**24590-PTF** -M5-V17T-00021001, Rev 2 -M5-V17T-00021004, Rev 2 -M6-PVP-00017001, Rev 0 -M6-PVP-00017002, Rev 0 -M6-PVP-00017003, Rev 0 -M6-PVP-000018001, Rev ~~0~~1 -M6-PVP-000018002, Rev 0 -N1D-PVP-P0002, Rev 1 -P1-P01T-00001, Rev 7 -P1-P01T-P0002, Rev 7 -P1-P01T-00003, Rev 4 -P1-P01T-00004, Rev 6	Section 4.1.2.16; Table C-8; and Figures C1-1, C1-2 and C1-02A of Operating Unit Group 10, Addendum C of this Permit.
Pretreatment Vessel Vent Process System (Cont.) PVP-CLR-00001 (Vessel Vent Aftercooler)	PVP	**24590-PTF** -M5-V17T-00021001, Rev 2 -M5-V17T-00021004, Rev 2 -P1-P01T-00001, Rev 7 -P1-P01T-P0002, Rev 7 -P1-P01T-00003, Rev 4 -P1-P01T-00004, Rev 6	Section 4.1.2.16; Table C-8; and Figures C1-1, C1-2 and C1-02A of Operating Unit Group 10, Addendum C of this Permit.

Table III.10.G.A.i – Pretreatment Plant Vessel Vent Systems Associated with Pretreatment Plant Miscellaneous Unit Systems

Description	Designation	Description Drawings	Narrative Description, Tables & Figures
Process Vessel Vent System (Cont.) PVV-FAN-00001A (Vessel Vent Exhaust Fan) PVV-FAN-00001B (Vessel Vent Exhaust Fan)	PVV	**24590-PTF** -M5-V17T-00021001, Rev 2 -M5-V17T-00021004, Rev 2 -P1-P01T-P0002, Rev 7 -P1-P01T-00003, Rev 4 -P1-P01T-00004, Rev 6	Section 4.1.2.16; Table C-8; and Figures C1-1, C1-2 and C1-02A of Operating Unit Group 10, Addendum C of this Permit.
Pretreatment Pulse Jet Mixer Exhaust Vent System PJV-HEPA-00001A (PJV Primary Exhaust HEPA Filter) PJV-HEPA-00001B (PJV Primary Exhaust HEPA Filter) PJV-HEPA-00001C (PJV Primary Exhaust HEPA Filter) PJV-HEPA-00001D (PJV Primary Exhaust HEPA Filter) PJV-HEPA-00001E (PJV Primary Exhaust HEPA Filter) PJV-HEPA-00001F (PJV Primary Exhaust HEPA Filter) PJV-HEPA-00001G (PJV Primary Exhaust HEPA Filter) PJV-HEPA-00002A (PJV Secondary Exhaust HEPA Filter) PJV-HEPA-00002B (PJV Secondary Exhaust HEPA Filter)	PJV	**24590-PTF** -M5-V17T-00021002, Rev 2 -M6-PJV-00001, Rev 3 -M6-PJV-00002, Rev 3 ~~-M6-PJV-00004, Rev 3~~ -M6-PJV-00004001, Rev 0 -MVD-PJV-P0003, Rev 0 -N1D-PJV-P0001, Rev 1 -P1-P01T-00001, Rev 7	Section 4.1.2.17; Table C-8; and Figures C1-1, C1-2 and C1-02A of Operating Unit Group 10, Addendum C of this Permit.

Table III.10.G.A.i – Pretreatment Plant Vessel Vent Systems Associated with Pretreatment Plant Miscellaneous Unit Systems

Description	Designation	Description Drawings	Narrative Description, Tables & Figures
PJV-HEPA-00002C (PJV Secondary Exhaust HEPA Filter) PJV-HEPA-00002D (PJV Secondary Exhaust HEPA Filter) PJV-HEPA-00002E (PJV Secondary Exhaust HEPA Filter) PJV-HEPA-00002F (PJV Secondary Exhaust HEPA Filter)			
Pretreatment Pulse Jet Mixer Exhaust Vent System (Cont.) PJV-FAN-00001A (PJV Exhaust Fan) PJV-FAN-00001B (PJV Exhaust Fan) PJV-FAN-00001C (PJV Exhaust Fan)	PJV	**24590-PTF** -M5-V17T-00021002, Rev 2 -M6-PJV-00001, Rev 3 -M6-PJV-00002, Rev 3 ~~-M6-PJV-00004, Rev 3~~ -M6-PJV-00004001, Rev 0 -MVD-PJV-P0003, Rev 0 -N1D-PJV-P0001, Rev 1 -P1-P01T-00001, Rev 7	Section 4.1.2.17; Table C-8; and Figures C1-1, C1-2 and C1-02A of Operating Unit Group 10, Addendum C of this Permit.
Pretreatment Pulse Jet Mixer Exhaust Vent System (Cont.) PJV-DMST-00002A (PJV Demister) PJV-DMST-00002B (PJV Demister) PJV-DMST-00002C (PJV Demisters)	PJV	**24590-PTF** -M5-V17T-00021002, Rev 2 -M6-PJV-00001, Rev 3 -M6-PJV-00002, Rev 3 ~~-M6-PJV-00004, Rev 3~~ -M6-PJV-00004001, Rev 0 -MVD-PJV-P0003, Rev 0 -N1D-PJV-P0001, Rev 1 -P1-P01T-00003, Rev 4	Section 4.1.2.17; Table C-8; and Figures C1-1, C1-2 and C1-02A of Operating Unit Group 10, Addendum C of this Permit.

Quarter Ending June 30, 2012 24590-WTP-PCN-ENV-11-009

Hanford Facility RCRA Permit Modification Notification Form

Part III, Operating Unit 10

Waste Treatment and Immobilization Plant

Index

Page 2 of 3: Hanford Facility RCRA Permit, Part III, Operating Unit 10, Waste Treatment and Immobilization Plant
Revise permit Conditions III.10.D.10.b.i., III.10.E.9.b.ii., III.10.E.9.c.ii., III.10.F.7.c.i., III.10.G.10.b.ii., III.10.G.10.c.ii., III.10.H.5.b.ii., III.10.H.5.c.ii., III.10.J.5.b.ii., and III.10.J.5.c.ii. to remove reference to General Arrangement (GA) Drawing cross sections.

Submitted by Co-Operator:

Donna Busche 5/23/12

D. M. Busche Date

Reviewed by ORP Program Office:

6/12/12

D. L. Noyes Date

Quarter Ending June 30, 2012

24590-WTP-PCN-ENV-11-009

Hanford Facility RCRA Permit Modification Notification Form

Unit:	Permit Part:
Waste Treatment and Immobilization Plant	**Part III, Operating Unit 10**

Description of Modification:

The purpose of this modification is to revise 10 Permit Conditions (III.10.D.10.b.i., III.10.E.9.b.ii., III.10.E.9.c.ii., III.10.F.7.c.i., III.10.G.10.b.ii., III.10.G.10.c.ii., III.10.H.5.b.ii., III.10.H.5.c.ii., III.10.J.5.b.ii., III.10.J.5.c.ii.) to remove reference to GA cross sections.

Justification: The GA plans show dangerous waste permitted units and secondary containment areas while cross sections provide only some partial views of selected sections of the building which makes the GA cross sections unusable for the permitting purposes. In addition, the Addendum C Tables C-1 through C-9 have recently been updated to include more details relative to the permitted equipment and its location within the WTP facilities and provide sufficient level of design detail to meet the intent of those permit conditions.

The redline/strikeout of requested changes to the 10 permit conditions is provided below:

III.10.D.10.b.i. Design drawings (General Arrangement Drawings - in plan~~ and cross sections~~) and specifications including references to specific building codes (e.g., UBC, ASCE) for each container storage areas' foundation and permanent containment systems. These items should show basic design parameters and dimensions, and location of the container storage areas and permanent containment systems; how permanent containment system design promotes positive drainage control (such as a locked drainage valve) to prevent release of contaminated liquids and so that uncontaminated liquids can be drained promptly for convenience of operation; capacity of the permanent containment system relative to the volume of the largest container to be stored; for permanent containment systems, how the base underlying the containers is sloped (i.e., floor slopes to sumps) or the containment system is otherwise designed and operated to drain and remove liquids resulting from leaks, spills, or other liquids, or how containers are kept from contact with standing liquids in the permanent containment system (i.e., elevated or are otherwise protected); for container storage areas without permanent containment systems, a description of how the storage area is designed or operated to drain and remove liquids or how containers are kept from contact with standing liquids;

III.10.E.9.b.ii.. Design drawings (General Arrangement Drawings in plan~~ and cross sections~~) and specifications for the foundation, secondary containment, including, liner installation details, and leak detection methodology [Note: leak detection systems for areas where daily, direct, or remote visual inspection is not feasible, will be continuous in accordance with WAC 173-303-640(4)(e)(iii)(C)]. These items should show the dimensions, volume calculations, and location of the secondary containment system, and should include items such as floor/pipe slopes to sumps, tanks, floor drains [WAC 173-303-640(4)(b) through (f), WAC 173-303-640(3)(a), WAC 173-303-806(4)(c)(i)];

III.10.E.9.c.ii. Design drawings (General Arrangement Drawings in plan~~ and cross sections~~, Process Flow Diagrams, Piping and Instrumentation Diagrams [including pressure control systems], Mechanical Drawings) and specifications, and other information, specific to tanks (to show location and physical attributes of each tank) [WAC 173-303-640(3)(a), WAC 173-303-806(4)(c)(i) through (iv)];

III.10.F.7.c.i. Design drawings (General Arrangement Drawings in plan~~ and cross sections~~) and specifications for the foundation, containment, including liner/coating installation details and leak detection methodology, as appropriate [40 CFR 264.1101(a)(1) and (b), in accordance with WAC 173-303-695].

III.10.G.10.b.ii. Design drawings (General Arrangement Drawings, in plan~~ and cross sections~~) and specifications for the foundation, secondary containment, including, liner installation details, and leak detection methodology [Note: leak detection systems for areas where daily, direct, or remote visual inspection is not feasible, will be continuous in accordance with WAC 173-303-640(4)(e)(iii)(C)]. These items should show the dimensions, volume calculations, and location of the secondary containment system, and should include items such as floor/pipe slopes to

Quarter Ending June 30, 2012 24590-WTP-PCN-ENV-11-009

	sumps, tanks, floor drains [WAC 173-303-640(4)(b) through (f) and WAC 173-303-640(3)(a), in accordance with WAC 173-303-680 and WAC 173-303-806(4)(i)(i)];
III.10.G.10.c.ii.	Design drawings (General Arrangement Drawings in plan ~~and cross sections~~, Process Flow Diagrams, Piping and Instrumentation Diagrams [including pressure control systems], and Mechanical Drawings) and specifications, and other information specific to miscellaneous units (to show location and physical attributes of each miscellaneous unit), [WAC 173-303-640(3)(a), in accordance with WAC 173-303-680(2) and WAC 173-303-806(4)(i)(i)];
III.10.H.5.b.ii.	Design drawings (General Arrangement Drawings, in plan ~~and cross sections~~) and specifications for the foundation, secondary containment including liner installation details, and leak detection methodology. These items should show the dimensions, volume calculations, and location of the secondary containment system, and should include items such as floor/pipe slopes to sumps, tanks, floor drains [WAC 173-303-640(4)(b) through (f) and WAC 173-303-640(3)(a), in accordance with WAC 173-303-680 and WAC 173-303-806(4)(i)(i)];
III.10.H.5.c.ii.	Design drawings [General Arrangement Drawings in plan ~~and cross section~~, Process Flow Diagrams, Piping and Instrumentation Diagrams (including pressure control systems), Mechanical Drawings, and specifications, and other information specific to subsystems (to show location and physical attributes of each subsystem)] [WAC 173-303-640(3)(a), in accordance with WAC 173-303-680(2) and WAC 173-303-806(4)(i)(i)];
III.10.J.5.b.ii.	Design drawings (General Arrangement Drawings, plan ~~and cross sections~~) and specifications for the foundation, secondary containment including liner installation details, and leak detection methodology. These items should show the dimensions, volume calculations, and location of the secondary containment system, and should include items such as floor/pipe slopes to sumps, tanks, floor drains [WAC 173-303-640(4)(b) through (f) and WAC 173-303-640(3)(a), in accordance with WAC 173-303-680 and WAC 173-303-806(4)(i)(i)];
III.10.J.5.c.ii.	Design drawings [General Arrangement Drawings in plan ~~and cross section~~, Process Flow Diagrams, Piping and Instrumentation Diagrams, (including pressure control systems), Mechanical Drawings, and specifications, and other information specific to subsystems (to show location and physical attributes of each subsystem specific to miscellaneous units)] [WAC 173-303-640(3)(a), in accordance with WAC 173-303-680(2) and WAC 173-303-806(4)(i)(i)];

In accordance with Permit Condition III.10.C.2.e, this permit modification may include page changes to the Permit, attachments, and permit application supporting documentation. Necessary permit changes are attached to this PCN. Ecology is requested to incorporate changes to the next revision of the WTP Dangerous Waste Permit.

(see attachments)

WAC 173-303-830 Modification Class:	Class 1	Class [1]1	Class 2	Class 3
Please mark the Modification Class:		X		

Enter relevant WAC 173-303-830, Appendix I Modification citation number: NA

Enter wording of WAC 173-303-830, Appendix I Modification citation:

In accordance with WAC 173-303-830(4)(d)(i), this modification notification is requested to be reviewed and approved as a Class [1]1 modification. WAC 173-303-830(4)(d)(ii)(A) states, "Class 1 modifications apply to minor changes that keep the permit current with routine changes to the facility or its operation. These changes do not substantially alter the permit conditions or reduce the capacity of the facility to protect human health or the environment. In the case of Class 1 modifications, the director may require prior approval."

Modification Approved/Concur: ☑ Yes ☐ Denied (state reason below)

Reason for denial:

Reviewed by Ecology:

A. Carlson 7/25/12 Date

Table III.10.E.A – Pretreatment Plant Tank Systems Description

Dangerous and/or Mixed Waste Tank Systems Name	System Designation	Engineering Description (Drawing Nos., Specifications Nos., etc.)	Narrative Description, Tables & Figures	Maximum Capacity (gallons)
		-P1-P01T-00001, Rev 7 -P1-P01T-P0002, Rev 7 -P1-P01T-00003, Rev. 4 ~~-P1-P01T-P0007, Rev 6~~ **24590-WTP** -3PS-G000-T0002, Rev 8 -3PS-MV00-T0001, Rev 4 -3PS-MV00-T0002, Rev3 -3PS-MV00-T0003, Rev 3		
Ultrafiltration Process System UFP-VSL-00001A (Ultrafiltration Feed Preparation Vessel) UFP-VSL-00001B (Ultrafiltration Feed Preparation Vessel) UFP-VSL-00002A (Ultrafiltration Feed Vessel) UFP-VSL-00002B (Ultrafiltration Feed Vessel) UFP-VSL-00062A (Ultrafilter Permeate Collection Vessel) UFP-VSL-00062B (Ultrafilter Permeate Collection Vessel) UFP-VSL-00062C (Ultrafilter Permeate	UFP	**24590-PTF** -M5-V17T-00009, Rev 2 -M5-V17T-00011, Rev 2 -M6-UFP-00001001, Rev 0 -M6-UFP-00001002, Rev 0 -M6-UFP-00001003, Rev 0 -M6-UFP-00001004, Rev 0 -M6-UFP-00001005, Rev 0 -M6-UFP-00001006, Rev 0 -M6-UFP-00001007, Rev 0 -M6-UFP-00002001, Rev 0 -M6-UFP-00002002, Rev 0 -M6-UFP-00002003, Rev 0 -M6-UFP-00002004, Rev 0 -M6-UFP-00002005, Rev 0 -M6-UFP-00002006, Rev 0 -M6-UFP-00002007, Rev 0 -M6-UFP-00002008, Rev 0 -M6-UFP-00003001, Rev 0 -M6-UFP-00003002, Rev 0 -M6-UFP-00003003, Rev 0	Section 4.1.2.3; Tables 4-2 and 4-6; and Figures C1-1, C1-2, and C1-02A of Operating Unit Group 10, Addendum C of this Permit.	UFP-VSL-00001A = 75,594 UFP-VSL-00001B = 75,594 UFP-VSL-00002A = 39,629 UFP-VSL-00002B = 40,378 UFP-VSL-00062A = 34,700 UFP-VSL-00062B = 34,700 UFP-VSL-00062C = 34,700 UFP-FILT-00001A= 474 UFP- FILT-00001B = 474 UPF-FILT-00002A = 474 UPF-FILT-00002B = 474

Table III.10.E.B – LAW Vitrification Plant Tank Systems Description

Dangerous and/or Mixed Waste Tank Systems Name	Unit Designation	Engineering Description (Drawing Nos, Specification Nos, etc.)	Narrative Description, Tables & Figures	Maximum Capacity (gallons)
LFP-VSL-00004 (Melter 2 Feed Vessel)		-MVD-LFP-P0008, Rev 1 -MVD-LFP-P0010, Rev 1 -MVD-LFP-P0011, Rev 1 -P1-P01T-00002, Rev 5 ~~-P1-P01T-00010, Rev 8~~ ~~-P1-P01T-00011, Rev 6~~ -N1D-LFP-00004, Rev 2 -N1D-LFP-00006, Rev 0		
LAW Secondary Off-gas/Vessel Vent Process System LVP-TK-00001 (LAW Caustic Collection Tank)	LVP	**24590-LAW** -M5-V17T-P0011, Rev 1 -P1-P01T-00004, Rev 3 ~~-P1-P01T-00009, Rev 8~~ -MT-LVP-00004, Rev 1 -MTD-LVP-P0001, Rev 0 -N1D-LVP-00002, Rev 2	Section 4.1.3.3; Tables 4-3 and 4-6; and Figures C1-1 and C1-3 of Operating Unit Group 10, Addendum C of this Permit.	LVP-TK-00001= 14,232
LAW Primary Off-gas Process System LOP-VSL-00001 (LAW Melter 1 SBS Condensate Vessel) LOP-VSL-00002 (LAW Melter 2 SBS Condensate Vessel)	LOP	**24590-LAW** -M5-V17T-P0007, Rev 0 -M5-V17T-P0008, Rev 0 -M6-LOP-P0001, Rev 2 -M6-LOP-P0002, Rev2 -MV-LOP-P0001, Rev 0 -MV-LOP-P0002, Rev 0 -MVD-LOP-P0004, Rev 1 -MVD-LOP-P0005, Rev 1 -N1D-LOP-00002, Rev 3 -P1-P01T-00002, Rev 5 ~~-P1-P01T-00010, Rev 8~~	Section 4.1.3.3; Tables 4-3 and 4-6; and Figures C1-1 and C1-3 of Operating Unit Group 10, Addendum C of this Permit.	LOP-VSL-00001 = 9,056 LOP-VSL-00002 = 9,056
LAW Vitrification Plant Radioactive	RLD	**24590-LAW**	Section 4.1.3.4; Tables 4-3 and 4-6;	RLD-VSL-00003 = 25,780

Table III.10.E.B – LAW Vitrification Plant Tank Systems Description

Dangerous and/or Mixed Waste Tank Systems Name	Unit Designation	Engineering Description (Drawing Nos, Specification Nos, etc.)	Narrative Description, Tables & Figures	Maximum Capacity (gallons)
Liquid Waste Disposal System RLD-VSL-00003 (Plant Wash Vessel) RLD-VSL-00004 (C3/C5 Drains/Sump Collection Vessel) RLD-VSL-00005 (SBS Condensate Collection Vessel)		-M5-V17T-P0014, Rev 2 -M6-RLD-00001001, Rev 0 -M6-RLD-00001002, Rev 0 -M6-RLD-00001003, Rev 0 -M6-RLD-00001004, Rev 0 -M6-RLD-00001005, Rev 0 -M6-RLD-00001006, Rev 0 -M6-RLD-00002001, Rev 0 -M6-RLD-00002002, Rev 0 -M6-RLD-00002003, Rev 0 -M6-RLD-00002004, Rev 0 -M6-RLD-00002005, Rev 0 -M6-RLD-00003001, Rev 0 -M6-RLD-00003002, Rev 0 -M6-RLD-00003003, Rev 0 -MVD-RLD-P0001, Rev 1 -MVD-RLD-P0006, Rev 2 -MVD-RLD-P0007, Rev 2 -MV-RLD-P0001, Rev 2 -MV-RLD-P0002, Rev 1 -MV-RLD-P0003, Rev 1 -P1-P01T-00001, Rev 3 -P1-P01T-00002, Rev 5 ~~-P1-P01T-00007, Rev 8~~ ~~-P1-P01T-00010, Rev 8~~ ~~-P1-P01T-00011, Rev 6~~ -N1D-RLD-00001, Rev 5 -N1D-RLD-00002, Rev 3 -N1D-RLD-00005, Rev 4	and Figures C1-1 and C1-3 of Operating Unit Group 10, Addendum C of this Permit.	RLD-VSL-00004 = 7696 RLD-VSL-00005 = 25,780

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Table III.10.E.C – HLW Vitrification Plant Tank Systems Description

Mixed Waste Tank Systems Name	Unit Designation	Engineering Description (Drawing Nos, Specification Nos, etc.)	Narrative Description, Tables & Figures	Maximum Capacity (gallons)
HLW Concentrate Receipt Process System The HCP System has ancillary equipment only.	HCP	**24590-HLW** -M5-V17T-P0001, Rev 4 -M6-HCP-00001001, Rev 0 -M6-HCP-00002001, Rev 0	Section 4.1.4.1; Tables 4-4 and 4-6; Figures C1-1 and C1-4 of Operating Unit Group 10, Addendum C of this Permit.	
HLW Melter Feed Process System HFP-VSL-00001 (Melter 1 Feed Preparation Vessel)	HFP	**24590-HLW** -3YD-HFP-00001[a] -M5-V17T-P0001, Rev 4 -P1-P01T-00002, Rev 7 ~~-P1-P01T-00009, Rev 11~~ -M6-HFP-00001001, Rev 0 -M6-HFP-00001002, Rev 0 -M6-HFP-00001003, Rev 0 -M6-HFP-00001004, Rev 0 -M6-HFP-00007001, Rev 0 **24590-WTP** -3PS-G000-T0002, Rev 8 -3PS-MV00-T0001, Rev 4 -3PS-MV00-T0002, Rev 3 -3PS-MV00-T0003, Rev 3	Section 4.1.4.1; Tables 4-4 and 4-6; Figures C1-1 and C1-4 of Operating Unit Group 10, Addendum C of this Permit.	HFP-VSL-00001 = 8,311
Melter Feed Process System cont. HFP-VSL-00002 (Melter 1 Feed Vessel)	HFP	**24590-HLW** -3YD-HFP-00001[a] -M5-V17T-P0001, Rev 4 -P1-P01T-00002, Rev 7 ~~-P1-P01T-00009, Rev 11~~ -M6-HFP-00002001, Rev 0 -M6-HFP-00002002, Rev 0 -M6-HFP-00002003, Rev 0	Section 4.1.4.1; Tables 4-4 and 4-6; Figures C1-1 and C1-4 of Operating Unit Group 10, Addendum C of this Permit.	HFP-VSL-00002 = 8,311

Table III.10.E.C – HLW Vitrification Plant Tank Systems Description

Mixed Waste Tank Systems Name	Unit Designation	Engineering Description (Drawing Nos, Specification Nos, etc.)	Narrative Description, Tables & Figures	Maximum Capacity (gallons)
		-M6-HFP-00008001, Rev 0 **24590-WTP** -3PS-G000-T0002, Rev 8 -3PS-MV00-T0001, Rev 4 -3PS-MV00-T0002, Rev 3 -3PS-MV00-T0003, Rev 3		
Melter Feed Process System cont. HFP-VSL-00005 (Melter 2 Feed Preparation Vessel)	HFP	**24590-HLW** -3YD-HFP-00001[a] -M5-V17T-P0001, Rev 4 -P1-P01T-00002, Rev 7 ~~-P1-P01T-00009, Rev 11~~ -M6-HFP-20001001, Rev 0 -M6-HFP-20001002, Rev 0 -M6-HFP-20001003, Rev 0 -M6-HFP-20001004, Rev 0 -M6-HFP-20007001, Rev 0 **24590-WTP** -3PS-G000-T0002, Rev 8 -3PS-MV00-T0001, Rev 4 -3PS-MV00-T0002, Rev 3 -3PS-MV00-T0003, Rev 3	Section 4.1.4.1; Tables 4-4 and 4-6; Figures C1-1 and C1-4 of Operating Unit Group 10, Addendum C of this Permit.	HFP-VSL-00005 =8,311
Melter Feed Process System cont. HFP-VSL-00006 (Melter 2 Feed Vessel)	HFP	**24590-HLW** -3YD-HFP-00001[a] -M5-V17T-P0001, Rev 4 -P1-P01T-00002, Rev 7 ~~-P1-P01T-00009, Rev 11~~ -M6-HFP-20002001, Rev 3 -M6-HFP-20002002, Rev 3 -M6-HFP-20002003, Rev 3	Section 4.1.4.1; Tables 4-4 and 4-6; Figures C1-1 and C1-4 of Operating Unit Group 10, Addendum C of this Permit.	HFP-VSL-00006 = 8,311

1

Table III.10.E.D – Analytical Laboratory Tank Systems Description

Mixed Waste Tank Systems Name	Unit Designation	Engineering Description (Drawing Nos, Specification Nos, etc.)	Narrative Description, Tables & Figures	Maximum Capacity (gallons)
Radioactive Liquid Waste Disposal System RLD-VSL-00164 (Laboratory Area Sink Drain Collection Vessel) RLD-VSL-00165 (Hot Cell Drain Collection Vessel)	RLD	**24590-LAB** -3YD-RLD-00001[a] -M5-V17T-P0029, Rev 1 -M6-RLD-P0001, Rev 2 -M6-RLD-P0002, Rev 1 -M6-RLD-P0006, Rev 1 -M6-RLD-P0007, Rev 1 -M6-RLD-P0008, Rev 1 -MVD-RLD-P0164, Rev 1 -MVD-RLD-P0165, Rev 1 -MV-RLD-P0001, Rev 0 -MV-RLD-00025001 Rev 0 -MV-RLD-00025002, Rev 0 -MV-RLD-00025003, Rev 0 -MV-RLD-00025004, Rev 0 -N1D-RLD-P0002, Rev 1 -N1D-RLD-P0003, Rev 1 -P1-60-P0007, Rev 2 -P1-60-P0008, Rev 2 ~~-P1-60-P0010, Rev 1~~ **24590-WTP** -3PS-G000-T0002, Rev 8 -3PS-MV00-T0001, Rev 4 -3PS-MV00-T0002, Rev 3 -3PS-MV00-T0003, Rev 3	Section 4.1.5.5; Table C-5 and 4-6 of Operating Unit Group 10, Addendum C of this Permit.	RLD-VSl-00164 = 3180 RLD-VSL-00165 = 9100

Table III.10.E.L - LAW Vitrification Plant Tank Systems Secondary Containment Systems, Including Sumps, Bulges, Autosamplers, and Floor Drains

Sump or Drain Line I.D.# & Room Location	Maximum Sump (gallons) or Drain Line (gallons per minute) Capacity	Sump Type/Nominal Operating Volume (gallons)	Sump or Drain Line Dimensions[a] (inches) & Materials of Construction	Engineering Description (Drawing Nos., Specifications Nos., etc.)
				~~P1-P01T-00010, Rev 8~~
RLD-SUMP-00030 L-0123 (Process Cell, El. +3')	30	Dry Sump	30" Dia. By 12" deep Stainless Steel	**24590-LAW** -M6-RLD-00003001, Rev 0 -M6-RLD-00003002, Rev 0 -M6-RLD-00003003, Rev 0 -P1-P01T-00002, Rev 5 ~~P1-P01T-00010, Rev 8~~
RLD-SUMP-00031 L-0124 Process Cell Sump, El. +3')	30	Dry Sump	30" Dia. By 12" deep Stainless Steel	**24590-LAW** -M6-RLD-00003001, Rev 0 -M6-RLD-00003002, Rev 0 -M6-RLD-00003003, Rev 0 -P1-P01T-00002, Rev 5 ~~P1-P01T-00010, Rev 8~~
RLD-SUMP-00032 L-0124 (Process Cell, El. +3')	30	Dry Sump	30" Dia. By 12" deep Stainless Steel	**24590-LAW** -M6-RLD-00003001, Rev 0 -M6-RLD-00003002, Rev 0 -M6-RLD-00003003, Rev 0 ~~P1-P01T-00010, Rev 8~~
RLD-SUMP-00035 L-0126 (Effluent Cell, El. +3')	30	Dry Sump	30" Dia. By 12" deep Stainless Steel	**24590-LAW** -M6-RLD-00003001, Rev 0 -M6-RLD-00003002, Rev 0 -M6-RLD-00003003, Rev 0 -P1-P01T-00002, Rev 5 ~~P1-P01T-00010, Rev 8~~

Table III.10.E.L - LAW Vitrification Plant Tank Systems Secondary Containment Systems, Including Sumps, Bulges, Autosamplers, and Floor Drains

Sump or Drain Line I.D.# & Room Location	Maximum Sump (gallons) or Drain Line (gallons per minute) Capacity	Sump Type/Nominal Operating Volume (gallons)	Sump or Drain Line Dimensions[a] (inches) & Materials of Construction	Engineering Description (Drawing Nos., Specifications Nos., etc.)
RLD-SUMP-00036 L-0126 (Effluent Cell, El. +3')	30	Dry Sump	30" Dia. By 12" deep Stainless Steel	**24590-LAW** -M6-RLD-00003001, Rev 0 -M6-RLD-00003002, Rev 0 -M6-RLD-00003003, Rev 0 -P1-P01T-00002, Rev 5 ~~-P1-P01T-00010, Rev 8~~
Drain Line ID# = RLD-FD-00001 L-B001B (RLD-BULGE-00001 Drain, El. -21')	N/A	N/A	2" Dia. 316L	**24590-LAW** -M6-RLD-00002001, Rev 0 -M6-RLD-00002002, Rev 0 -M6-RLD-00002003, Rev 0 -M6-RLD-00002004, Rev 0 -M6-RLD-00002005, Rev 0
Drain Line ID# = RLD-FD-00035 L-0126 (RLD-BULGE-0000-4 Drain El. +3')	N/A	N/A	2" Dia. 6 Mo	**24590-LAW** -M6-RLD-00001001, Rev 0 -M6-RLD-00001002, Rev 0 -M6-RLD-00001003, Rev 0 -M6-RLD-00001004, Rev 0 -M6-RLD-00001005, Rev 0 -M6-RLD-00001006, Rev 0
Drain Line ID# = LOF-FD-00001 L-0123 (LOP-BULGE-00001 drain El. +3)	N/A	N/A	2" Dia. 6 Mo	**24590-LAW** -M6-LOP-P0001, Rev 2
Drain Line ID# = LCP-FD-00001 L-0123 (LCP-BULGE-00001 Drain, El. +3')	N/A	N/A	2" Dia. 316L	**24590-LAW** -M6-LCP-~~P~~00001001, Rev ~~3~~0

Table III.10.E.N - HLW Vitrification Plant Tank Systems Secondary Containment Systems, Including Sumps, Autosamplers, and Floor Drains

Sump or Drain Line I.D.# & Room Location	Maximum Sump (gallons) Capacity	Sump Type	Sump or Drain Line Dimensions[a] (inches) & Materials of Construction	Engineering Description (Drawing Nos., Specifications Nos., etc.)
				~~-P1-P01T-00008, Rev 11~~
RLD-SUMP-00001 H-B014 (Wet Process Cell, El. –21')	75	Dry Sump	30" Dia. X 18" Deep Stainless Steel	**24590-HLW** -M6-RLD-00015001, Rev 04 -P1-P01T-00001, Rev 9
HOP-SUMP-00003 H-B021 (SBS Drain Collection Cell 1, El. –21')	75	Dry Sump	30" Dia. X 18" Deep Stainless Steel	**24590-HLW** -M6-RLD-00015001, Rev 04 -P1-P01T-00001, Rev 9
HOP-SUMP-00008 H-B005 (SBS Drain Collection Cell 2, El. -21_	75	Dry Sump	30" Dia. X 18" Deep Stainless Steel	**24590-HLW** ~~-M6-RLD-20004, Rev 6~~ -M6-RLD-20004001, Rev 0 -P1-P01T-00001, Rev 9
HDH-SUMP-00001 H-B039B (Canister Rinse Tunnel, El. –16.5')	75	Dry Sump	30" Dia. X 18" Deep Stainless Steel	**24590-HLW** -M6-RLD-00016001, Rev 04 -P1-P01T-00001, Rev 9 ~~-P1-P01T-00009, Rev 11~~
HDH-SUMP-00002 H-B039A (Canister Rinse Bogie Maintenance Room, El. –16')	75	Dry Sump	30" Dia. X 18" Deep Stainless Steel	**24590-HLW** -M6-RLD-00016001, Rev 04 -P1-P01T-00001, Rev 9
HDH-SUMP-00003 H-B035 (Canister Decon Cave, El. –16')	75	Dry Sump	30" Dia. X 18" Deep Stainless Steel	**24590-HLW** -M6-RLD-00004002, Rev 05 -P1-P01T-00001, Rev 9
HFP-SUMP-00002 H-0117 (Melter Cave 1, El. 5')	50	Dry Sump	20.5" X 20.5" X 16" Stainless Steel	**24590-HLW** -M6-RLD-00008002, Rev 05 -P1-P01T-00002, Rev 7 ~~-P1-P01T-00009, Rev 11~~
HFP-SUMP-00005 H-0106 (Melter Cave 2 El. 5')	50	Dry Sump	20.5" X 20.5" X 16" Stainless Steel	**24590-HLW** -M6-RLD- 20005, Rev 6 -P1-P01T-00002, Rev 7

Table III.10.E.N - HLW Vitrification Plant Tank Systems Secondary Containment Systems, Including Sumps, Autosamplers, and Floor Drains

Sump or Drain Line I.D.# & Room Location	Maximum Sump (gallons) Capacity	Sump Type	Sump or Drain Line Dimensions[a] (inches) & Materials of Construction	Engineering Description (Drawing Nos., Specifications Nos., etc.)
HSH-SUMP-00003 H-0117 (Melter Cave 1, El. 3')	50	Dry Sump	20.5" X 20.5" X 16" Stainless Steel	**24590-HLW** -M6-RLD-00008002, Rev 0~~5~~ -P1-P01T-00002, Rev 7 ~~-P1-P01T-00009, Rev 11~~
HSH-SUMP-00007 H-0106 (Melter Cave 2, El. 3')	50	Dry Sump	20.5" X 20.5" X 16" Stainless Steel	**24590-HLW** -M6-RLD-20005001, Rev 0~~6~~ -P1-P01T-00002, Rev 7
HSH-SUMP-00008 H-310A (Melter 1 Equip. Decon. Pit Area, El. 0')	50	Dry Sump	30" X 24" X 16" Stainless Steel	**24590-HLW** -M6-RLD-00003001, Rev 0~~5~~ -P1-P01T-00002, Rev 7
HSH-SUMP-00009 H-0304A (Melter 2 Equip. Decon. Pit Area, El. 0')	50	Dry Sump	30" X 24" X 16" Stainless Steel	**24590-HLW** -M6-RLD-20003001, Rev 0~~5~~ -P1-P01T-00002, Rev 7
HPH-SUMP-00001 H-0136 (Canister Handling Cave, El. -3')	75	Dry Sump	30" Dia. X 18" Deep Stainless Steel	**24590-HLW** -M6-RLD-00016001, Rev 04
HPH-SUMP-00005 H-0136 (Canister Handling Cave, El. -3')	75	Dry Sump	30" Dia. X 18" Deep Stainless Steel	**24590-HLW** -M6-RLD-00004001, Rev. 0~~5~~
HPH-SUMP-00003 H-B032 (Pour Tunnel 1, El. -21')	75	Dry Sump	30" Dia. X 18" Deep Stainless Steel	**24590-HLW** -M6-RLD-00016001, Rev 04
RLD-ZF-03330-S11B-03 H-B021 (SBS Drain Collection Cell 1)	N/A	N/A	Line Size Pipe Dia 3" 316L Stainless Steel	**24590-HLW** -M6-RLD-00015001, Rev 04
RLD-ZF-03447-S11B-03 H-B005 (SBS Drain Collection Cell 2)	N/A	N/A	Line Size Pipe Dia 3" 316L Stainless Steel	**24590-HLW** ~~-M6-RLD-20004, Rev 6~~ -M6-RLD-20004001, Rev 0
RLD-FD-0186 H-0308 (Melter 1 - Active	N/A	N/A	Line Size Pipe Dia 6" Stainless Steel	**24590-HLW** -M6-RLD-00015001, Rev 04

Table III.10.G.A – Pretreatment Plant Miscellaneous Unit Systems

Miscellaneous Unit System Description[a]	Miscellaneous Unit System Designation	Description Drawings	Narrative Description, Tables, & Figures	Maximum Capacity (gallons)
		~~N1D-FEP-P0004~~ ~~N1D-FEP-P0005~~ -P1-P01T-00001, Rev 7 -P1-P01T-P0002, Rev 7 ~~P1-P01T-P0007, Rev 6~~		
Waste Feed Evaporation Process System (Cont.) FEP-COND-00001A (Waste Evaporator Primary Condenser) FEP-COND-00001B (Waste Evaporator Primary Condenser) FEP-COND-00002A (Waste Evaporator Intercondenser) FEP-COND-00002B (Waste Evaporator Intercondenser) FEP-COND-00003A (Waste Evaporator Aftercondenser) FEP-COND-00003B (Waste Evaporator Aftercondenser)	FEP	**24590-PTF** -3PS-MEVV- T0001, Rev 2 -M5-V17T-00004001, Rev 3 -M5-V17T-00004002, Rev 3 -M6-FEP-00003002, Rev 0 -M6-FEP-00005001, Rev 0 -MED-FEP-P0003, Rev 0 -MED-FEP-P0004, Rev 0 -MED-FEP-P0005, Rev 0 -MED-FEP-P0006, Rev 0 -MED-FEP-P0007, Rev 0 -MED-FEP-P0008, Rev 0 -N1D-FEP-P0008, Rev 0 -N1D-FEP-00009, Rev 3 -N1D-FEP-00010, Rev 3 -P1-P01T-00001, Rev 7 -P1-P01T-P0002, Rev 7 ~~P1-P01T-P0007, Rev 6~~	Section 4.1.2.2.; Table C-8; and Figures C1-1, C1-2 and C1-02A of Operating Unit Group 10, Addendum C of this Permit.	N/A
Waste Feed Evaporation Process System (Cont.)	FEP	**24590-PTF**	Section 4.1.2.2.;	N/A

Table III.10.G.A – Pretreatment Plant Miscellaneous Unit Systems

Miscellaneous Unit System Description[a]	Miscellaneous Unit System Designation	Description Drawings	Narrative Description, Tables, & Figures	Maximum Capacity (gallons)
FEP-RBLR-00001A (Waste Feed Evaporator Reboiler) FEP-RBLR-00001B (Waste Feed Evaporator Reboiler)		-3PS-MEVV- T0001, Rev 2 -M5-V17T-00004001, Rev 3 -M5-V17T-00004002, Rev 3 -MED-FEP-P0010, Rev 0 ~~-N1D-FEP-P0007, Rev 1~~ -N1D-FEP-P0008, Rev 0 -P1-P01T-00001, Rev 7 -P1-P01T-P0002, Rev 7 ~~-P1-P01T-P0007, Rev 6~~	Table C-8; and Figures C1-1, C1-2 and C1-02A of Operating Unit Group 10, Addendum C of this Permit.	
Cesium Nitric Acid Recovery Process System CNP-EVAP-00001 (Cesium Evaporator Separator Vessel)	CNP	**24590-PTF** -3PS-MEVV-T0002, Rev 4 -M5-V17T-00014, Rev 2 ~~-M6-CNP-00001, Rev 2~~ -M6-CNP-00001001, Rev 0 -M6-CNP-00001002, Rev 0 -M6-CNP-00001003, Rev 0 ~~-M6-CNP-00002, Rev 2~~ -M6-CNP-00002001, Rev 0 -M6-CNP-00002002, Rev 0 -M6-CNP-00002003, Rev 0 -M6-CNP-00008, Rev 2 -M6-CNP-00008001, Rev 0 -MV-CNP-P0001, Rev 0 -MV-CNP-P0002, Rev 1 -MV-CNP-P0005, Rev 0	Section 4.1.2.6.; Table C-8; and Figures C1-1, C1-2 and C1-02A of Operating Unit Group 10, Addendum C of this Permit.	CNP-EVAP-00001 = RESERVED

Table III.10.H.A - LAW Plant Miscellaneous Unit System Description

Sub-system Description	Sub-system Designation	Engineering Description (Drawing Nos., Specification Nos., etc.)	Narrative Description, Tables and Figures
LAW Melter Process System LMP-MLTR-00001 (LAW Melter 1) LMP-MLTR-00002 (LAW Melter 2)	LMP	**24590-LAW** -P1-P01T-00002, Rev 5 ~~-P1-P01T-00007, Rev 8~~ ~~-P1-P01T-00009, Rev 8~~	Section 4.1.3.2, Table C-8, and Figures C1-1, C1-3 and C1-21 in Operating Unit Group 10, Addendum C of this Permit.
LAW Primary Offgas Process System LOP-FCLR-00001 (Melter 1 Primary Film Cooler) LOP-FCLR-00002 (Melter 1Standby Film Cooler No. 2) LOP-FCLR-00003 (Melter 2 Primary Film Cooler) LOP-FCLR-00004 (Melter 2 Standby Film Cooler)	LOP	**24590-LAW** -P1-P01T-00002, Rev 5 ~~-P1-P01T-00007, Rev 8~~ ~~-P1-P01T-00009, Rev 8~~ -M6-LOP-P0001, Rev 2 -M6-LOP-P0002, Rev 2	Section 4.1.3.3, Table C-8, and Figures C1-1, C1-3 and C1-21 in Operating Unit Group 10, Addendum C of this Permit.
LAW Primary Offgas Process System (Cont.) LOP-SCB-00001 (Melter 1 Submerged Bed Scrubber) LOP-SCB-00002 (Melter 2 Submergered Bed Scrubber)	LOP	**24590-LAW** -M5-V17T-P0007, Rev 0 -M5-V17T-P0008, Rev 0 -M6-LOP-P0001, Rev 2 -M6-LOP-P0002, Rev 2 -MK-LOP-P0001001, Rev 0 -MK-LOP-P0001002, Rev 0 -MK-LOP-P0001003, Rev 0	Section 4.1.3.3, Table C-8, and Figures C1-1 and C1-3 in Operating Unit Group 10, Addendum C of this Permit.

Table III.10.H.A - LAW Plant Miscellaneous Unit System Description

Sub-system Description	Sub-system Designation	Engineering Description (Drawing Nos., Specification Nos., etc.)	Narrative Description, Tables and Figures
		-MKD-LOP-P0008, Rev 0 -NID-LOP-P0001, Rev 1 -P1-P01T-00002, Rev 5 ~~-P1-P01T-00007, Rev 8~~ ~~-P1-P01T-00010, Rev 8~~	
LAW Primary Offgas Process System (Cont.) LOP-WESP-00001 (Melter 1 Wet Electrostatic Precipitator - WESP) LOP-WESP-00002 (Melter 2 Wet Electrostatic Precipitator -WESP)	LOP	**24590-LAW** -M5-V17T-P0007, Rev 0 -M5-V17T-P0008, Rev 0 -M6-LOP-P0001, Rev 2 -M6-LOP-P0002, Rev 2 -NID-LOP-00003, Rev 3 -P1-P01T-00002, Rev 5 ~~-P1-P01T-00007, Rev 8~~ ~~-P1-P01T-00011, Rev 6~~ **24590-WTP** -3PS-MKE0-T0001, Rev 5	Section 4.1.3.3, Table C-8, and Figures C1-1 and C1-3 in Operating Unit Group 10, Addendum C of this Permit.
LAW Secondary Offgas/Vessel Vent Process System LVP-HEPA-00001A (Melter Offgas HEPA Filter) LVP-HEPA-00001B (Melter Offgas HEPA Filter) LVP-HEPA-00002A (Melter Offgas HEPA	LVP	**24590-LAW** -M5-V17T-P0010, Rev 2 -M6-LVP-~~P~~00003001, Rev 01~~1~~	Section 4.1.3.3, Table C-8, Figures C1-1 and C1-3 in Operating Unit Group 10, Addendum C of this Permit.

Table III.10.H.A - LAW Plant Miscellaneous Unit System Description

Sub-system Description	Sub-system Designation	Engineering Description (Drawing Nos., Specification Nos., etc.)	Narrative Description, Tables and Figures
LVP-ADBR-00001B (Offgas Mercury Adsorber – located on LVP-SKID-00001)			
LAW Secondary Offgas/Vessel Vent Process System (Cont.) LVP-SCB-00001 (Melter Offgas Caustic Scrubber)	LVP	**24590-LAW** -P1-P01T-00004, Rev 3 ~~-P1-P01T-00009, Rev 8~~ -M6-LVP-~~P~~00002001, Rev 0~~3~~ -M6-LVP-00002002, Rev 0 -M6-LVP-00002003, Rev 0 -M6-LVP-00002004, Rev 0 -M6-LVP-00002005, Rev 0 -M6-LVP-00002006, Rev 0	Section 4.1.3.3, Table C-8, and Figures C1-1 and C1-3 in Operating Unit Group 10, Addendum C of this Permit.
LAW Secondary Offgas/Vessel Vent Process System (Cont.) LVP-HTR-00001A (Melter Offgas HEPA Preheater) LVP-HTR-00001B (Melter Offgas HEPA Preheater) LVP-HTR-00002 (Catalytic Oxidizer Electric Heater – located on LVP-SKID-00002)	LVP	**24590-LAW** -M5-V17T-P0010, Rev 2 -M6-LVP-~~P~~00001001, Rev 0~~-1~~ -M6-LVP-00001002, Rev 0 -M6-LVP-00001003, Rev 0 -M6-LVP-00001004, Rev 0 -M6-LVP-00001005, Rev 0 -M6-LVP-00001006, Rev 0 -M6-LVP-~~P~~00005001, Rev 0~~-1~~ -M6-LVP-00005002, Rev 0	Section 4.1.3.3, Table C-8, and Figures C1-1 and C1-3 in Operating Unit Group 10, Addendum C of this Permit.

Quarter Ending June 30, 2012 24590-WTP-PCN-ENV-11-010

Hanford Facility RCRA Permit Modification Notification Form
Part III, Operating Unit 10
Waste Treatment and Immobilization Plant

Index

Page 2 of 3: Hanford Facility RCRA Permit, Part III, Operating Unit 10, Waste Treatment and Immobilization Plant
Modification of Dangerous Waste Permit (DWP) Chapter 4 text and associated figures to align the DWP with current secondary containment design with redline strikeout of existing permit text and replacement text and figure.

Submitted by Co-Operator:

Donna Busche 4/20/12
D. M. Busche Date

Reviewed by ORP Program Office:

5/24/12
D. L. Noyes Date

Quarter Ending June 30, 2012 24590-WTP-PCN-ENV-11-010

Hanford Facility RCRA Permit Modification Notification Form

Unit:	Permit Part:
Waste Treatment and Immobilization Plant	**Part III, Operating Unit 10**

Description of Modification:

The purpose of this Class 1 prime modification is to update the DWP Chapter 4 text and figures regarding secondary containment design details for floor and wall coatings. The Chapter 4 details for the following two containment buildings are affected by the modification:

1. PTF Filter Cave Containment Building (P-0335)
2. PTF Spent Filter Drum Handling Area Containment Building (P-0223)

Descriptions and justification for the two proposed changes in this permit modification request are listed below. Redline and strikeout pages are provided on pages 4 through 5, and the revised replacement pages are provided on pages 6 through 7.

No.	Proposed Change	Justification
1	Chapter 4, Section 4.2.4.4, Pretreatment Filter Cave Containment Building (P-0335), text changes to include a portion of the floor covered with stainless steel. The following four subsections on Page 10-4-154 are affected by this modification: Pretreatment Filter Cave Containment Building Unit Materials. The Pretreatment Filter Cave Containment Building will be constructed of steel-reinforced concrete. The floor, wall, and berm surrounding the PJV demisters and PVP HEMEs will be covered with a stainless steel liner. ~~The interior floor and a portion of the walls will be covered with epoxy coating to protect the concrete and facilitate decontamination.~~ Use of Incompatible Materials for the Pretreatment Filter Cave Containment Building. The liner~~protective coating~~ will be compatible with the wastes that will be managed in the unit, which will include spent HEPA and HEME filters. Activities in the unit will be limited to waste packaging. Treatment reagents that could cause the liner~~protective coating~~ to leak, corrode, or otherwise fail will not be used within the unit. Primary Barrier Integrity in the Pretreatment Filter Cave Containment Building. The Pretreatment Filter Cave Containment Building will be designed to withstand loads from the movement of ~~personnel,~~ wastes~~,~~ and handling equipment. The seismic design criteria found in DWP Operating Unit Group 10, Supplement 1 ensures that appropriate design loads, load combinations, and structural acceptance criteria are employed at the WTP. Maintenance of the Pretreatment Filter Cave Containment Building. The stainless steel liner surrounding the demisters and HEMEs~~epoxy coated concrete floor and walls of the unit~~ will be constructed and maintained in a manner that will be free of significant cracks, gaps, corrosion, or other deterioration. The liner~~epoxy coating~~ will be compatible with materials that will be managed in the containment building, which will include spent HEPA and HEME filters. No decontamination chemicals that are incompatible with the liner~~coated concrete~~ will be used.	Design evolved to include stainless steel liner on a portion of the floor inside the curbing in room P-0335 under and surrounding the demisters and HEMEs. The stainless steel liner is an upgrade over the protective coating in the previous design. The majority of the floor and walls in P-0335 will be unlined concrete. Also, deletion of "personnel" in the third subsection is needed since P-0335 is a R5 area and personnel will not be allowed to enter the room during operation of the plant.

Quarter Ending June 30, 2012 24590-WTP-PCN-ENV-11-010

No.	Proposed Change	Justification
2	Chapter 4, Figure C1-59, update name of containment building to "PTF Spent Filter Drum Handling Area Containment Building (P-0223)" and remove the "X" in the "SS Liner With Welded Seams" column.	Chapter 4.2.4.3 text aligns with the current secondary containment design in describing an area that does not require secondary containment liner or protective coatings for free liquids. Protective coatings are applied in the PTF Spent Filter Drum Handling Area Containment Building (P-0223), but they are not DWP coatings and are for decontamination purposes only. Figure C1-59 is being corrected to match the text in Chapter 4.2.4.3 by removing reference to stainless steel liner and updating the room/area name.

WAC 173-303-830 Modification Class:	Class 1	Class [1]1	Class 2	Class 3
Please mark the Modification Class:		X		

Enter relevant WAC 173-303-830, Appendix I Modification citation number: NA

Enter wording of WAC 173-303-830, Appendix I Modification citation:

In accordance with WAC 173-303-830(4)(d)(i), this modification notification is requested to be reviewed and approved as a Class [1]1 modification. WAC 173-303-830(4)(d)(ii)(A) states, "Class 1 modifications apply to minor changes that keep the permit current with routine changes to the facility or its operation. These changes do not substantially alter the permit conditions or reduce the capacity of the facility to protect human health or the environment. In the case of Class 1 modifications, the director may require prior approval."

Modification Approved/Concur: ☑ Yes ☐ Denied (state reason below)

Reason for denial:

Reviewed by Ecology:

A. Carlson 9-10-12 Date

Redline Text and Figure

Pretreatment Filter Cave Containment Building Structure.
Because the Pretreatment Filter Cave Containment Building will be a concrete-walled structure fully enclosed within the pretreatment facility, its requirements will be met by the design standards of the pretreatment facility. The design will ensure that the unit has sufficient structural strength to prevent collapse or failure. DWP Operating Unit Group 10, Supplement 1 provides documentation that the seismic requirements for the pretreatment facility meet or exceed the Uniform Building Code Seismic Design Requirements.

Pretreatment Filter Cave Containment Building Unit Materials.
The Pretreatment Filter Cave Containment Building will be constructed of steel-reinforced concrete. The floor, wall, and berm surrounding the PJV demisters and PVP HEMEs will be covered with a stainless steel liner. ~~The interior floor and a portion of the walls will be covered with epoxy coating to protect the concrete and facilitate decontamination.~~

Use of Incompatible Materials for the Pretreatment Filter Cave Containment Building.
The liner ~~protective coating~~ will be compatible with the wastes that will be managed in the unit, which will include spent HEPA and HEME filters. Activities in the unit will be limited to waste packaging. Treatment reagents that could cause the liner~~protective coating~~ to leak, corrode, or otherwise fail will not be used within the unit.

Primary Barrier Integrity in the Pretreatment Filter Cave Containment Building.
The Pretreatment Filter Cave Containment Building will be designed to withstand loads from the movement of ~~personnel,~~ wastes~~,~~ and handling equipment. The seismic design criteria found in DWP Operating Unit Group 10, Supplement 1 ensures that appropriate design loads, load combinations, and structural acceptance criteria are employed at the WTP.

Certification of Design for the Pretreatment Filter Cave Containment Building.
Prior to initial receipt of dangerous and mixed waste, certification by a qualified registered professional engineer that the Pretreatment Filter Cave Containment Building meets the design requirements of 40 CFR 264.1101(a) and (c) will be obtained. The requirements of 40 CFR 264.1101(b) do not apply to this design because any dangerous waste containing free liquids will be managed on portable secondary containment that meets the requirements of WAC 173-303-603(7).

Operations of the Pretreatment Filter Cave Containment Building.
Operational and maintenance controls and practices will be established to ensure containment of the waste within the Pretreatment Filter Cave Containment Building, as required by 40 CFR 264.1101(c)(1).

Maintenance of the Pretreatment Filter Cave Containment Building.
The stainless steel liner surrounding the demisters and HEME~~sepoxy coated concrete floor and walls of the unit~~ will be constructed and maintained in a manner that will be free of significant cracks, gaps, corrosion, or other deterioration. The liner ~~epoxy coating~~ will be compatible with materials that will be managed in the containment building, which will include spent HEPA and HEME filters. No decontamination chemicals that are incompatible with the liner ~~coated concrete~~ will be used.

Figure C1-59 Typical System - Containment Building Typical Design Features Crosswalk (Sheet 2)

Containment Building	Negative Cell Air Pressure	Air Flow to HEPA Filters	SS Liner With Welded Seams	Import / Export Hatch - (Controlled Air Gap)	Shield Windows - (Sealed)	Steel Reinforced Concrete Floor/Foundation	Steel Reinforced Concrete Walls & Ceilings	Through Wall MSMs - (Sealed)	In - Cell Bridge Crane / Monorail	Horiz./Vertical Shield Doors - (Controlled Air Gap)	Miscellaneous In-cell Room Equipment
Pretreatment Plant											
Pretreatment Hot Cell Containment Building (P-0123)	X	X	X	X	X	X	X	X	X	X	X
Pretreatment Maintenance Containment Building											
PM0124 Hot Cell Crane Maintenance Mezzanine	X				X	X	X		X		X
P-0121A Spent Resin Dewatering	X	X		X	X	X	X				X
P-0122A Waste Packaging Area	X	X		X	X	X	X				X
P-0123A Remote Decontamination Maintenance Cave	X	X	X	X	X	X	X		X		X
P-0124 C3 Workshop	X	X		X	X	X	X		X		X
P-012C1 C3 Workshop	X	X		X	X	X	X		X		X
P-0125 Cask Lidding Airlock	X	X		X	X	X	X			X	X
P-0125A Cask Lidding Room	X	X		X	X	X	X		X		X
P-0128A MSM Repair Area	X	X		X	X	X	X				X
P-0128 Temporary Storage Room	X				X	X	X				X
Pretreatment Spent Filter ~~Package Maintenance~~ Drum Handling Area Containment Building (P-0223)	X	X	~~X~~			X	X			X	X
Pretreatment Filter Cave Room-Containment Building (P-0335)	X	X	X			X	X			X	X
Pretreatment PJV Secondary HEPA Filter Room Containment Building (P-0431A)	X	X				X	X				

Replacement Text and Figure
Section 4.2.4.4 Pretreatment Filter Cave Containment Building (P-0335)
(paragraphs 3 through 9)

Pretreatment Filter Cave Containment Building Structure
Because the Pretreatment Filter Cave Containment Building will be a concrete-walled structure fully enclosed within the pretreatment facility, its requirements will be met by the design standards of the pretreatment facility. The design will ensure that the unit has sufficient structural strength to prevent collapse or failure. DWP Operating Unit Group 10, Supplement 1 provides documentation that the seismic requirements for the pretreatment facility meet or exceed the Uniform Building Code Seismic Design Requirements.

Pretreatment Filter Cave Containment Building Unit Materials
The Pretreatment Filter Cave Containment Building will be constructed of steel-reinforced concrete. The floor, wall, and berm surrounding the PJV demisters and PVP HEMEs will be covered with a stainless steel liner.

Use of Incompatible Materials for the Pretreatment Filter Cave Containment Building
The liner will be compatible with the wastes that will be managed in the unit, which will include spent HEPA and HEME filters. Activities in the unit will be limited to waste packaging. Treatment reagents that could cause the liner to leak, corrode, or otherwise fail will not be used within the unit.

Primary Barrier Integrity in the Pretreatment Filter Cave Containment Building
The Pretreatment Filter Cave Containment Building will be designed to withstand loads from the movement of wastes and handling equipment. The seismic design criteria found in DWP Operating Unit Group 10, Supplement 1 ensures that appropriate design loads, load combinations, and structural acceptance criteria are employed at the WTP.

Certification of Design for the Pretreatment Filter Cave Containment Building
Prior to initial receipt of dangerous and mixed waste, certification by a qualified registered professional engineer that the Pretreatment Filter Cave Containment Building meets the design requirements of 40 CFR 264.1101(a) and (c) will be obtained. The requirements of 40 CFR 264.1101(b) do not apply to this design because any dangerous waste containing free liquids will be managed on portable secondary containment that meets the requirements of WAC 173-303-603(7).

Operations of the Pretreatment Filter Cave Containment Building
Operational and maintenance controls and practices will be established to ensure containment of the waste within the Pretreatment Filter Cave Containment Building, as required by 40 CFR 264.1101(c)(1).

Maintenance of the Pretreatment Filter Cave Containment Building
The stainless steel liner surrounding the demisters and HEMEs will be constructed and maintained in a manner that will be free of significant cracks, gaps, corrosion, or other deterioration. The liner will be compatible with materials that will be managed in the containment building, which will include spent HEPA and HEME filters. No decontamination chemicals that are incompatible with the liner will be used.

Replacement Text and Figure (continued)
Addendum C1 Figures and Drawings
Figure C1-59 Typical System - Containment Building Typical Design Features Crosswalk
(Page 10-C1-14, first of three pages of the crosswalk)

Containment Building	Negative Cell Air Pressure	Air Flow to HEPA Filters	SS Liner With Welded Seams	Import / Export Hatch - (Controlled Air Gap)	Shield Windows - (Sealed)	Steel Reinforced Concrete Floor/Foundation	Steel Reinforced Concrete Walls & Ceilings	Through Wall MSMs - (Sealed)	In - Cell Bridge Crane / Monorail	Horiz./Vertical Shield Doors - (Controlled Air Gap)	Miscellaneous In-cell Room Equipment
Pretreatment Plant											
Pretreatment Hot Cell Containment Building (P-0123)	X	X	X	X	X	X	X	X	X	X	X
Pretreatment Maintenance Containment Building											
PM0124 Hot Cell Crane Maintenance Mezzanine	X				X	X	X		X		X
P-0121A Spent Resin Dewatering	X	X		X	X	X	X				X
P-0122A Waste Packaging Area	X	X		X	X	X	X				X
P-0123A Remote Decontamination Maintenance Cave	X	X	X	X	X	X	X		X		X
P-0124 C3 Workshop	X	X		X	X	X	X		X		X
P-012C1 C3 Workshop	X	X		X	X	X	X		X		X
P-0125 Cask Lidding Airlock	X	X		X	X	X	X			X	X
P-0125A Cask Lidding Room	X	X		X	X	X	X		X		X
P-0128A MSM Repair Area	X	X		X	X	X	X				X
P-0128 Temporary Storage Room	X				X	X	X				X
Pretreatment Spent Filter Drum Handling Area Containment Building (P-0223)	X	X				X	X			X	X
Pretreatment Filter Cave Room-Containment Building (P-0335)	X	X	X			X	X			X	X
Pretreatment PJV Secondary HEPA Filter Room Containment Building (P-0431A)	X	X				X	X				

Issued by
RPP-WTP PDC
R50022586

Quarter Ending June 30, 2012 24590-WTP-PCN-ENV-12-001

Hanford Facility RCRA Permit Modification Notification Form
Part III, Operating Unit 10
Waste Treatment and Immobilization Plant

Index

Page 2 of 3: Hanford Facility RCRA Permit, Part III, Operating Unit 10, Waste Treatment and Immobilization Plant
Replace Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria" in Appendix 7.5 of the Dangerous Waste Permit (DWP).

Submitted by Co-Operator:

Donna Busche 5/9/12

D. M. Busche Date

Reviewed by ORP Program Office:

6/6/12

D. L. Noyes Date

Quarter Ending June 30, 2012

24590-WTP-PCN-ENV-12-001

Hanford Facility RCRA Permit Modification Notification Form

Unit:	Permit Part:
Waste Treatment and Immobilization Plant	**Part III, Operating Unit 10**

Description of Modification:

The purpose of this Class 1 prime modification is to update and replace the following design criteria document in Appendix 7.5 of the DWP:

Appendix 7.5			
Replace:	24590-WTP-DC-PS-01-001, Rev. 6	With:	24590-WTP-DC-PS-01-001, Rev. 7A

This modification requests Ecology approval and incorporation into the permit the specific changes to the design criteria document that are indicated by revision notes and bars. The design criteria document includes changes provided in applicable document change forms (e.g., DCN, SCN, SDDR, FCN, FCR, etc.) that were submitted to Ecology in accordance with Condition III.10.C.9.h. In addition, the design criteria document includes changes associated with the resolution to comments on change documents since the issuance of the last revision of the permitted document.

Changes to the design criteria document are summarized below:

- Revised Sections 3 (Design Requirements and Criteria), 4 (Pipe Stress Analysis), 5 (Computer Analysis Procedures), 6 (Interface with Other Disciplines), and 7 (Special Stress Analysis) to provide additional clarification and/or requirements for flange loads, wind load analysis, seismic category, hydrogen in piping and ancillary vessels (HPAV) analysis, piping flexibility analysis, analysis of black cell/hard-to-reach piping, and environmental room temperatures
- Added or updated reference documents in Section 8
- Revised Section 9.2, Appendix 2 (Span and Support Load Tables) and Section 9.8, Appendix 8 (Criteria for Critical Piping)
- Incorporated changes from change documentation identified in the History Sheet

This modification requests Ecology approval and incorporation of the following list of outstanding change documents into the permit. Although not yet incorporated into the revised document attached to this PCN, this list of outstanding DCNs are intended to be incorporated into this modification.

None

In accordance with Permit Condition III.10.C.2.e, this permit modification may include page changes to the Permit, attachments, and permit application supporting documentation. Necessary permit changes are attached to this PCN. Ecology is requested to incorporate changes in the next revision of the WTP Dangerous Waste Permit.

None

Quarter Ending June 30, 2012 24590-WTP-PCN-ENV-12-001

WAC 173-303-830 Modification Class:	Class 1	Class [1]1	Class 2	Class 3
Please mark the Modification Class:		X		

Enter relevant WAC 173-303-830, Appendix I Modification citation number: NA

Enter wording of WAC 173-303-830, Appendix I Modification citation:

In accordance with WAC 173-303-830(4)(d)(i), this modification notification is requested to be reviewed and approved as a Class [1]1 modification. WAC 173-303-830(4)(d)(ii)(A) states, "Class 1 modifications apply to minor changes that keep the permit current with routine changes to the facility or its operation. These changes do not substantially alter the permit conditions or reduce the capacity of the facility to protect human health or the environment. In the case of Class 1 modifications, the director may require prior approval."

Modification Approved/Concur: [X] Yes [ ] Denied (state reason below) Reason for denial:	Reviewed by Ecology: for ~~A. Carlson~~ S. Dahl	7/18/12 Date

Issued by RPP-WTP PDC
R5002258 6

General Document Change Notice (GDCN) A

Effective Date 11/22/2011

Document to be changed:

Document Number: 24590-WTP-DC-PS-01-001 Rev 7

Document Title: Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria"

Identify Changed Sections: 3.1, 4.3.3

	Organization	Type/Print Name	Signature	Date
Initiated by:	ENG	Joseph Sasson	Joseph Sasson	11/21/2011
Reviewed by: (when required)	ENG	Susan Karnesky	Susan A. Karnesky	11/21/2011
Reviewed by:	E&NS	Kenneth D. Gibson	K.D. Gibson	11/21/2011
Approved by:	ENG	Jeffrey Monahan	Jeffrey Monahan	11/21/2011

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 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.

Document title: **Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria"**

Department: Engineering

Author(s): Joseph Sasson

Principal author signature: _____

Document number: 24590-WTP-DC-PS-01-001, Rev 7

Checked by: Susan A. Karnesky

Checker signature: _____

Date of issue: **11/21/2011**

Issue status: **Approved**

Approved by: **Keith Mercier**

Approver's position: Plant Design Functional Lead Engineering

Approver signature: _____

E&NS Screening

Print/Type Name	Signature	Date

River Protection Project
Waste Treatment Plant
2435 Stevens Center Place
Richland, WA 99354
United States of America
Tel: 509 371 2000

History Sheet

Rev	Date	Reason for revision	Revised by
0	07/23/01	Issued for Project Use	Jack Shen
1	01/16/02	Revised per New Procedure and Incorporated DRN Comments	Dick Huang/Jack Shen
2	09/10/03	Revised per Safety Evaluation Number 24590-WTP-SE-ENS-03-704 Rev.0, Extended Span and Support Loads, and Nozzle Tables from 16"ϕ Pipe to 24"ϕ Pipe	Jack Shen
3	05/13/04	Revised per Safety Evaluation Number 24590-WTP-SE-ENS-03-962 Rev.0, pressure vessel nozzle load combination per Reference 8-22, and piping with D_o/t_c greater than 50	Dick Huang
4	10/18/04	Consideration of ASME B31.3 Mechanical / Corrosion / Erosion Allowances per PIR GPI-6BEB-00401-000, CCN069183 and 24590-WTP-CAR-QA-04-120, add SAM Criteria, Removed Rotary Equipment Nozzle Load Tables	Jack Shen
5	08/23/06	Extensive revision; changes not tracked, except on the cover sheet. Revised to Incorporate the Considerations from CCN 115252, Safety Evaluation 24590-WTP-SE-ENS-05-0128 Rev. 1, and the Discipline Directions Specified in CCNs 085280, 109336, 114910, 130111, 130571 and 134128; SC-III(Non-Chem) & SC-IV Span Tables for Every DW and Every Other DW Span, and Criteria of Critical Piping; Delete Tables 3-1, 3-2,2.1, 2.3, 3.1.1, 3.3.1, Appendices 4, 5 and 6; delete Section 4.3.2., Seismic mode combination per Ref. 8.56, Revised section 3.1 valve qualification, Revised Section 4.6 Wind load. Changed titles of Appendix 3, Tables 3.2.1 and 3.4.1.	Joseph Sasson
6	01/15/08	Revised to Incorporate the Considerations from CCN 143512, Safety Evaluation 24590-WTP-SE-ENS-06-0153 Rev. 0, "Evaluation of WTP Piping and Supports Qualified to SC I, SC II, SC III, and SC IV Requirements," which was approved in US DOE ORP letter 06-WTP-198 and incorporated into Revision 2b of the PSAR (Ref, 8.38); added Section 5 and Table 1-1 & 1-2 to Appendix 1; added Appendix 10 to address Washington Dept. of Ecology Issue 35, "Stress Limits for SC-III(Non-Chem) and SC-IV Piping and Supports"	Joseph Sasson
7	05/24/11	Revised to incorporate General Document Change Notices (GDCN) A and B for Rev 6 of the criteria. Incorporate 24590-WTP-CRPT-QA-08-0214-B ACTION 06. Incorporate 24590-WTP-ATS-QAIS-09-0431. Revised to remove reference to ITS, replace with safety. Revised to incorporate the considerations specified in CCN 144225, Plant Design Discipline Direction - Wind Load Analysis. Documented flange loads requirements per Ref 8.64. Incorporate requirements for piping class IIIE per 24590-WTP-BODCN-ENG-09-0020. Incorporate requirements for HPAV loads in stress analysis per 24590-WTP-BODCN-ENG-10-0001. Incorporate requirements for piping interface with flexible equipment per 24590-WTP-RPT-ENG-09-040.	Joseph Sasson

7A	**11/21/2011**	**Revised to incorporate 24590-WTP-PIER-MGT-09-1179-C Action 26, by revising Section 4.3.3 & 3.1 to address environmental room temperature**	**Joseph Sasson**

Contents

Acronyms v
1 Purpose 1
2 Scope 1
3 Design Requirements and Criteria 1
3.1 Design Codes and Requirements 1
3.2 Pipe Classifications 3
3.3 Load Combinations and Acceptance Criteria 4
4 Pipe Stress Analysis 6
4.1 Analysis Methods 6
4.2 Pressure Design 8
4.3 Flexibility Analysis 8
4.4 Weight Analysis 10
4.5 Seismic Analysis 11
4.6 Analysis for Wind Loads – For Exposed Piping Only 16
4.7 Simplified Methods 17
4.8 Deleted 18
4.9 Computer Analysis Using ME101 18
4.10 Consideration of Mechanical, Corrosion, and Erosion Allowance 22
5 Computer Analysis Procedures 26
5.1 General Procedure 26
5.2 Pipe Mathematical Model 26
5.3 De-coupled Analysis 27
5.4 Considerations of Support Design in Pipe Stress Analysis 27
5.5 Modeling of Piping Components in ME101 29
5.6 Summary of Analysis Results 30
5.7 Documentation of Calculation Packages 30
6 Interface with Other Disciplines 31
6.1 Interface with the Layout Group 31
6.2 Interface with the Pipe Support Designer 31
6.3 Interface with Mechanical Systems Group 31
6.4 Interface with CS&A Discipline 31
6.5 Interface with Piping and Valve Engineering 31
6.6 Interface with the Jumper Group 32
6.7 Interface with Plant Equipment Group 32

7 Special Stress Analysis 32
7.1 Pipe Local Stress Analysis at Welded Attachments 32
7.2 Nozzle and Anchor Qualifications 35
7.3 Dynamic Transient Forces on Closed Discharge Piping Systems 39
7.4 Welding Tee 40
7.5 Piping with $D_o/t_c > 50$ 40
7.6 Black Cell / Hard-to-Reach Piping Systems 40
7.7 Piping Two over One Protection 43
7.8 Jumpers 43
7.9 Pipe Break (To be determined) 43
7.10 Wind Missile (To be determined) 43
7.11 Hydrogen In Pipes And Ancillary Vessels (HPAV) 43
7.12 Buried Pipe 44
8 References 45
9 Appendices 48
9.1 APPENDIX 1, Span Method Criteria 48
9.2 APPENDIX 2, Span and Support Load Tables 55
9.3 APPENDIX 3, SC-III and SC-IV Anchor Load Tables 64
9.4 APPENDIX 4, Deleted 69
9.5 APPENDIX 5, Deleted 69
9.6 APPENDIX 6, Deleted 69
9.7 APPENDIX 7, ME101 Stress Check Based on Nominal Weight and Eroded/Corroded Pipe Wall Thickness 69
9.8 APPENDIX 8, Criteria for Critical Piping 72
9.9 APPENDIX 9, ME101 Gap Options: 73
9.10 APPENDIX 10, Use of UBC and Alternate Stress Criteria for SC-III(Non-Chem) and SC-IV 75

Tables

Table 4.1 Piping with Erosion/Corrosion Allowance 50% or Greater 25

Acronyms

AISC ASD	American Institute of Steel Construction, Allowable Stress Design
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
C.S.	Carbon Steel
CIS	Component Information System
CQC	Complete Quadratic Combination
CS&A	Civil, Structural & Architectural
DOE	Department Of Energy
DW	Deadweight
EGS	Engineering Group Supervisor
HPAV	Hydrogen in Pipes And Ancillary Vessels
HVAC	**Heating, Ventilation, and Air-Conditioning**
ISO	Isometric
ME101	Bechtel computer program for the linear elastic analysis of piping systems (LEAP)
NPH	Natural Phenomena Hazards
PDSA	Preliminary Documented Safety Analysis
QA	Quality Assurance
RPP-WTP	River Protection Project – Waste Treatment and Immobilization Plant
SAM	Seismic Anchor Movement
SC	Safety Class or Seismic Category
SC-I	Seismic Category I
SC-II	Seismic Category II
SC-III	Seismic Category III
SC-III(Chem)	SC-III piping containing a significant Chemical release hazard
SC-III(Non-Chem)	SC-III piping not containing a significant Chemical release hazard, other than SC-III(Chem)
SC-IIIE	Seismic Category III Enhanced.
SC-IV	Seismic Category IV
SRSS	Square Root of the Sum of the Square
SS	Safety Significant
SSC	Systems, Structures & Components

S.S.	Stainless Steel
SRD	Safety Requirements Document
UBC	Uniform Building Code

1 Purpose

The "Pipe Stress Design Criteria" is developed to establish the design basis for the pipe stress analysis of RPP-WTP piping systems and to demonstrate that the piping systems meet both ASME B31.3 Code and DOE seismic design requirements in DOE-STD-1020-94.

The purpose of the design criteria is also to provide uniform guidance and acceptance criteria for performing pipe stress analysis for different pipe categories of this project.

2 Scope

The Pipe Stress Design Criteria is applicable to the pipe categories identified in Section 3.2. All pipe stress analysis shall be performed based on the analysis procedures provided in this Design Criteria and project engineering calculation procedure 24590-WTP-3DP-G04B-00037 [Ref 8.3]. Generic calculations are also performed to generate the "Span and Support Load Tables" using the simplified pipe design methods, based on the analysis procedures provided in this Design Criteria. This Design Criteria is the analysis basis and the analysis procedure for the pipe stress analysis of RPP-WTP in accordance with the ASME B31.3 Code and the DOE seismic design requirements in DOE-STD-1020-94.

3 Design Requirements and Criteria

3.1 Design Codes and Requirements

The design Code of RPP-WTP is ASME B31.3, Process Piping [Ref 8.1]. This project is also required to meet the DOE seismic requirements as specified in DOE-STD-1020-94 [Ref 8.2]. Due to the stringent seismic requirements for different levels of seismic safety protections, a more realistic seismic analysis methodology provided in ASME Section III Code [Ref 8.4] may serve as a model for the details missing from ASME B31.3.

In compliance with seismic requirements as specified in Reference 8.2, either the response spectrum method or the UBC static method is used for the seismic analysis of the piping systems. A 5% continuous damping, as specified in Table 2-3 of the Preliminary Safety Analysis Report [Ref 8.38], shall be used when performing piping analysis using a response spectrum method.

- ASME B31.3 Code – Process Piping

This Code provides the basic design principles and formulas for the design of Chemical plants and petroleum refinery piping. The Code defines the pressure, temperature, and forces applicable to the design of piping, and states the considerations that shall be given to various effects and their consequent loadings. Those loadings are due to weight effects, dynamic effects (such as earthquake or wind effects), thermal expansion and contraction effects, etc. The Code also specifies stress criteria such as limits of calculated stresses due to sustained loads and displacement stress range, and limits of calculated stresses due to occasional loads, etc.

- Uniform Building Code (UBC)

The UBC [Ref 8.5] provides the design earthquake loads, and the design rules for the design of buildings and other structural systems that are regulated by this Uniform Building Code. The UBC has treated piping systems similar to other mechanical equipment. The UBC is commonly used and is accepted in the design of fossil power plants, petro-chemical and other industrial facilities and is the required standard by DOE-1020-94 [Ref 8.2] for PC-1 and PC-2 SSCs. Therefore, those RPP-WTP piping systems that are SC-III, including SC-III(Chem), SC-III(Non-Chem), and SC-IIIE, or SC-IV will be designed using the UBC to calculate the static loads.

- ASCE 7-98 - Minimum Design Loads for Buildings and Other Structures (ASCE)

The ASCE [Ref 8.9] provides the design rules and method required for evaluation of wind loads. The ASCE is commonly used and is accepted in the design of fossil power plants, petro-chemical and other industrial facilities and is the required standard by Safety Requirements Document 24590-WTP-SRD-ESH-01-001-02 [Ref 8.19]. Therefore, those RPP-WTP piping systems that are exposed to wind loads will be designed using the ASCE to calculate the wind loads.

- ASME B16.5 Pipe Flanges and Flanged Fittings

Flanges may be designed per ASME B16.5 [Ref 8.6], or the flange joint may be evaluated in accordance with the design rules of ASME B31.3 Code for this project.
In order to prevent leakage at flanged joint due to excessive bending the following equations B5 and B6 of Ref. 8.64 may be used:

Deadweight + Thermal * $\leq$ $M_{fs} \leq 3125 \cdot (S_y/36000)\ C \cdot A_b$ [Ref 8.64]
Deadweight+Thermal+Seismic * $\leq$ $M_{fd} \leq 6250 \cdot (S_y/36000)\ C \cdot A_b$ [Ref 8.64]
* Maximum of Bending or Torsional Moments at the flange [in·lbf]
S_y = Yield Strength of Flange material at **maximum metal temperature** [psi]
Note: $S_y/36000 \leq 1$
C = Diameter of Bolt Circle [in]
A_b = Total Cross –Sectional Area of bolts at root of thread or section of least diameter under stress (stress area) [in^2]
M_{fs}, M_{fd} = Allowed moment on the flanged joint

- Valve/In-Line Component/Instrumentation Qualifications

  The design and analysis of piping systems shall be performed so that non-hand-wheel valves and in-line components that are important to safety are subjected to seismic/dynamic acceleration less than:

  - 4.54g for SC-I & II valves and in-line components. This value is a resultant acceleration of X, Y & Z (SRSS) directions and is equivalent to a test or analysis done to 4.5g biaxial in accordance with IEEE-382 [Ref 8.60] with a 1.4 margin as required by DOE-1020-94 [Ref 8.2].
  - 5.78g for SC-III & IV valves and in-line components. This value is a resultant acceleration of X, Y & Z (SRSS) directions and is equivalent to a test or analysis done to 4.5g biaxial in accordance with IEEE-382 [Ref 8.60] with a 1.1 margin as required by DOE-1020-94 [Ref 8.2]. Note that the above value applies for dynamically analyzed systems. SC-III and SC-IV systems utilizing the UBC static analysis method will automatically meet the 5.78g limit (see Section 4.5.2(a)).

  Notes:

  1. When operator weight and location is provided, model the valve with operator weight and location in ME101 computer model.
  2. When valve CG location is not available, use 2/3 of valve assembly overall height as CG location.
  3. For the valves w/o automatic operator, valve qualification is governed by the stress check at the valve ends in the ME101 detailed analysis.
  4. The acceleration shall include the effects of all modes, including the "residual response" mode; ME101 automatically includes the acceleration from the "residual response" mode, since the "residual response" mode is treated like any other mode. The user is cautioned that other Programs used for analysis may not do this automatically.

3.2 Pipe Classifications

The design Code for the piping systems of RPP-WTP is ASME B31.3 Code. Piping systems shall be designed for pressure effects, weight effects, thermal expansion or contraction effects, and dynamic effects, etc., in accordance with the design rules of ASME B31.3 Code.

The piping classified by seismic categories along with their seismic analysis methods and acceptance criteria are provided in Table 2-6 of the Preliminary Safety Analysis Report [Ref 8.38].

Note that SC-III(Chem) is listed in the line list (CIS data base) as "SC-III Q" and SC-III(Non-Chem) is listed as "SC-III CM".

Piping classified as SC-IIIE is defined in Reference 8.66; its acceptance criteria are the same as SC-III(Chem) but with a different coefficient of C_a [Ref 8.67].

3.3 Load Combinations and Acceptance Criteria

According to ASME B31.3 Code, in addition to internal pressure and external pressure loads, the applicable loadings considered in the pipe design shall be classified as sustained loads, displacement strains, and occasional loads. This is required because the design criteria for sustained loads, displacement strains, and occasional loads are different. They are defined as follows:

Sustained Loads - These loads include the weight of piping components, insulation, and other superimposed permanent loads supported by the pipe. The weight of the medium transported or the medium used for the test is also considered as a sustained load.

Displacement strains - These loads include thrusts and moments that arise when the free thermal expansion and contraction of the piping system is prevented by the restraints or anchors. The effects of movements of piping supports, anchors, and connected equipment shall be considered as this category as well.

Occasional loads - Earthquake loads, wind loads and the dynamic fluid transient loads due to the excitation of the contained fluid.

The following are the load combinations considered in the design of ASME B31.3 Piping:

1. Internal Pressure Stress

   Hoop stresses due to internal pressure are considered safe when the wall thickness of the piping component including any reinforcement, meets the requirement of the Code [Ref 8.1]. The compliance to meet these requirements has been established by the piping group. Longitudinal stress due to internal pressure is included in the Code stress calculation.

2. Longitudinal Stresses S_L

   The sum of longitudinal stresses in any piping component due to pressure, weight, and other applicable sustained loads shall not exceed S_h. Longitudinal stresses shall be based on the nominal outside diameter and the end-of-life (corroded) thickness, as required by ASME B31.3 [Ref 8.1, Para. 302.3.5].

   For SC-III(Non-Chem) and SC-IV piping, the weight plus pressure stress is limited to $0.8S_h$, based on Appendix 10. This limitation may be exceeded (but not to exceed $1.0S_h$) if it can be shown that the sum of seismic, weight, and pressure stresses meet $1.33S_h$ when the seismic stresses are determined using the strict UBC limitations, as explained in Appendix 10. When the SC-III(Non-Chem) and SC-IV piping weight plus pressure stresses exceed $0.8S_h$, the approval of the Stress EGS is required.

3. Allowable Displacement Stress Range S_A

The computed displacement stress range S_E in a piping system shall not exceed the following displacement stress range S_A. In compliance with ASME B31.3 [Ref 8.1, Paragraph 319.3.5], the analysis and stresses shall be based on nominal outside diameter and thickness.

$S_A = f\,(1.25\,S_c + 0.25\,S_h)$, as defined in Equation (1a) of Reference 8.1.

$S_A = f\,[1.25\,(S_c + S_h) - S_L]$, as defined in Equation (1b) of Reference 8.1, where

f = stress range reduction factor, as defined in Equation (1c) of Reference 8.1
S_h = basic allowable stress at maximum metal temperature expected during the displacement cycle under analysis, from Table A-1 of ASME B31.3 Code.
S_c = basic allowable stress at minimum metal temperature expected during the displacement cycle under analysis, from Table A-1 of ASME B31.3 Code.

4. Limits of Calculated Stresses due to Occasional Loads

a) <u>SC-I, SC-II, SC-III Piping containing a significant Chemical release hazard (SC-III(Chem)), SC-IIIE, or any Black Cell piping</u>

The sum of the longitudinal stresses due to pressure, weight, other sustained loads (S_L) and the stresses produced by occasional loads (S_{oc}), such as wind, earthquake, or fluid transient, shall not exceed $1.33S_h$ per ASME B31.3 Code. Longitudinal stresses shall be based on the nominal outside diameter and the end-of-life (corroded) thickness, as required by ASME B31.3 [Ref 8.1]. Earthquake loads for SC-I, SC-II and any piping located in the Black cells are calculated using Response Spectrum methods with 5% continuous damping and the Complete Quadratic Combination (CQC) for modal combination [Section 3.2.7 of Ref 8.56] using nominal dimensions. The converted response spectra are documented in References 8.31 and 8.32 for the HLW and PTF facilities, respectively. The occasional loads should be combined by the square root of sum of squares (SRSS) method. Earthquake loads need not be considered as acting concurrently with wind or HPAV.

SC-IIIE is subject to the same requirements as SC-III(Chem) except for the C_a coefficient which is 0.312 (horizontal) for SC-IIIE [Ref 8.67] and 0.24 (horizontal) for SC-III(Non-Chem) and SC-IV.

b) <u>SC-III piping without containing a significant Chemical release hazard (SC-III(Non-Chem)) and SC-IV piping</u>

The sum of the longitudinal stresses due to pressure, weight, other sustained loads (S_L) and the stresses produced by occasional seismic loads (S_{oc}) shall be less than or equal to $3.0S_h$, but not greater than $2.0S_y$ as specified in Reference 8.38, where

S_h is as defined above, and

S_y = yield strength at design temperature. ASME B31.3 Code par. 302.3.2(e) refers the user to ASME Section II part D Table Y-1 [Ref 8.4] for the yield strength at temperature.

For SC-III, including SC-III(Chem), SC-III(Non-Chem), and SC-IIIE, and SC-IV piping, earthquake loads are established based on Uniform Building Code (UBC) Formula 32-2 and the pipe stresses are calculated using the UBC static method, using nominal dimensions for load calculation and the end-of-life (corroded) thickness for stress calculation.

The sum of the longitudinal stresses due to pressure, weight, other sustained loads S_L and the occasional stresses S_{oc} produced by occasional loads such as wind or fluid transient shall not exceed 1.33 S_h (per ASME B31.3 [Ref 8.1]). Longitudinal stresses shall be based on the nominal outside diameter and the end-of-life (corroded) thickness, as required by ASME B31.3. The occasional loads are combined by the square root of the sum of the squares method. However, earthquakes need not be considered as acting concurrently with wind or HPAV.

4 Pipe Stress Analysis

4.1 Analysis Methods

For the purposes of this criteria document, the following definitions apply:
Critical Piping is that which requires a formal ME101 computer analysis, see Appendix 8.
Non Critical Piping is that which does not require a formal ME101 computer analysis.

Piping systems shall be designed to prevent the effects of temperatures, pressures, weight, and dynamic loads from causing the following failures:

a) Failure of piping or supports from overstress or fatigue due to pressure cycling and thermal cycling;
b) Leakage at joints; or
c) Detrimental stresses or distortion in piping and valves or in connected equipment resulting from excessive thrusts and moments in the piping

To demonstrate a piping system meets Code stress criteria, the following analysis approaches may be used:

1. No Formal Analysis

   a) Duplicates, or replaces without significant change, a piping system operating with a successful service record

b) A piping system can readily be judged adequate by comparison with previous analyzed systems.

c) A piping system determined to be non-critical and judged to be free from design concerns such as deflection, clearance, thermal expansion/contraction, critical nozzle allowable, etc. Critical piping may be identified using the list in Appendix 8.

2. Formal Analysis

a) **Simplified or approximate method** may be applied only if used within the range of configurations, similar boundary conditions and load patterns for which their design adequacies have been demonstrated. This is normally shown by a generic calculation. Using "Span and Support Load Tables" may be considered as this approach.

b) **Acceptable comprehensive methods** of analysis include analytical and chart methods that provide an evaluation of the forces, moments, and stresses due to various load effects. This is usually performed by a manual calculation using existing analytical equations or charts on an individual case. This is not cost effective for mass production.

c) **Comprehensive analysis** for all piping components in the piping system. This is performed based on the most realistic design condition by taking into account stress intensification factors for any piping component. It is performed for all the stress evaluations to meet the stress criteria as specified in Section 4.9, Computer Analysis Using ME101, under various load considerations.

In summary, comprehensive analysis using ME101 shall be performed for SC-I, SC-II, SC-III(Chem), and SC-IIIE piping and critical piping as identified in Appendix 8, and simplified analysis using "Span and Support Load Tables" should be performed for SC-III(Non-Chem) and SC-IV piping. A comprehensive analysis for a pipeline should also be performed to qualify:

- A group of pipelines with similar pipe layout, if it is judged to be technically justifiable.
- The pipe design of a SC-III(Non-Chem) or SC-IV pipeline that deviates significantly from the design permitted by Span Tables.

In case of a piping system interaction with two different seismic category (SC) pipe classes, the piping shall be designed to the seismic design with the lowest SC number, if it is not feasible or practical to isolate them. The technical approach shall comply with the criteria for the piping of the lowest SC number. For instance, SC-III piping with respect to SC-I piping shall be designed using the more stringent analysis approach and design criteria required for SC-I piping. The model of pipe stress analysis shall be extended up to the first anchor or overlap supports on the SC-III piping. Two rigid supports in each global direction and one change in direction of the pipe are considered sufficient to isolate the piping for overlap.

4.2 Pressure Design

The compliance of pressure design required per Section 304 of ASME B31.3 is demonstrated in the pipe design for determining required pipe thickness [Ref 8.53 & 8.54].

4.3 Flexibility Analysis

Piping systems shall have sufficient flexibility to allow for thermal expansion or contraction or movements of piping supports and terminals. To accept the piping flexibility, a pipe flexibility analysis (formal analysis as provided in 4.1.2) or an engineering judgment (no formal analysis as provided in 4.1.1) is required to demonstrate that the stress criterion specified in Section 4.9.2 has been met. For specific guidance regarding when a formal flexibility analysis is required, see Section 4.3.4.

1. Design input for flexibility analysis

   a) Properties of piping materials such expansion coefficient, modulus of elasticity, allowable stress.

   b) Pipe ISO to show pipe configuration, pipe sizes and pipe schedule, support and anchor locations, types of supports, etc.

   c) Temperatures of various operating modes and corresponding imposed movements from support/anchors to determine the displacement stress ranges.

2. Deleted

3. Comprehensive analysis - using computer program ME101

   Input 3-D pipe mathematical model including all pipe dimensions, pipe material properties, piping component types and temperatures into computer program ME101 to determine the dimensional change of the piping system due to the change in temperature. As the piping system is constrained from free expansion or contraction by the connected equipment and restraints, it will be displaced from its unrestrained position. The stress ranges proportional to the total displacement strains are then determined at any piping component, with stress intensification factors per Appendix D of the ASME B31.3 Code. If an SIF is not available in ASME B31.3, use of a suitable SIF shall be justified.

   By Code, the stress range S_E is calculated between the maximum metal temperature and the minimum metal temperature for the thermal cycle under analysis. If no minimum operating temperature is below the ambient temperature 70°F, the temperature range shall be determined between the maximum metal temperature and the ambient temperature 70°F. For most piping systems, analyzing for the **pipe maximum metal** temperature may be the most critical case for the design of the piping system. However, some piping systems may have more than one operating temperature including

temperature below ambient. It is imperative that the pipe stress engineer determines the worst thermal condition for which the flexibility analysis should be performed. In cases where it is not possible to determine the worst case by engineering judgment, it is necessary to perform flexibility analysis for each of the significant thermal modes.

Note 1: **Maximum pipe temperature may be controlled by the room environment temperature provided in WTP facility-specific room environment data sheet, See Section 2.4.13.1 of References 8.38. For those rooms for which environment temperatures are not provided use Table 12-1 of 24590-WTP-DB-ENG-01-001 [Ref 8.48].**

The Environment room temperatures provided in the facility data sheet are as follows:

Normal Temperatures: **generally are based on summer maximum temperature listed in Table 12-1 of 24590-WTP-DB-ENG-01-001 [Ref 8.48]**

Abnormal temperatures: **are due to an anticipated eight hour loss of HVAC cooling event conservatively postulated to occur once per year. Abnormal temperatures are not the result of an accident. Abnormal environment room temperature need not be considered concurrent with seismic event [Ref 8.74].**

Post DBE temperatures: **are due to an anticipated loss of HVAC cooling event following seismic event per 24590-WTP-RPT-M-09-006 [Ref 8.75]. Post DBE environment room temperature need not be considered concurrent with seismic event [Ref 8.74].**

Environment temperature due to Steam line Break:

For rooms subject to steam line break identified in WTP facility-specific room environment data sheet, See Section 2.4.13.1 of References 8.38

Note 2: **Report 24590-WTP-RPT-ENG-11-153 [Ref 8.75], Section 7.4.2, concludes that rooms with environment temperature of 160°F and lower do not require formal flexibility analysis due to environmental room temperature.**

4. Analysis Approaches

Per the ASME B31.3 Code requirements, all piping, regardless of classification, is required to meet the flexibility requirements whether by using formal analysis or by engineering judgment. Based on the previous experience of piping systems with successful service, the analysis approaches are provided as follows [Ref 8.38]:

a) For piping systems with the maximum operating temperature not greater than 150°F, no formal flexibility analysis is required. However, pipe stress engineer reviews and ensures that there are no significant externally imposed displacements such as movements due to anchor or nozzle displacements, connected piping, or building settlements.

b) For piping systems with the maximum operating temperature not greater than 250°F and properly routed with adequate flexibility, formal flexibility analysis is also not required. However, where the piping systems are SC-I/SC-II, connected to major/sensitive equipment, or will have significant externally imposed displacements, a formal flexibility analysis is required.

c) For piping systems with the maximum operating temperature above 250°F, formal flexibility analysis is required.

d) Per Reference 8.19, for piping systems that contain welds that are to be vacuum box leak tested and have design temperatures greater than or equal to 150°F, a comprehensive flexibility analysis shall be performed in accordance with ASME B31.3.

4.4 Weight Analysis

1. General Requirements of Weight Analysis

Sustained loads include weight loads, such as the weight of the piping, piping components, insulation, contents, and other superimposed permanent loads, and live loads such as snow load of 15 lb/ft^2, volcanic ash loads of 12.5 lb/ft^2 for SC-I & SC-II piping, and snow load of 15 lb/ft^2, volcanic ash loads of 5 lb/ft^2 for SC-III (Chem and Non-Chem) & SC-IV piping [Tables 4-1 & 4-2 of Ref 8.19]. Note that snow and volcanic ash loads apply only to exposed piping outside the buildings; therefore these loads do not apply to SC-IIIE piping, which is exclusively inside the facilities. These additional loads apply only to weight analysis and are not required to be combined with seismic per section 1612.3.1 of UBC [Ref 8.5]. In addition, it is reasonable to assume that the snow and volcanic ash will not remain on the pipe during seismic or wind events.

One of the characteristics of snow or volcanic ash is that it is like powder. Buildup of a powder-like substance on a round surface such as a pipe will result in accumulation in the shape of a triangle and not a rectangle, which is common for a flat surface. Hence, any excess of snow or volcanic ash will fall off. In addition, since snow loads envelope volcanic ash live loads, qualifying the pipe for live loads of 15 lb/ft^2 addresses the requirements for both snow and volcanic ash.

The main purpose of weight analysis is to support the piping system to meet the criterion specified in Section 4.9.1, and to limit the piping sag to 1/4” or less. This is to avoid

creating low points (pockets) in the piping between supports if no slope is taken into consideration, and to avoid system drainage problems.

For development of Span and Support Load Tables for RPP-WTP piping, sag is limited to 0.25 inch, or the pipe stress due to weight load is limited as specified in Appendix 1, whichever provides the shortest span length.

Rigid vertical supports should be provided to the piping system based on the weight analysis where possible. If the piping system is operating at higher temperature, spring hangers may be required at locations near equipment or a connected header due to large differential movements.

2. Analysis Approaches

In general, a formal analysis is required to determine the piping sag and the pipe stresses.

a) "Span and Support Load Tables", provided in Appendix 2, may be used for SC-III(Non-Chem) and SC-IV piping. Using spans less than or equal to the weight span specified in the Span Tables for SC-III(Non-Chem) and SC-IV piping indicates that the sustained load requirement of ASME B31.3 is met and will also ensure that the lower $0.8S_h$ limit is met, due to the limitations on pressure stresses.

b) Comprehensive analysis using ME101 is required for SC-I, SC-II, SC-III(Chem), and SC-IIIE piping, and for critical piping as identified in Appendix 8 in order to perform the Code check for sustained load.

4.5 Seismic Analysis

1. Code Requirements of Seismic Analysis

ASME B31.3 Code requires piping systems be designed for occasional loads such as earthquake to meet the design criteria specified in Section 4.9.3, to ensure that the piping systems will be able to perform their seismic safety function.

2. Seismic Analysis Techniques

Seismic analysis is performed using static methods or dynamic methods. Each method consists of several steps such as seismic load determination, methods of applied loads, pipe model selections, and methods of determining the pipe responses, etc. For RPP-WTP, the static method based on the Uniform Building Code is used for SC-III(Chem), SC-III(Non-Chem), SC-IIIE and SC-IV piping except for black cell piping. The response spectrum method is used for dynamic seismic analysis of SC-I and SC-II piping and all black cell piping. These methods are described as follows:

a) Static Method Using the Uniform Building Code

This method establishes the lateral seismic force, F_p, on piping systems using the nominal pipe wall thickness for defining loads as detailed in Section 4.9 and is based on Equations 32-2 and 32-3 and Zone 2B of UBC [Ref 8.5] as follows:

$$0.7C_a I_p W_p \le F_p = \frac{a_p C_a I_p}{R_p}\left(1+3\frac{h_x}{h_r}\right)W_p \le 4C_a I_p W_p$$

where

- C_a = Seismic Coefficient, as set forth in UBC Table 16-Q, taken as 0.24 for WTP (see below) except for SC-IIIE, for which C_a is taken as 0.312 [Ref 8.67]
- I_P = Importance Factor specified in UBC Table 16-K, taken as 1.50 for SC-III piping and 1.0 for SC-IV piping for WTP
- W_P = The weight of an element or component
- F_p = Total design lateral seismic force (as defined in UBC 1632.2)
- a_p = In-structure Component Amplification Factor from UBC Table 16-O
- R_p = Component Response Modification Factor from UBC Table 16-O
- h_x = Element or Component elevation with respect to grade, not less than 0.0
- h_r = Structure roof elevation with respect to grade

The following list indicates the requirements that are used to develop loads for SC III/IV piping and supports:

- Lateral and vertical seismic loading, with the vertical force, F_v, equal to 2/3 the lateral force, which is consistent with typical Nuclear Power Plant (NPP) requirements
- Lateral force applied in both horizontal directions consistent with typical NPP requirements
- The three directions of force (both horizontals and the vertical) combined SRSS
- No reduction factor applied to the earthquake load
- a_p = 2.5 for piping (UBC Table 16-O, maximum possible value)
- R_p = 3.0 (UBC Table 16-O, Item 3B) for piping and for supports that don't use Concrete Expansion Anchors (CEAs) or have a buckling issue
- R_p = 1.5 for non-ductile failure modes based on Table 16-O, Item 4B (buckling, CEA pullout)

Determination of the seismic coefficient, C_a, is described in section 8.1.6, 1997 Uniform Building Code Soil Profile Type, of the WTP geotechnical investigation report (Shannon & Wilson 2000) [Ref 8.61]. The coefficient is based upon the soil profile type and the UBC Seismic Zone 2B classification.

F_p and F_v shall be distributed in proportion to the mass distribution of the piping system. To determine the pipe stresses and support loads using static methods, either of the following two approaches may be used:

- Simplified or approximate method

  This method uses the single span beam with the assumed end conditions as the pipe mathematical model, and applying the lateral and vertical seismic forces (F_p and F_v) to the model to determine the pipe stresses and support loads. This method is used to develop the "Span and Support Load Tables" for earthquake load as provided in Appendix 1, Span Method Criteria.

- Comprehensive Static Analysis using ME101

  This method applies UBC static lateral and vertical seismic loads to the mass distribution of the piping system model to determine the pipe stresses and support loads. The piping system model is the same as that for comprehensive ME101 flexibility analysis and comprehensive ME101 weight analysis. This analysis will provide more realistic results than those from the "Span and Support load Tables" using a single span beam model. When using ME101, F_p is applied in both horizontal directions with F_v in the vertical, and the results are combined by SRSS.

- In-line Component Accelerations Based on UBC Static Methods

  <u>SC-III(Chem), SC-III(Non-Chem) or SC-IV</u>
  With C_a = 0.24, and I_p conservatively = 1.5, and considering both horizontal directions of load and 2/3 the horizontal for the vertical, the resultant maximum acceleration for a valve or any in-line component is:

$$A_{res} = \sqrt{(4 \cdot 0.24 \cdot 1.5)^2 + (4 \cdot 0.24 \cdot 1.5)^2 + \left(\frac{2}{3} \cdot 4 \cdot 0.24 \cdot 1.5\right)^2} = 2.25g$$

  Applying the 1.1 factor required in DOE-1020-94, page 2-20 (assuming the equipment is tested):

  A_{res} (test) = 2.48g peak

  <u>SC-IIIE</u>
  With C_a = 0.312, and I_p = 1.5 [Ref 8.66 & 8.67], and considering both horizontal directions of load and 2/3 the horizontal for the vertical, the resultant maximum acceleration for a valve or any in-line component is:

$$A_{res} = \sqrt{(4 \cdot 0.312 \cdot 1.5)^2 + (4 \cdot 0.312 \cdot 1.5)^2 + \left(\frac{2}{3} \cdot 4 \cdot 0.312 \cdot 1.5\right)^2} = 2.93g$$

  Applying the 1.1 factor required in DOE-1020-94, page 2-20 (assuming the equipment is tested):

A_{res} (test) = 3.22g peak

Since these are lower than the value cited in Section 3.1 for SC-III in-line components, in-line devices tested as described in Section 3.1 will automatically meet UBC maximum static accelerations.

b) Dynamic Seismic Analysis – Response Spectrum Method with 5% Damping

Response Spectrum Method is the most common dynamic seismic analysis method for piping systems used by the nuclear industry.

Facility Structures are approximated by mathematical models to permit analysis of responses due to earthquake motions. For piping systems or equipment that are not analyzed as part of the building structural model, the Stress EGS should consult with CS&A for the use of floor response spectra curves. Both horizontal and vertical floor response spectra are computed from time history motions of the structure at various floor elevations or other support locations of interest.

A comprehensive dynamic seismic analysis using in-structure response spectra required per Reference 8.2 is performed using ME101 for SC-I, SC-II piping and all black cell piping to ensure meeting the occasional load requirement. In the response spectrum analysis, the piping system shall be modeled in accordance with Section 7.2.2.2.2 (b) of the Seismic Analysis and Design Criteria [Ref 8.7]. The peak values of particular responses of interest are determined for each mode. The total response may be obtained by combining the peak modal responses by the CQC modal combination method. Reference 8.56 approves CQC as a method for considering closely spaced modal effects. The residual rigid response is then combined with the modal response, again in compliance with Reference 8.56. In combining the effects due to tri-axial excitations, the natural frequencies, mode shapes, and the loads for each mode of the piping system are first determined. The load for each mode for unit-generalized response is the product of the stiffness matrix, the mode shapes, and the mode participation factors. When this product is multiplied by the generalized response determined from spectrum curves, the load for each natural mode results. The combined earthquake-induced response is then computed by the SRSS method of the three earthquake components [Ref 8.56].

Motions in a piping system dissipate energy from the system. The phenomenon of this kind of energy loss is called damping. For the WTP project, the damping value of 5% is used for piping [Ref 8.2].

The following Inelastic Energy Absorption Coefficients (F_μ) shall be used in piping stress analysis for SC-I and SC-II piping [Table 2-6a, Ref 8.38]:

Component	F_μ Value
Butt Joined Groove Welded Pipe	1.50

Socket Welded Pipe	1.25
Threaded Pipe	1.15
Equipment and Pipe Supports	1.50

However, Inelastic Energy Absorption Coefficients (F_μ) shall remain equal to 1.0 for the following:

- Calculating piping displacements
- Calculating loads and/or accelerations on active equipment that must function during and after the seismic event
- Calculating loads on components that exhibit non-ductile failure modes (buckling, concrete expansion anchor pull out, cast-iron standard components)
- Calculating pipe support attachment interface loads to be used in evaluation of CS&A components

Note that Seismic analysis of piping may involve consideration of Seismic Anchor Movement (SAM) loads; see section 4.9.5 for details.

3. Analysis Approaches

The earthquake loads are different from facility to facility, and the response spectra curves are different from elevation to elevation. Therefore, seismic analysis shall be performed by Formal Analysis approach using either the simplified approximate method or comprehensive computer analysis.

"Span and Support Load Tables" are developed based on simplified or approximate methods and UBC requirements for SC-III(Non-Chem) and SC-IV piping. The detailed design basis is provided in Appendix 1. Using spans less than or equal to the seismic span specified in "Span and Support Load Tables" in Appendix 2 indicates that the occasional load requirement of ASME B31.3 is met for piping design of SC-III(Non-Chem) and SC-IV piping.

"Formal Analysis – response spectrum analysis" always provides more realistic results and the results are less conservative than those using simplified or approximate methods. Therefore, if the support span of a SC-III(Non-Chem) or SC-IV piping system deviates from that specified in the span and support tables and can not be justified, the piping system will be qualified using "Formal Analysis" by ME101 for weight, flexibility and/or seismic analysis to reduce the conservatism.

In case the actual support span is less than that specified in "Span and Support Load Tables", the support load may be adjusted to the actual support span by interpolation. Appendix 2 provides span load tables at maximum span with lateral support at every DW support, every other DW support and every third DW support for this purpose.

4.6 Analysis for Wind Loads – For Exposed Piping Only

ASME B31.3 Code requires that the effect of wind loading be considered in the design of exposed piping. ASME Code B31.3 Paragraph 301.5.2 states that the method of analysis may be as described in ASCE 7 [Ref 8.9], Minimum Design Loads for Buildings and Other Structures, or the Uniform Building Code [Ref 8.5]. The ASCE 7-98 [Ref 8.9] is used as the basis for wind load analysis for the RPP-WTP project [Ref 8.19].

For wind load analysis, the design wind pressures are determined per ASCE and applied to the pipe in any horizontal direction using static analysis. The design wind pressures per Equation 6-20 of ASCE 7-98 are determined for any height in accordance with the following formula:

$$F = q_z G C_f A_f$$

where

F = design wind force (lb)
q_z = wind velocity pressure evaluated at height z above ground (lb/ft^2)
{I_w = wind importance factor as set forth in Table 4-1 and 4-2 of Ref 8.19 (Note 1)}
G = gust effect factor (Note 2)
C_f = force coefficient (Note 3)
A_f = pipe projected area normal to the wind direction (ft^2)

Per Tables 4-1 and 4-2 of Reference 8.19, the straight wind speed is 91 miles per hour, 3-second gust, at 33 ft above ground for SSCs without NPH Safety Functions SC-III & SC-IV, and 111 miles per hour, 3-second gust, at 33 ft above ground for SSCs with NPH Safety Functions SC-I & SC-II.

Notes:

1) Use I_w = 1.00 (part of q_z)
2) G should be 0.85 for piping, per ASCE 7-98 Section 6.5.8 [Ref 8.9]
3) C_f is force coefficient taken as 0.7, per ASCE 7-98 Table 6-10.
4) It is recommended to use exposure category "C" [Ref 8.9, Section 6.5.6].

The wind analysis is to be performed using static method assuming the wind to come from any horizontal direction. For piping with segments mostly in global directions, enveloping the results of global x-wind and global z-wind is acceptable. For piping with global as well as skewed segments, SRSS of the results of global x-wind and global z-wind is acceptable.

Wind loads and seismic loads do not have to be taken concurrently. Wind loads are also considered as occasional loads and are considered as S_{oc} in Section 4.9.3 as required by seismic category of the piping. However, wind loads are kept to 1.33 S_h in all seismic category piping.

Since only a few piping systems may require analysis for wind loads, no simplified or approximate methods such as Span Tables are provided here. If required, ME101 has the capability to perform the above analysis as required by the B31.3 Code and ASCE 7-98.

Note 1: Wind data (profile) for use in ME101 analysis in accordance with ASCE 7-98 [Ref 8.9] is provided by calculation 24590-WTP-P6C-P40T-00015 [Ref 8.62]

Note 2: In order to meet the 1Hz frequency requirement of ASCE 7-98, deflection due to wind load is limited to 10" [Ref: 8.62]. In addition, Attachment 5 of the Stress calculation lists all piping movement above 1.0" as part of the Interference Clearance Deviation Evaluation [Ref 8.57].

4.7 Simplified Methods

In order to simplify the analysis process, a simple pipe mathematical model has to be established. The simple pipe model usually consists of a single span of one or two dimension pipe layout with conservative end conditions and simple loading conditions.

a) Simplified Methods for Flexibility Analysis

Simplified Methods for flexibility analysis are effective for piping with simple layout and end conditions. The main purpose of simplified method is to determine the offset length or expansion loop to absorb the expansion/contraction movements imposed by its connected pipe or equipment. If necessary, a comprehensive analysis using a computer program such as ME101 may be used to obtain realistic results from thermal expansion/contraction and imposed thermal anchor movements.

b) Simplified Methods for Weight and Seismic Analyses – Span Tables

As weight analysis is a simple static analysis with gravity load only, a simplified weight analysis in general provides a reasonably accurate result in comparison to the result of a comprehensive computer analysis. Therefore, the "Span and Support Load Tables" for weight loads, generated based on the simplified method provided in Appendix 1, Span Method Criteria, should be used for SC-III(Non-Chem) and SC-IV piping.

The "Span and Support Load Tables" were developed for straight insulated pipe with and without water content. Piping with different insulation materials and specific gravities than those used in developing the span tables should be accounted for when applying the Span and Support Load Tables into the design of SC-III(Non-Chem) and SC-IV piping.

The span tables were originally developed based on nominal wall thickness. In addition, a calculation [Ref 8.27] was prepared to justify the span tables to account for mechanical, corrosion, and erosion allowance in accordance with ASME B31.3 Code. The guidelines for using the span tables are specified in Section 4.10.2.

The static seismic analysis based on UBC is used to develop the span and support load tables for SC-III(Non-Chem) and SC-IV piping. Design of SC-III(Non-Chem) and SC-IV piping by fully applying the "Span and Support Load Tables" is considered as meeting the Code requirements for occasional load, and no further analysis is required.

Separate analysis to document the design of non-critical SC-III(Non-Chem) and SC-IV piping systems is not required when Span Tables are used, provided that the design is consistent with the limitations for using the Span Tables as described in Engineering Design Guide for Pipe Stress [Ref 8.57], and the supports are designed with the loads specified in Span Tables, as allowed per project procedures [Ref 8.3 & 8.41]. The signature of the stress engineer on the piping isometric signifies that the design meets the span and flexibility requirements.

c) Simplified Methods - Study Run

Pipe support loads for a straight pipe per the Span Tables have proven to be approximately the same as those from ME101 analysis per Reference 8.15. For a complicated three-dimensional piping routing with concentrated weight, in-line equipment, and more turns, the support loads from an ME101 study run may be more realistic than those from the Span Tables; loads from the study run for non-critical SC-III(Non-Chem) and SC-IV piping systems may be used for pipe support design provided that ME101 input and the requested results are documented as an attachment to the support calculation.

Separate analysis to document the design of non-critical SC-III(Non-Chem) and SC-IV piping systems is not required when Span Tables are used, provided that the design is consistent with the limitations for using the Span Tables as described in Engineering Design Guide for Pipe Stress [Ref 8.57], and the supports are designed with the loads specified in Span Tables, as allowed per project procedures [Ref 8.3 & 8.41]. The signature of the stress engineer on the piping isometric signifies that the design meets the span and flexibility requirements.

4.8 Deleted

4.9 Computer Analysis Using ME101

ME101, Linear Elastic Analysis of Piping Program, is a family of computer programs that performs design analysis of piping systems, does various Code compliance checks, and produces complete calculation packages excluding project required manually attached information. The program is based on the finite pipe element method to calculate the response of piping systems subjected to a variety of loading conditions. Static analysis is performed for weight loading, thermal expansion loading, wind loading, seismic anchor-movement loading, building settlement, and static seismic loading such as UBC earthquake loading, etc. Dynamic analysis is performed for earthquake events using response spectrum

methods or time history methods. Transient events, such as water hammer loads, can also be analyzed with modal time history or direct integration methods.

ME101 input keyword "CODE=B31399" meets all Code requirements of B31.3, 1996 and is acceptable for use on the WTP project per Reference 8.43.

Note that paragraphs 1 through 5 below describe how ME101 calculates applicable stresses. Since WTP uses a mixture of nominal thickness (loads, displacement stresses) and end-of-life thickness (sustained and occasional stresses), the ME101 analysis is run using nominal dimensions. The resulting stresses are then corrected as explained in Section 4.10 to account for the end-of-life thickness.

1. Longitudinal Stresses S_L

$$S_L = \frac{PD}{4t_n} + S_s \le S_h \qquad \text{[Ref 8.1, Paragraph 302.3.5(c)]}$$

The longitudinal pressure stress of $\frac{PD}{4t_n}$ may be determined by the equation of

$$S_{lp} = \frac{Pd^2}{D^2 - d^2}$$

where

S_s = the longitudinal stress due to weight and other sustained loads.
S_{lp} = the longitudinal pressure stress.
P = design pressure
D = pipe outside diameter
t_n = nominal thickness of pipe; for corrosion/erosion and mechanical allowance consideration see Section 4.10
d = pipe inside diameter; for corrosion/erosion and mechanical allowance consideration see Section 4.10

2. Displacement Stress Range S_E – used as the criteria in the design of piping for flexibility

$$S_E \le S_A$$

where

S_E is the displacement stress range due to thermal displacements (constrained from free expansion or contraction), reaction displacements and externally imposed displacements such as seismic anchor movements, see paragraph 319.4.4 of Reference 8.1.

$$S_A = f\left(1.25S_c + 0.25S_h\right)$$

where

f = stress range reduction factor defined in equation (1c) ASME B31.3.

= 1 if the equivalent number of full displacement cycles during the expected service life of the piping system is less than 7,000.

f may be taken as unity for the initial design of RPP-WTP piping systems. However, the Pipe Stress EGS should consult with Mechanical Systems for service life system operation thermal cycles. If the expected number of thermal cycles in the service life of any piping system exceeds 7,000 cycles, Equations (1c) and (1d), or the Stress-Range Reduction Factors *f* in Table 302.3.5 in ASME B31.3 shall be applied.

3. Longitudinal Stresses due to Pressure, Sustained loads, and Occasional loads

3.1. For SC-I, SC-II, SC-III piping containing a significant Chemical release hazard (SC-III(Chem)), and SC-IIIE or any piping in black cells

$$S_L = \frac{PD}{4t_n} + S_s + S_{oc} \le 1.33 S_h \qquad \text{[Ref 8.1, Paragraph 302.3.6(a)]}$$

3.2. For SC-III without containing a significant Chemical release hazard (SC-III(Non-Chem)) and SC-IV Piping

$$S_L = \frac{PD}{4t_n} + S_s + S_{oc} \le 3.0 S_h \text{, but not greater than 2.0 } S_y \qquad \text{[Ref 8.38, Table 2-6]}$$

where

S_{oc} is the longitudinal stress produced by occasional seismic loads.

For S_{oc} based on wind or fluid transient loads for SC-III(Non-Chem) & SC-IV piping:

$$S_L = \frac{PD}{4t_n} + S_s + S_{oc} \le 1.33 S_h \qquad \text{[Ref 8.1, Paragraph 302.3.6(a)]}$$

4. The pipe stresses S_s, $S_{oc,}$ and S_E shall be calculated from the bending moments and torsional moment at the piping component in the piping system as follows:

$$S_s, S_{oc,} S_E = \sqrt{S_b^2 + 4S_t^2}$$

where

$$S_b = \frac{\sqrt{(i_i M_i)^2 + (i_o M_o)^2}}{Z} \text{ = resultant bending stress}$$

S_t = torsional stress, $\frac{M_t}{2Z}$

M_t = torsional moment

M_i = in-plane bending moment

M_o = out-of-plane bending moment

i_i = in-plane stress intensification factor

i_o = out-of-plane stress intensification factor

Z = section modulus of pipe

The three moment components (M_t, M_i, M_o) are calculated at the same location of a piping component in the piping system due to sustained load, occasional load and displacement strains, respectively.

In performing pipe stress analysis for sustained and occasional loads using ME101, the longitudinal and occasional stress checks shall be performed per Section 4.10.1 below to meet Para. 302.3.5 (c) and 302.3.6 (a) of ASME B31.3 Code [Ref 8.1].

5. Seismic Anchor Movement (SAM)

Pipe stress analysis for the effects of SAM should be evaluated as Displacement Stress Range S_E. The application of SAM to pipe supports (same building/facility) in the pipe stress analysis is simplified in the following:

(1) SLAB-WALL Joints: In-Phase in all directions and at all elevations
(2) Vertical SAM:
- If on the same slab: In-Phase
- If on different slabs:
  - (A) If on the same elevation
    - (a) If there is a vertical support on wall (i.e., penetration, etc.):
      - Supports on slabs: In-phase
      - Supports on wall: Out-of-Phase
    - (b) If no vertical support on wall:
      - Supports on slabs: Out-of-Phase
  - (B) If on different elevations: Out-of-Phase

Refer to Reference 8.29 and Reference 8.30 for the seismic displacements in HLW and PTF facilities, respectively.

Note that SAM displacement can be induced by Seismic movement of header piping, structural attachment (such as building/support) and equipment seismic movement.

The impact from seismic anchor movement may be insignificant and the analysis of SAM may not be necessary if either of the following conditions is met [Ref 8.15]

<u>Condition 1</u> (All limitations of this condition must be satisfied)

a). Relative SAM between structural elements such as wall penetration, floor box, etc. and first adjacent support is less than 1/8" in any direction, or 1/16" for first support from a nozzle

b) Pipe nominal size is 6" and smaller

c). Displacement stress range is less than 70% of thermal piping Code stress allowable S_A for piping schedules 40 & 80 and less than 65% for piping with schedule 10S

d) The distance of adjacent support from the effected SAM is not less than 80% of the weight span specified in Span Tables (Note: This is an offset span that absorbs the SAM by bending)

e) Maximum SIF for the piping subjected to SAM is 2.1

<u>Condition 2</u> (All limitations of this condition must be satisfied)

a) The piping system is analyzed utilizing ME101 (comprehensive stress analysis)

b) Relative SAM between structural elements such as wall penetration, floor box etc. and first adjacent support is less than 1/16" in any direction

c) Displacement stress range combined with pressure and longitudinal stresses (sustained) are less than 90% of the piping Code stress allowable S_A+S_h

4.10 Consideration of Mechanical, Corrosion, and Erosion Allowance

The ASME B31.3 Code requirements for mechanical, corrosion and erosion allowance shall be incorporated in pipe stress calculations as follows:

4.10.1 ME-101 Analyzed Piping

Two confirmatory longitudinal stress checks for the eroded/corroded condition, sustained and occasional, shall be performed for each pipe stress calculation. These stress checks shall be completed prior to assigning a confirmed/committed status to any of future stress calculations.

A. Sustained Stress Check, S_L = longitudinal stress due to pressure and weight,

$$S_L = \frac{PD}{4t_c} + S_s \text{, psi} \leq 1.0\ S_h \text{ (SC-I, SC-II, SC-III(Chem), SC-IIIE);}$$

$$\leq 0.8\ S_h \text{ (SC-III(Non-Chem), SC-IV; see Section 3.3.2 for discussion)}$$

using

1. Nominal weight for load calculations and
2. Corroded (reduced) wall properties for stress calculations

The longitudinal pressure stress $S_{lp} = \frac{PD}{4t_c}$ may also be determined by the equation of

$$S_{lp} = \frac{P(d+2c)^2}{D^2-(d+2c)^2} \text{ or } \frac{P(D-2t_c)^2}{D^2-(D-2t_c)^2}$$

Where

S_s = the longitudinal stress due to weight and other sustained loads, see Section 4.10.1.C below
S_{lp} = the longitudinal pressure stress
P = design pressure
D = pipe outside diameter
d = pipe inside diameter
t_c = eroded/corroded thickness of pipe, = t_n - c
t_n = nominal thickness of pipe
c = mechanical, erosion, and corrosion allowance

Longitudinal stresses [Ref 8.1, Para. 302.3.5(c)] are re-calculated based on weight moments from ME101 output with corroded section modulus plus pressure stress from design pressure with corroded wall thickness. Nominal pipe weight and pipe content are considered in the longitudinal stress calculations. The sustained load stress ratio is calculated by dividing the calculated longitudinal stresses by the Code stress allowable. The sustained load stress ratio shall be ≤ 1.0 for SC-I, SC-II, SC-III(Chem), and SC-IIIE, and ≤ 0.8 for SC-III(Non-Chem) and SC-IV (see 3.3.2 for discussion and permitted changes).

Sustained Longitudinal Stress Check due to pressure and weight under corrosion/erosion consideration shall be performed directly using the ME101 Report Writer. The standard Excel sheet/instructions in Appendix 7A may be used at the discretion of the Pipe Stress EGS.

B. Occasional Stress Check, S_L = longitudinal stress due to pressure, weight and occasional load,

$S_L = \frac{PD}{4t_c} + S_s + S_{oc}$, psi, ≤ 1.33 S_h (for SC-I, SC-II, SC-III(Chem) and SC-IIIE piping)

or

≤ 3.0 S_h, but not greater than 2.0 S_y [for SC-III(Non-Chem) and SC-IV piping] (See Note 3 for additional restrictions)

where

S_{oc} = the longitudinal stress due to occasional load, see Section 4.10.1.C
S_h = basic allowable stress at maximum metal temperature, (psi)
S_y = yield strength at temperature, (psi) using

1. Nominal weight for load calculations
2. Corroded (reduced) wall properties for stress calculations
3. For wind and fluid transient loads the stress limit is 1.33 S_h, regardless of seismic category

Stresses due to occasional loads are re-calculated based on occasional moments from the ME101 output with corroded section modulus. Occasional stresses [Ref 8.1, Para. 302.3.6 (a)] are calculated by combining stresses due to sustained loads with stresses due to occasional loads, such as wind or earthquake loads. The occasional load stress ratio is calculated by dividing the calculated occasional stress by the allowable stress. The occasional load stress ratio shall be less than or equal to 1.0.

Longitudinal Stress Check due to pressure, weight and occasional loads under corrosion/erosion consideration shall be performed directly using the ME101 Report Writer. The standard Excel sheets/instructions in Appendix 7B may be used at the discretion of the Pipe Stress EGS.

C. The pipe stresses S_s and S_{oc} shall be calculated from the bending moments and torsional moment at the piping component in the piping system as follows:

$$S_s, S_{oc} = \sqrt{S_b^2 + 4S_t^2}$$

where

$$S_b = \frac{\sqrt{(0.75 i_i M_i)^2 + (0.75 i_o M_o)^2}}{Z_c}$$

S_t = torsional stress, $\dfrac{M_t}{2Z_c}$

M_t = torsional moment

M_i = in-plane bending moment

M_o = out-of-plane bending moment

i_i = in-plane stress intensification factor from Appendix D of the ASME B31.3 Code

i_o = out-of-plane stress intensification factor from Appendix D of the ASME B31.3 Code

Z_c = reduced section modulus of pipe for S_s and S_{oc} in consideration of erosion/corrosion

Per the Code interpretation 1-34 [Ref 8.44] of ASME B31.3, $0.75i_i$ or $0.75i_o$ is used in the calculation but shall not be less than 1.0. Note that Code Case 178 [Ref 8.59] issued at a later date reaffirmed Code interpretation 1-34. Axial loads, which are included in the Code Case equation, are typically small for piping and

are, therefore, ignored. This treatment is in compliance with Table 2-6 of the PDSA [Ref 8.38].

4.10.2 Piping Qualified by the Span Tables [Ref. 8.27]

The current RPP-WTP Span Tables shall be used for the pipe sizes (with mechanical, corrosion, erosion allowance of up to 50% of the nominal wall thickness) listed in Tables 2.2 and 2.4, which address the majority of piping at the WTP project. The following pipe sizes with wall thinning of 50% or more shall require further review:

Table 4.1 Piping with Erosion/Corrosion Allowance 50% or Greater

Pipe Size	Schedule	E/C, c, (in)	% of E/C	Pipe Classes Requiring Further Review
1/2	80 or 80s	0.125	85%	**C.S.**: C14A, C14B; **Alloy**: N14A; **S.S.**: S14A
3/4	80 or 80s	0.125	81%	**C.S.**: C14A, C14B; **Alloy**: N14A; **S.S.**: S14A
1	80 or 80s	0.125	70%	**C.S.**: C14A, C14B; **Alloy**: N14A; **S.S.**: S14A; W32A*
1-1/2	40S	0.0937	65%	**C.S.**: None; **Alloy**: N14A; **S.S.**: W32A*
1-1/2	80 or 80s	0.125	63%	**C.S.**: C14A, C14B; **Alloy**: N14A; **S.S.**: S14A, S14E, S14F
2	40S	0.0937	61%	**C.S.**: None; **Alloy**: None; **S.S.**: W32A*
2	80 or 80S	.125	57%	**C.S.**: C14A; **Alloy**: N14A; **S.S.**: S14A, S14E
3	40 or 40s	0.125	58%	**C.S.**: C14A; **Alloy**: N14A; **S.S.**: S14A, S14E, S14F
4	40 or 40s	0.125	53%	**C.S.**: C14A; **Alloy**: N14A; **S.S.**: S14A, S14E, S14F
6	80S	0.25	58%	**C.S.**: None; **Alloy**: None; **S.S.**: S14D
8	80S	0.25	50%	**C.S.**: None; **Alloy**: None; **S.S.**: S14D

* Inner (core) pipe of jacketed pipe system (outer pipe (jacket) has corrosion = 0.0”)

Additional requirements may include a review of the existing pipe elevations and/or performance of a detailed ME101 stress analysis as follows:

A. Piping located at elevations (or below):
+23 ft in HLW,
+28 ft in PTF,
+3 ft in LAW,
+2 ft in LAB
is acceptable per the existing Span Tables; no further analysis is required.

B. For piping located at elevations:
+40 ft in HLW,
+56 ft in PTF,
+28 ft in LAW,
+27 ft in LAB

ME-101 analysis is required for:

Pipe Size	Schedule	E/C, c, (in)	% of E/C	Pipe Classes Requiring ME-101 Analyses
1/2	80 or 80s	0.125	85%	**C.S.**: C14A, C14B; **Alloy**: N14A; **S.S.**: S14A
3/4	80 or 80s	0.125	81%	**C.S.**: C14A, C14B; **Alloy**: N14A; **S.S.**: S14A

C. For piping located at the following elevations (and above), ME-101 analysis is required for all pipe sizes and pipe classes listed in Table 4.1:
   +71 ft in HLW,
   +98 ft in PTF,
   +48 ft in LAW,
   +36 ft in LAB

5 Computer Analysis Procedures

5.1 General Procedure

A pipe mathematical model needs to be established in order to perform the pipe stress analysis using a computer program. The mathematical model shall include the pipe dimensions and geometry, pipe material, piping component types, support types and support locations, and the loading conditions.

5.2 Pipe Mathematical Model

A pipe mathematical model is used to represent the piping system and its boundaries in sufficient detail based on its pipe classification such as SC-I and SC-II, SC-III(Chem), SC-IIIE or SC-III(Non-Chem) and SC-IV in order to obtain realistic analysis results per Project design requirements.

The boundaries of a piping system are located at anchors such as equipment nozzles, penetrations, or intermediate structural support anchors, or at free ends. In some cases, the boundaries also can be at locations where the “De-couple Criteria” per Section 5.3 apply and a fictitious fixed point of the piping system may be assumed.

The model includes piping coordinates and properties such as pipe diameters, pipe wall thickness, pipe materials, support locations and support types. Pipe fittings/piping components and welded joints if necessary should be modeled as well. At each fitting/piping component or welded joint in the piping system, the stress intensification factor (SIF) per Appendix D of ASME B31.3 Code shall be specified. For anchors, a SIF of 2.1 should be specified to account for welded attachments, anchor plates, etc. For response spectrum analysis, for valves with operators offset from the valve body, the operator weight should be modeled at its center of gravity. It is preferable to model small

cantilever vents and drains with the large process pipe. If the design of vents and drains are not available at the time the larger process pipe is analyzed, it is acceptable not to include them in the pipe mathematical model. However, the effects of vents and drains should be addressed later in either a revision of the stress calculation, or in a separate calculation.

5.3 De-coupled Analysis

The following de-coupled criteria may be used for de-coupling of branch pipe analysis if either of the following conditions is met:

- If the pipe moment of inertia ratio is greater than 25
- If the nominal pipe diameter ratio is greater than 3

De-coupling piping systems generally is not a significant issue for static analysis such as UBC seismic analysis, thermal expansion or weight calculations. The following are guidelines for de-coupling of the branch pipe analysis:

1) The analysis of the branch piping must include the thermal and seismic movements of the run pipe at the intersection point. If SC-III or SC-IV piping is de-coupled from SC-I and SC-II piping, the seismic displacements from SC-I and SC-II piping in terms of SAM at the decoupled point should be considered in the design of SC-III and SC-IV piping. The support loads due to the SAM case shall be considered as occasional loads (note that SAM stress is considered as secondary stress similar to thermal stress). For SC-III and SC-IV branch piping de-coupled from either SC-III or SC-IV piping, the requirement for SAM analysis is determined by the stress engineer. The analytical approach of SAM is specified in Section 4.9.5.

2) If an anchor or rigid constraint on the branch pipe significantly restrains the movement of the run pipe, this branch pipe should not be decoupled. Instead, the branch pipe up to its anchor or the nearest three-way restraint or sufficient overlap restraints should be included in the model of the run pipe.

3) The branch pipe including the mass effects such as a valve or in-line equipment close to main run should be included in the mathematical model of the run pipe if more precise magnitude of reaction is required at terminal points (i.e., equipment, penetration, etc.)

4) The connecting component such as sockolet, weldolet, latrolet, un-reinforced branch, etc., shall be appropriately specified at the branch/run intersection location to get proper stress intensification factors in both the run pipe and branch pipe during analysis.

5.4 Considerations of Support Design in Pipe Stress Analysis

1. Rigid Supports in Thermal Expansion Analysis

   A free thermal expansion analysis is initially helpful to locate rigid supports at points of zero thermal movement (inflection points).

Rigid supports for weight and seismic shall permit expansion and contraction of the piping. To accomplish this, rigid supports used as guides such as U-bolts or seismic bumpers with small gaps of 1/16" are practical. Using a support gap in analysis to reduce either the weight or thermal load should be avoided whenever possible. However, when it is necessary to use gapped supports, the analysis should follow the guidelines specified in Appendix 9. For high temperature piping, snubbers may be practical based on a design point of view. However, they are prone to premature lock-up and are costly to maintain. Therefore, snubbers are not recommended unless there is absolutely no practical alternative. Snubbers are not permitted for the piping systems in black cells.

2. Spring hangers are considered to take deadweight only and no seismic load. Snubbers are not considered as effective in weight and thermal expansion analysis. If the analysis is based on design cold loads, then it should be stated clearly in the hanger guidance in order to design the travel range of the spring hanger. Spring hangers shall not be used in the black cells.

3. Pipe Supports are to be designed for normal operating loads and occasional loads. Therefore, pipe stress analysis shall provide the following loads for each support:

Normal Operating Loads – Weight*, or
Weight* + Thermal

* If there are no temporary supports to resist hydro test load, the pipe support shall be qualified with hydro load specified in hanger guidance.

* Weight also includes live loads

Occasional Loads – Normal Operating* + Earthquake, or
Normal Operating* + Wind, or
Normal Operating* + Other Fluid Transient Load if exist.**

* Weight also includes live loads

** In some cases, a fluid transient load may occur at the same time as earthquake or wind load. In this case, SRSS may be used to combine two occasional loads. Wind and earthquake loads do not need to be considered as acting concurrently.

For pipe support load combination due to HPAV loading see Section 7.11 of this criteria.

The upward thermal and seismic load can be offset by weight for any piping. For the vertical supports on SC-III and SC-IV piping, if the maximum positive thermal load plus positive seismic load is less than the deadweight, the vertical support does not need to be double-acting. However, for the vertical supports on SC-I and SC-II piping, the vertical supports should be double-acting unless the piping is also qualified with specific vertical supports inactive in the seismic run, as defined in the hanger guidance (note that the seismic average downward loads of the adjacent supports should be added manually to this support (only downward)).

Where vertical deadweight supports in the 3D Model are designed to contact or are in close proximity (<1/8") to other support steel or CS&A steel, these vertical deadweight support points shall be analyzed per the requirements specified in the previous paragraph, identified with support numbers on the appropriate isometric, and reflected on the parent support, as applicable.

Under the following circumstances, the points in the 3D Model may not be considered as support points and no support tag number is required even though there is the possibility of lateral or upward contact with pipe support or CS&A steel:

- The point is not modeled as a support point in the piping stress analysis.
- Clearance is greater than the thermal displacement at the point.
- Piping with design temperature less than 150°F and the total thermal growth at the point is judged to be less than 1/8".

5.5 Modeling of Piping Components in ME101

To perform a pipe stress analysis, the pipe mathematical model of the pipe system, design conditions and the loading input and their combinations are required as input in ME101. ME101 data separates the data field of 80 characters into four regions. They are functional tag, node map, nodal increment, and engineering data.

Functional tag is to identify the key functions such as RUN (Load case definition), HED (General heading information), ANC (Anchor description), CMB (Load combination definition), OLA (Code compliance stress check), etc. CMB and OLA are all preset for each seismic category piping, and need not be reset for each calculation

Node map is the simple way to layout the mathematical model of a piping system. The node map is defined by a **FROM** field and a **TO** field between column 4 to 6, and 7 to 9, respectively. The finite element model is automatically created as each node is defined. A **From** field does not need to be input if the **TO** node is connected from the previous node.

Node increment is to describe the node geometry. They are divided into four individual columns, i.e., the increment of D_X (Column 10-20), D_Y (Column 21-31), D_Z (Column 32-42), and elbow radius. The format of each of these column employs engineering notation, such as feet-inch-fraction input.

Engineering data field is from column 51 to 80. It is reserved for inputting the engineering design data of this unique node point using Class-B keywords, or to the pipe segment beginning from this node point using Class-A keywords. Class-A keywords include OD (outside diameter), THICK (pipe wall thickness), TEMP (pipe temperature), LBS/FT (weight density distribution), etc. The Class-A keyword implies the properties are passed to the next node or next element until the value of same keyword is redefined. Class-B keywords include ADDWT (additional weight), TEE (tee type identification), SIF (stress intensification factor), etc. The Class-B keyword is applied to that unique node and that unique element only.

The major task of a pipe stress engineer is to follow the Stress ISO's to establish the pipe mathematical model by defining the node map and node increments, and to identify the engineering data of each node or element.

For more details, pipe stress engineers should refer to "ME101 User Manual" [Ref 8.55].

5.6 Summary of Analysis Results

The purpose of pipe stress analysis is to demonstrate that all piping components in the piping system have met the Code requirements and seismic requirements as specified in Section 4.9.

ME101 provides the stress summary for each piping component specified as a nodal point. The calculated stresses at each nodal point per criteria specified in Section 4.9 are compared with the Code allowable, respectively. The stress intensification factor for each nodal point (piping component) is also identified. In addition, the maximum calculated stress for each equation for the entire piping system is identified by the nodal point and listed in the stress summary sheet. The pipe stress engineer shall review and ensure that all piping components meet the Code requirements.

The displacements in local and global coordinates of each nodal point for each loading condition are also shown in the computer output. The pipe stress engineers should review these data to avoid pipe interference problems, ensure proper slope requirements are maintained, and to relocate the seismic supports at the zero or minimum thermal movement locations when possible.

The forces and the displacements at each support in local and global coordinates are shown in the computer output. The three forces and three moments at the nozzles are also shown in the output. The support loads and the displacements shall be given to the pipe support designer to design the support details. The forces and the moments of the nozzles shall be evaluated with the nozzle allowable specified in Reference 8.22 or per project approved data for vessel nozzles, or per Code criteria or vendor data as applicable (e.g., pumps, etc.).

5.7 Documentation of Calculation Packages

Pipe stress calculations are required to meet the applicable Quality Assurance (QA) procedures specified in Engineering Department Project Instructions. The documentation of each calculation package in engineering calculation preparation, checking, and approval shall follow the procedures specified in References 8.3, 8.20 and 8.41. The use of computer software shall be per the requirements of Reference 8.17.

ME101 Report Writer has been designed to create the calculation package in the format of a report to meet the unique requirements of the above project procedures. The Report Writer is constructed directly from the input design data and the output data stored in the ME101 master file.

6 Interface with Other Disciplines

6.1 Interface with the Layout Group

The layout group routes the pipe and transmits the stress ISO's to the Stress Group for analysis. The pipe stress engineer performs the stress analysis per Code requirements and coordinates any required routing changes with the layout group. The fabrication isometrics shall be reviewed and signed by the Pipe Stress EGS or designee.

6.2 Interface with the Pipe Support Designer

The pipe support designer is responsible for designing the pipe supports and determining the support locations based on the availability of structural steel, pipe racks, etc. The stress engineer coordinates with the pipe support designer for any changes to the original support configuration, support location, or support types.

If pipe stress analysis is done based on ME101, then the Pipe Stress Group issues the pipe support design loads table to the Pipe Support Group for the design of support details. If the pipe stress is completed based on the span method (tables), transmittal of support loads is not required.

6.3 Interface with Mechanical Systems Group

The system operating modes, pressures, temperatures, thermal cycles, specific gravity, nozzle loads, HPAV loads, fluid transient and thrust loads from relief valves are generated by the Mechanical Systems Group. The Stress Group needs to coordinate with Mechanical Systems for the timely issuance of that information, and to ensure the analysis meets those requirements.

6.4 Interface with CS&A Discipline

CS&A is responsible for generating the floor response spectrum curves for piping stress analysis. CS&A is also responsible for designing and qualifying building structural members. Coordination with CS&A regarding supporting piping from building structural members is primarily the responsibility of the Pipe Support Group.

6.5 Interface with Piping and Valve Engineering

Piping & Valve Engineering is responsible for developing the piping material classes such as piping schedules, corrosion/erosion rates and flange ratings that provide important design input data for pipe stress analysis.

6.6 Interface with the Jumper Group

The Jumper group is responsible for providing the Stress and Pipe Support group with the Jumper Frame simplified dynamic model to incorporate in ME101 pipe stress analysis. In addition, the Jumper Group is responsible for approving the loads from the ME101 piping analysis on the jumper frame.
Note: Dynamic simplified model data applies only to SC-I and SC-II Jumper Frames

6.7 Interface with Plant Equipment Group

Depending on the type of equipment and its status, the Plant Equipment Group may be responsible for providing pipe stress with the following information:

- An equipment data sheet to address operating condition such as material, pressures, temperatures and allowable nozzle loads determined by the vendor or PEQ
- Whether the equipment is considered rigid (Fundamental frequency is above 33 Hz horizontally or 50 Hz vertically) or not; if not, to provide a simplified dynamic model, if available and needed, to incorporate in ME101 pipe stress analysis.
  Note: applies only to SC-I and SC-II equipment
- Equipment seismic spectra, if available
  Note: applies only to SC-I and SC-II equipment

7 Special Stress Analysis

7.1 Pipe Local Stress Analysis at Welded Attachments

1. General Design Consideration

According to Subsection 321.3 of ASME B31.3 Code, structural attachments shall be designed so that they will not cause undue flattening of the pipe, excessive localized bending stresses, or harmful thermal gradients in the pipe wall. It is important that attachments be designed to minimize stress concentration, particularly in cyclic services.

Welded attachments are those shear lugs, shoes, saddles, stanchions, and structural anchors, etc., welded to piping systems. The use of welded attachments requires additional engineering hours and increases construction and fabrication cost. Therefore, welded attachments should be minimized on large bore pipe and not used on small-bore pipe (pipe sizes 2” and smaller) or any thinner than Sch40 pipes unless justified by stress engineer.

Welded attachments should be standardized. The design should be simple such as rectangular or circular cross section made of tube steel or pipe to facilitate analysis.

Irregular cross sections (such as channel, wide flange, cross configuration, etc.), are not recommended. To perform local stress analysis, similar welded attachments should be grouped together and the number of analyses should be kept to a minimum using engineering judgment.

2. Analysis Approach

The industry practice to ensure the attachment designs meet the ASME B31.3 Code requirements is to perform the pipe local stress analysis based on Welding Research Council Bulletin No. 107 [Ref 8.21] or by using stress intensification factor methods (SIF methods).

a) ME101/LS is written based on WRC Bulletin No.107 [Ref 8.21], and is used to determine local stresses at welded attachments. Local stresses should be added to the pipe stresses calculated per equations provided in Section 4.10.1 and compared with the appropriate allowable stresses as specified in Sections 7.1.1 and 7.1.2. In the local stress analysis, the additional loading due to friction (normal case and live loads conditions only) needs to be considered.

b) SIF Methods

This method is to apply an appropriate SIF value at the welded attachment to intensify the general pipe stress to determine the total pipe stress that is equivalent to the general pipe plus local stress. The following are recommended SIF values:

- When a stanchion is directly welded to the pipe, SIF of reinforced tee (RTEE) may be used to calculate the pipe stress including local stress. In this case, the stanchion should be included in the pipe model to represent the branch side of the pipe.

- When a welded attachment consists of a stanchion and a partial wrapper plate ($\leq 180^o$ around the pipe circumference), SIF of RTEE may be used except that the wrapper plate thickness can also be considered as reinforcement thickness in the RTEE SIF calculation. Local stresses at the pipe/wrapper plate can be calculated using ME101/LS.

- Welded attachment with 360° wrapper plate, the stresses due to attachment are no longer local in nature as the plate is not a pressure boundary any more. The interface weld between wrapper plate and the pipe should be analyzed using a fillet weld SIF = 1.3 or that per note 14 in Appendix D of B31.3 in the pipe stress analysis.

- Standard welded attachments AP (anchor plate), AW (axial stop), and ZL (riser clamps - lugs) may be analyzed using SIF = 2.1, provided that the following conditions are met:

- The support is modeled and evaluated in strict compliance with the loading and eccentricity limitations of the Engineering Design Guide for Pipe Support [Ref 8.46].
- Pipe schedule is limited to schedule STD and higher
- Allowed loads and associated local stresses are listed for lugs AW or ZL in Reference 8.58, including the limitations.

- Welded attachments on fittings such as elbows, tees, etc., should be avoided.

- Welded attachments should be avoided on thin-wall pipe. Local stress analysis utilizing ME101 local stress module (LS or FE), shall be performed for welded attachments on 5S, 10S, or other thin-wall pipe.

- For standard supports on insulated lines, it is recommended to use SIF = 2.1 to account for saddles, shoes, etc. This will conservatively cover the support whether a welded attachment is used or not. This does not apply for stanchions, which should be addressed as noted previously.

3. Acceptance Criteria

ASME B31.3 Code does not provide the stress criteria for local stress analysis. The following Criteria are established based on the Code Cases N318 (rectangular) or N392 (hollow circular) of ASME Section III [Ref 8.49 and 8.50], ASME Section VIII Code (Fig 4-130.1) [Ref 8.4] and industry practice.

7.1.1 For SC-I, SC-II, SC-III(Chem), and SC-IIIE Piping

a) Primary membrane stress check

$$S_{SL} = \frac{PD}{4t_c} + S_s + S_{oc} + S_{ml} \leq 1.8S_h$$

Note: S_{oc} is a stress due to DBE seismic load, or to wind or fluid transient load.

Where

S_{ml} = local primary membrane stress due to weight and occasional loads such as earthquake or wind or fluid transient load

P, D, t_c, S_s, S_{oc} and S_h are defined in Section 4.10.

b) Primary plus secondary stress check

$$\frac{PD}{4t_c} + S_s + S_{oc} + S_E + S_{nl} \leq 3.0S_h$$

Where

S_{nl} = the local primary plus secondary stress due to weight, occasional loads, plus secondary loads such as thermal expansion load

P, D, t_c, S_s, S_{oc}, and S_h are defined in Section 4.10, and S_E is defined in Section 4.9.

7.1.2 For SC-III(Non-Chem) and SC-IV Piping

Only primary membrane stress check with occasional loads is required for piping.

$$\frac{PD}{4t_c} + S_s + S_{oc} + S_{ml} \leq 3.0S_h \text{, but not} > 2.0\ S_y \text{ (seismic)}$$

$$\leq 1.8S_h \text{ (wind, fluid transient)}$$

Note: Stress limits of the above equation are the same limits that apply to piping without local stress (see section 4.9.3.2).

Where

S_{ml} = local primary membrane stress due to weight and occasional loads such as earthquake, wind, fluid transient

P, D, t_c, S_s, S_{oc} and S_h are defined in Section 4.10.

b) Primary plus secondary stress check

Primary plus Secondary stress check (without seismic) is not required, since gross pressure boundary integrity is all that is required for SC-III & SC-IV piping. Hence, local stress evaluation check for secondary stress (through - wall bending) is not required.

All piping stresses evaluated per Sections 7.1.1 and 7.1.2 are combined by absolute sum method.

7.2 Nozzle and Anchor Qualifications

An anchor is a rigid restraint to provide essentially complete fixation (i.e., ideally provide full constraint against three deflections and three rotations of the pipe on any of three reference axes). An equipment nozzle is not primarily designed as an anchor for the pipe and may not be designed as rigid as a structural anchor. However, it provides significant constraint in three deflections and three rotations on the pipe. Since in general the flexibility of the nozzle is not provided by the vendor, a nozzle may be considered as an anchor in the pipe stress analysis (see also Section 7.2.1.c).

A structural anchor is primarily designed to provide six way restraint. Therefore, it meets the definition of a pipe anchor in pipe stress analysis. Structural anchors are very often designed to analytically separate the pipeline from each side of the anchor. This type of anchor is called an intermediate structural anchor. The loading from both sides of the

anchor shall be combined per paragraphs a) thru c) in Section 7.2.2 and applied to the design of the anchor.

7.2.1 Nozzle Qualification

a) Nozzle Load Consideration

Nozzle loads on equipment are one of the controlling parameters in the design of a piping system. Nozzle reactions are a function of the piping routing, support configuration, and operating conditions.

For vessel nozzle qualification, pipe stress engineers shall perform pipe stress analysis to demonstrate that the pipe reactions at the vessel nozzle are below the nozzle allowable loads specified in Reference 8.22 or project approved data. Nozzle load qualification for rotary equipment, such as API610/API685 pumps, shall follow their governing Codes or project approved vendor nozzle data.

b) Nozzle Load Evaluation

Pipe reaction loads are generally tabulated in the Hanger Guidance as individual weight, thermal and seismic loads and as combined design loads.

For SC-I, SC-II, SC-III(Chem) and SC-IIIE piping, the calculated pipe reaction loads shown in the Hanger Guidance should be compared with the nozzle loads provided in Reference 8.22 or project approved data, or sent to the Vessel Group for approval via Correspondence Control Number (CCN).

The nozzle loads on pressure vessels should be qualified based on the following two cases:

1. Weight + Seismic
2. Weight + Seismic + Thermal

This load combination is consistent with the WRC 107 [Ref. 8.21] method of qualifying local stresses in the vicinity of the nozzle to shell interface for primary and primary plus secondary stress. Per Engineering Specification for Pressure Vessel Design and Fabrication, 24590-WTP-3PS-MV00-T0001 [Ref. 8.22], “Seller shall design nozzles according to the methods of WRC-107, WRC-297, or finite element analysis as applicable.”

Individual weight evaluation on pressure vessels may be performed if needed.

Seismic should include seismic inertia, seismic anchor movement and dynamic transient loads, as applicable, and they may be combined by the square root of sum of squares (SRSS) per Paragraph (4) below. Per Section 3.7.5 of Reference 8.22, if the maximum operating temperature is less than 350F, the thermal loads on Table A1 thru Table A4 of Reference 8.22 must be reduced by a scale factor of |(X-70)/(350-70)|, in

which X is the maximum operating temperature of the vessel. The vessel maximum operating temperature is specified on the vessel data sheet, and should be used to calculate the reduction, unless otherwise noted. In addition, each individual nozzle load (e.g. F_x, F_y, F_z, M_x, M_y, and M_z) from the analysis shall satisfy its corresponding nozzle allowable load instead of qualification by SRSS of nozzle loads, unless approved by the Pipe Stress EGS on case-by-case basis.

For non-critical SC-III(Non-Chem) and SC-IV piping with no thermal expansion/contraction and external thermal anchor movement concerns, connecting to any non-safety vessels or sumps, routed and supported per the "Span and Support Load Tables", and accepted by a pipe stress engineer, the nozzles may be considered as acceptable.

If the pipe reactions do not meet the nozzle allowable, the following are some approaches to reduce the nozzle loads:

(1) Using pipe maximum operating temperature to qualify the nozzle load instead of the design temperature.

(2) Consider nozzle flexibility in ME101. This is to include the vessel shell stiffness to reduce the rigidity of the anchor and, therefore, reduce the nozzle loads. Nozzle stiffness values may be obtained from WTP Mechanical Vessel Group or utilizing ME101 capability to extract the vessel shell stiffness.

(3) Using expansion joints to reduce nozzle loads. However, expansion joints are not suitable for all service conditions. In some cases, it is more desirable to add an expansion loop or modify the support types and/or support locations. Expansion joints may be used only in accessible areas (not in Black Cells, for example).

(4) The pipe reaction loads with signs such as due to weight and thermal expansion should be combined algebraically. The loads due to seismic inertia, seismic anchor movement and dynamic transient loads should be combined by the square root of sum of squares (SRSS) first, then combined absolutely with the loads with signs.

(5) The nozzle thermal loads can be reduced by the use of hot modulus of elasticity (E_h) as ME101 loads are calculated based on the cold modulus of elasticity (E_c).

(6) Reduce thermal load by modeling the first dead weight support inactive in hot condition if the net movement (thermal plus weight) is upward. It may be necessary to run two weight cases: one for cold condition in which all gravity supports are active, and another case for hot condition in which any gravity

supports with net upward movement are considered inactive. The enveloped results of these two weight cases will be used for Code compliance.

(7) If the calculated nozzle loads are still above the nozzle allowable, the loads should be submitted to the Mechanical Vessel Group via CCN for review and approval.

c) Interface with Flexible Equipment

SC-I and SC-II piping is analyzed using in-structure response spectra from the building. However, if the equipment to which the piping is attached is flexible, then the equipment itself will also amplify the seismic motion. Equipment is considered flexible if the fundamental frequency is less than 33Hz (horizontal) or 50 Hz (vertical) This amplification has to be addressed in the piping stress analysis (Section 3.2.3.1 and 3.1.7.1 of Ref. 8.56, Section 7.2.2.2.2 of Ref 8.7, and Ref 8.65).

For SC-I and SC-II piping attached to flexible equipment one of the following approaches should be used (Ref. 8.19, Appendix L 4.3):

1. A simplified model of the equipment, provided by the Plant Equipment Group, may be included in the ME101 model. The simplified model should approximate the dynamic characteristics of the equipment.
2. If spectra are available at the attachment point (nozzle) of the piping to the equipment, then those spectra may be used with the building spectra.
3. If the fundamental frequency is not available, then assume that the equipment is flexible, and follow the guidance in Design Guide 24590-WTP-GPG-ENG-0144 Ref. 8.69 for flexible equipment and document it as an assumption in Section 6 of the stress calculation. The assumption that the fundamental frequency is less than 33 Hz (horizontal) or 50 Hz (vertical) is conservative.
4. If the equipment is considered flexible, but neither a simplified model nor equipment spectra are available, then follow the guidance provided in Design Guide 24590-WTP-GPG-ENG-0144 Ref. 8.69

Note that for piping analyzed in accordance with SC-III or SC-IV, there is no need to address the equipment as flexible. The piping seismic loads and stresses are analyzed in accordance with UBC Code (static seismic), which considers only the building seismic motion.

7.2.2 Anchor Qualifications

The main purpose of an anchor is to provide a complete fixation for the pipe system. Therefore, it shall be designed to meet the specified pipe reaction loads as required.

An intermediate anchor has the pipe reaction loads from both sides of the anchor; therefore, the loading combination for the intermediate anchor is determined as follows:

a) The pipe reaction loads with signs such as due to weight and thermal effects from both sides of the anchor may be combined algebraically for the design of anchor structure.

b) The pipe reaction loads without signs due to seismic inertia, seismic anchor movement and dynamic transient loads may be combined by the square root of sum of the squares (SRSS) from both sides. These loads are then combined by absolute sum with the other pipe reaction loads with signs for the design of anchor structure.

c) All the above combinations should be performed on the force component and moment component levels.

d). Intermediate anchors for SC-III(Non-Chem) and SC-IV piping may be designed based on the nozzle load tables specified in Appendix 3, multiplying the loads by two.

e). For an intermediate anchor that has analyzed loads from one side and the other side is non-analyzed pipe, the loading combination is determined in one of the following three ways:

- To obtain non-analyzed pipe reaction load, use nozzle load table specified in Appendix 3 and follow the provisions of a) thru c) of Section 7.2.2 to combine the loads with analyzed side loads.
- Include portion of the non-analyzed pipe as overlap in the analysis and qualify overlapped supports for greater of analyzed/Span table loads. The overlap portion should include at least two supports in each direction of restraint, i.e., X, Y and Z direction restraints.
- For non-analyzed pipe use the same reaction loads as the analyzed side pipe and follow the provisions of a) thru c) of Section 7.2.2 to combine the loads if judged acceptable by Pipe Stress and Support EGS.

7.3 Dynamic Transient Forces on Closed Discharge Piping Systems

Pipe loads may be caused by the events due to transient fluid flow in closed discharge piping systems. A fluid flow transient is often initiated by intentional actuation of some flow control device (pump, valve, or rupture disc). The pipe stress engineer should pay attention to the following three types of fluid transient forces if applicable:

(1) Transient unbalanced thrust load along the pipe run axis, tending to forcibly displace the pipe and to set up pipe vibrations.

(2) Continually oscillating periodic force along any surface of the pipe tending to set up steady state resonance vibrations.

(3) Transient pressure change tending to either burst or collapse the pipe.

Of these three forces, the first type is by far the most common dynamic problem for design, and the attention of this Subsection will be directed toward that problem. The piping systems that have this type of transient unbalanced thrust load are required to be identified by Mechanical Systems engineers. Design calculations of dynamic transient forcing functions normally are required to be generated by qualified fluid transient analysts using specialized computer programs. The time history fluid dynamic transient forcing functions are then provided to the pipe stress analysts for piping structural analysis using ME101. The pipe stresses due to fluid dynamic transient forcing functions shall be combined with earthquake load or wind load using SRSS method and considered as S_{oc} per Section 4.9.3.

7.4 Welding Tee

Either ASME B16.9-1986 welding tees that meet the requirements of ASME B31.3-1996 or ASME B16.9-1993 welding tees that meet the requirements of ASME B31.3-2002 are permitted in the RPP-WTP project per Appendix C, Section 26.0 of the SRD [Ref 8.19]. The SRD also provides the requirements to meet the stress limits in accordance with the ASME B16.9 welding tees specified in ASME B31.3-2002 [Ref 8.42]. Per the SRD, the flexibility characteristic and stress intensification factors for ASME B16.9 welding tees shall be per Table D300 of the ASME B31.3-2002 Code [Ref 8.42]. A pipe stress engineer may either manually input the SIF based on the flexibility characteristic, or use TEE=EXTEE, and specify $RX=2.1r_2$, where r_2 is the mean radius of the run pipe.

If $r_x \geq 1/8D_b$ and $T_c \geq 1.5T$, a flexibility characteristic of $4.4T/r_2$ may be used in accordance with ASME B31.3-2002, where T is the nominal wall thickness of the matching pipe; r_2 is mean radius of matching pipe; r_x is radius of curvature of external contoured portion of outlet, measured in the plane containing the axes of the header and branch; T_c is the crotch thickness of tees; D_b is outside diameter of branch.

7.5 Piping with $D_o/t_c > 50$

For B31.3 piping with outside diameter to thickness ratio (D_o/t_c) greater than 50, the eroded/corroded section modulus Z_c used to calculate bending stresses, M/Z_c shall be replaced by $(1.3-0.006\ D_o/t_c)Z_c$, where D_o is outside diameter and t_c is the pipe eroded/corroded thickness. In order to fulfill this requirement for the pipe with D_o/t_c greater than 50, the pipe stress engineer should either calculate the bending stresses with $(1.3-0.006\ D_o/t_c)Z_c$ or conservatively adjust the stress ratio from ME101 output by a factor of $1/(1.3-0.006\ D_o/t_c)$.

7.6 Black Cell / Hard-to-Reach Piping Systems

Piping within the black cells and Hard-to-Reach areas shall be analyzed to Seismic category I (SC-I) requirements, per the Basis of Design [Ref 8.48, Section 16.4.2.7].

Black Cell Piping – All piping and tubing within the black cell up to the first weld outside the black cell. (See Figure 1.) The room numbers of the black cells, located in the PT and HLW facilities are:

Room Numbers P-0102, P-0102A, P-0104, P-0106, P-0108, P-0108A, P-0108B, P-0108C, P-0109, P-0111, P-0112, P-0113, P-0114, P-0117, and P-0117A in the PT Building

Room numbers H-B005, H-B014, and H-B021 in the HLW Building

Hard-to-Reach Areas – Facility areas located in the rooms listed below where piping and equipment is not designed for manual or remote access, replacement, or repair.

PTF Facility Rooms P-B001, P-B001A, P-B002, P-B003, P-B004, P-0123 (piping out to jumper nozzles), P-0123 (components above crane), P-0123A (components above crane), P-0335 (components out of reach of crane and below the filter deck), and P-0335A (components out of reach of crane and below the filter deck).

HLW Facility Rooms H-B005A, H-B032, H-B015, HCH14, HCH15, H-0104 (components out of reach of crane and below filter deck), H-0115, H-0121, H-0136 (components out of reach of crane or below canister racks or weld table), and H-0302, H-0308.

All-welded construction shall be used for piping. With the exception of socket welded thermowell nozzle connections, socket welded branch fittings on outer jacket pipe drains used in dual containment piping systems, and the threaded black cell liner spray nozzle connections, which will be tack welded or mechanically secured so that they will not back out, there shall be no flanged, socket welded or threaded connections in the black cells. For black cell and hard-to-reach components, there shall be no non-removable soft or non-metallic parts that could be affected by high radiation doses.

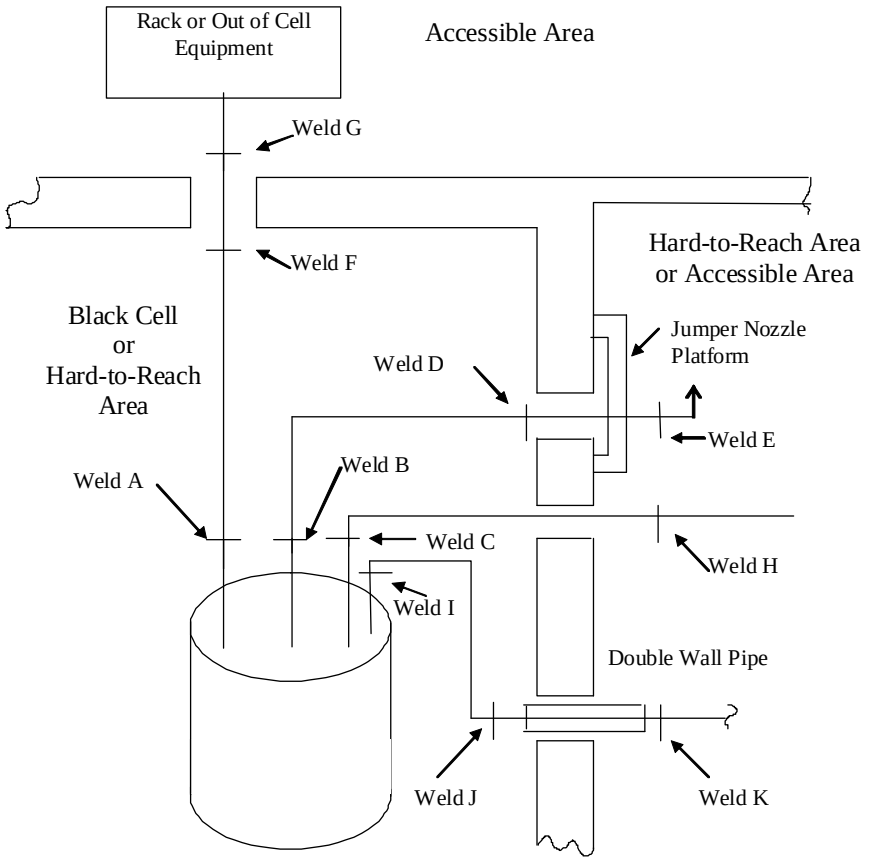

Figure 1: Example of Black Cell and Component Piping

Black cell piping extends between termination welds. Examples include the piping and welds extending from Weld A to Weld G, from Weld B to Weld E, from Weld C to Weld H, and Weld I to Weld K.

The piping procured as part of equipment and penetrating the black cell or hard-to-reach area walls shall meet the same design, fabrication, construction, testing, and inspection requirements as the black cell piping to which it attaches out to the first weld outside of a black cell or a hard-to-reach area. An example is the component piping between Weld F and Weld G, and Weld J to K.

The piping procured as part of a jumper platform (Frame) and penetrating the black cell wall shall meet the same design, fabrication, construction, testing, and inspection requirements as the black cell or hard-to-reach piping to which it attaches out to the first weld outside of the black cell or hard-to-reach area. An example of this is the piping between Weld D and Weld E.

Hard-to-reach piping includes pipe spools extending from a field weld inside the hard-to-reach area across a wall or slab out to the first accessible field weld out in an R2/R3 area; see Table 5-1 of 24590-WTP-DB-ENG-01-001 [Ref 8.48] for definition of R1 through R5. Examples include the piping and welds extending from Weld A to Weld G and Weld C to Weld H.

7.7 Piping Two over One Protection

The requirements for seismic interaction analysis/classification are provided in Reference 8.19, safety criterion 4.1-3.

Piping shall be analyzed to the minimum seismic requirement above when a two over one protection issue is identified via hazards reviews.

7.8 Jumpers

The jumper piping system design shall comply with the requirements of Jumper Stress Design Criteria, 24590-WTP-DC-PS-03-001 [Ref 8.70].

Note that a "Jumper" is a remotely removable assembly consisting of piping, dunnage, remote end connectors and in some cases in-line components such as valves or instruments.

7.9 Pipe Break (To be determined)

7.10 Wind Missile (To be determined)

7.11 Hydrogen In Pipes And Ancillary Vessels (HPAV)

1. The design requirements and acceptance criteria to qualify the pipe stress for HPAV (Hydrogen in Piping and Ancillary Vessels) loading are provided in 24590-WTP-BODCN-ENG-10-0001 [Ref 8.71].

2. HPAV - Stress Analysis Design Guide 24590-WTP-GPG-ENG-0143 [Ref 8.72] provides specific guidance for pipe stress analysts to model and qualify piping.

   Note: At the present time the above documents address the piping located in the pretreatment facility (PT). Design requirements for the HLW facility are to be determined.

3. Load Combinations for Pipe Supports due to HPAV loading

   If the total number of deflagrations N≥1000
   Normal Operating Loads: Larger of (Weight or Weight plus Thermal) plus Abs(Fdef)
   Occasional Loads – Normal Operating + Abs(Fdet)

   If the total number of deflagrations N<1000
   Normal Operating Loads: Larger of (Weight or Weight plus Thermal)
   Occasional Loads – Normal Operating + Abs(Fdef) or
   Occasional Loads – Normal Operating + Abs(Fdet)

Notes:

1 That for the Occasional loads. The loading is an “OR”. That is, neither deflagration nor detonation loads are considered concurrent with either earthquake, wind, or other fluid transient loads, nor are they concurrent with each other.

2. Abs(Fdef) Absolute loads due to deflagration
3. Abs(Fdet) Absolute loads due to detonation/R-DDT load
4. Vertical supports on HPAV affected piping must be designed as double-acting, regardless of whether the HPAV load overcomes the deadweight.
5. See Stress Analysis Design Guide 24590-WTP-GPG-ENG-0143 [Ref 8.72] for more details and definition of deflagration and detonation/R-DDT load

7.12 Buried Pipe

For the analysis of buried pipe, the recommendations of ASCE 4-98 Section 3.5.2 [Ref 8.56] will be followed

8 References

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9 Appendices

9.1 APPENDIX 1, Span Method Criteria

Design Basis of Span and Support Load Tables

DESIGN BASIS OF SPAN AND SUPPORT LOAD TABLES FOR WEIGHT AND SEISMIC LOADS

1.0 Introduction

A piping system is normally supported by a series of supports, dividing the system into a series of continuous spans. The spans of the piping system are limited by

1) Vertical supports for pipe weight; and

2) Two mutually perpendicular restraints to the pipe
   - At each change of direction,
   - At all concentrated masses,
   - At each tee, or
   - At the maximum spacing on straight runs of piping

This document is to establish the piping design criteria to meet the ASME B31.3 Code requirements and to provide the methodology to determine the maximum support spans and their support loads under such design conditions.

2.0 Weight Spans

a. ***General***

The end condition of a pipe span for a pipe system under a series of supports is approximately between the fixed end and the simply supported end. The maximum deflection, bending moment and support load of pipe span with these end conditions under uniformly distributed load are the average of the values from equations of Case 1 [Ref 8.16, Page 2-296] and Case 15 [Ref 8.16, Page 2-301] and expressed below:

Deflection (Δ) = ½ [($5wL^4/384EI$) + ($wL^4/384EI$)] = $3wL^4/384EI$

Moment load (M) = ½ [($wL^2/8$) + ($wL^2/12$)] = $5wL^2/48$

Support load (R) = wL

Where
w = pipe weight per unit length
L = maximum pipe span between two supports
I = moment of inertia of the pipe
E = modulus of elasticity

b. ***Criteria***

The following is the basic criteria to develop the weight spans for SC-III(Non-Chem), and SC-IV piping components:

1. Limit the maximum deflection of a pipe span ≤ ¼ inch, or limit the pipe stress due to weight load to σ_w whichever provides the shortest span length.

   $\Delta = 3wL^4/384EI \leq ¼$ inch, or

   $M = 5wL^2/48 \leq \sigma_w Z/i$ (or $iM/Z \leq \sigma_w$, psi)

   Where

   σ_w = Pipe stress due to weight load
   Z = Section Modulus

   in which, σ_w ranges from 2,600 psi to 3,550 psi for carbon steel pipe, and 2,000 psi to 2,950 psi for stainless pipe. A lateral seismic restraint is required at every, every second, or every third dead weight support.

   Refer to Section 4.10.2 of this criteria for considering the mechanical / erosion / corrosion allowances.

2. Limit the internal pressure to 400 psi for pipe schedules 40 and 80, and 200 psi for schedules 10 and 20.

3. Stress intensification factor (SIF or *i*) per ASME B31.3 Code as follows:

   SIF (or *i*) = 1.3 for fillet welds for pipe sizes 2" and below. (*)

   SIF (or *i*) = 1.0 for butt welds for pipe sizes above 2 inch.

   (*) Per Appendix D of B31.3 Code[Ref 8.1], for fillet weld joint, or socket weld flange or fitting, *i*=2.1 (SIF) or $i = 2.1 \cdot T / C_x$ but not less than 1.3. C_x is the fillet weld length identified in paragraph 328.5.2C of [Ref 8.1], and is $1.25 \cdot T$ minimum but not less than 1/8″. For longitudinal stress by sustained loads and occasional loads, the use of $0.75 \cdot i$ is acceptable [Ref 8.44]. Therefore, $i = 0.75 \cdot 2.1 \cdot (T / 1.25 \cdot T) = 1.26$, use 1.3.

4. The weight spans and support loads in the Span and Support Load Tables are determined as follows:

   Weight Span, L is equal to the lesser of $L_1 = (^1/_4 \cdot 384EI/3w)^{1/4}$ or $L_2 = (\sigma_w \cdot 48Z/5iw)^{1/2}$
   Support Load due to weight, R = *w*L

3.0 Deleted

4.0 Seismic Spans based on the Uniform Building Code (SC-III(Non-Chem) and SC-IV Piping components)

For SC-III without containing a significant Chemical release hazard (SC-III(Non- Chem)) and SC-IV piping components, the seismic spans are developed based on Section 7.3.4 of Seismic Analysis and Design Criteria [Ref 8.7]. The lateral seismic force on systems and piping components, F_p, is calculated per Formula (32-1) of the UBC Code, i.e.,

$$F_p = 4.0\ C_a\ I_p\ W_p = 1.44\ W_p$$

For vertical seismic force, $F_v = {}^2/_3 F_p = 0.96\ W_p$

where

W_p = the weight per unit length of piping component
C_a = 0.24
I_p = the importance factor, shall be taken as 1.5 for SC-III piping and 1.0 for SC-IV piping [see Section 7.3.4 of Reference 8.7].
M_h = $5F_pL_h^2/48$ where L_h is the distance between lateral restraints
M_v = $5F_vL_v^2/48$ where L_v is the distance between vertical restraints
R_h = F_pL_h
R_v = F_vL_v
M = $(M_h^2 + M_v^2)^{1/2}$

The stress for SC-III and SC-IV piping components is calculated as follows:

$$\frac{PD}{4t_n} + \text{weight stress} + i\frac{M}{Z} \le 3.0S_h\text{, but not greater than } 2.0S_y.$$

where

t_n = pipe nominal wall thickness
Z = pipe section modulus based on nominal wall thickness

The dead weight supports for SC-III(Non-Chem) or SC-IV piping are not always designed as double-acting supports. To account for that, the seismic span (L) is developed conservatively based on the same span for calculation of horizontal and vertical moments. Therefore, the seismic spans and seismic support loads for SC-III without containing a significant Chemical release hazard SC-III(Non-Chem) and SC-IV piping in Span Tables are determined as follows:

$$L \le \sqrt{\left(3.0S_h - \frac{PD}{4t_n} - weight\_stress\right)\frac{Z}{i\sqrt{(1.44w)^2 + (0.96w)^2}}\frac{48}{5}}$$

where

weight stress, $\sigma_w = 5iwL^2/48Z$

S_h = 20,000 psi for carbon steel, and S_h =16,700 psi for stainless steel
$R_h = 1.44 W_p L$ for lateral UBC seismic loads

$R_v = 0.96 \cdot W_p L$ for vertical UBC seismic loads

1" thickness of insulation with an assumed density of 8 lb/ft^3 for pipe 1-1/2 inch and under and 2" thickness of insulation for pipe 2 inch and above has been included into pipe weight to develop the "Span and Support Load Tables". For the backup calculation for the "Span and Support Load Tables" see Reference 8.15. For pipe insulation density other than 8 lb/ft^3, the span and support load should be adjusted based on the formula specified in "limitations 5" under Tables 2.2 and 2.4. Refer to Reference 8.15 for more detailed development of "Span and Support Load Table" if needed.

Refer to Section 4.10.2 of this criteria for considering the mechanical / erosion / corrosion allowances. The span tables listed in Appendix 2 comply with project requirements for mechanical / erosion / corrosion allowances as documented in calculation 24590-WTP-P6C-P40T-00008 [Ref 8.27].

5.0 Span Tables Seismic Load Reduction Factor based on the Uniform Building Code (SC-III(Non-Chem) and SC-IV Piping components)

Section 3.3.4.b permits the use of UBC formula 32-2 for calculating the seismic loads and stresses for SC-III & SC-IV piping, which results in reduction of applied seismic acceleration on the piping and seismic support load.

Tables 2-2 and 2-4 are based on maximum horizontal acceleration of 1.44g and vertical acceleration of 0.96g based on maximum seismic acceleration [g] in Formula 32-2 of the UBC code as follow → $4C_aI_p$

Table 1-1 Seismic Load Reduction Factor for SC-III(Non-Chem) support loads, Ductile failure

Build.	Roof Elev	Floor Elev	Minimum Horizontal Accl.	Horizontal Accl.	Vertical Accl.	Reduction Factor Horizontal	Reduction Factor Vertical
	[ft]	[ft]	(1)	(2)	(3)	(4)	(5)
PTF	98	98	0.252	1.200	0.8	0.84	0.92
		77	0.252	1.007	0.68	0.7	0.86
		56	0.252	0.814	0.55	0.57	0.8
		28	0.252	0.557	0.38	0.39	0.7
		0	0.252	0.300	0.2	0.21	0.62
HLW	89	89	0.252	1.200	0.8	0.84	0.92
		72	0.252	1.028	0.69	0.72	0.87
		58	0.252	0.887	0.6	0.62	0.82
		37	0.252	0.674	0.45	0.47	0.74
		14	0.252	0.442	0.3	0.31	0.67
		0	0.252	0.300	0.2	0.21	0.62
LAW	68	68	0.252	1.200	0.8	0.84	0.92
		48	0.252	0.935	0.63	0.65	0.83
		28	0.252	0.671	0.45	0.47	0.74
		3	0.252	0.340	0.23	0.24	0.63
LAB	35	35	0.252	1.200	0.8	0.84	0.92
		17	0.252	0.737	0.5	0.52	0.77
		0	0.252	0.300	0.2	0.21	0.62

Notes:

(1) UBC Formula 32-2 minimum seismic acceleration [*g*] as follows: $0.7C_aI_p$

(2) UBC Formula 32-2 for seismic acceleration [*g*] as follows: $\frac{a_pC_aI_p}{R_p}\left(1+3\frac{h_x}{h_r}\right) \le 4C_aI_p$

Note that I_p for SC-III is 1.5 and R_p for ductile failure is 3; all other coefficients are defined in section 4.5.2

(3) Vertical seismic acceleration is 2/3 the lateral acceleration (see section 4.5.2)

(4) Horizontal seismic load reduction factor: this factor should be applied for supports design loads per Span Tables 2-2 and 2-4 of this criteria, horizontal direction only

(5) Vertical seismic load reduction factor: based on gravity + vertical seismic acceleration over 1.96*g*. This factor should be applied for supports design loads per Span Tables 2-2 and 2-4 of this criteria.

Table 1-2 Seismic Load Reduction Factor for SC-IV support loads, Ductile failure

Build.	Roof Elev	Floor Elev	Minimum Horizontal. Accl.	Horizontal Accl.	Vertical Accl.	Reduction Factor Horizontal	Reduction Factor Vertical
	[ft]	[ft]	(1)	(2)	(3)	(4)	(5)
PTF	98	98	0.168	0.800	0.54	0.56	0.79
		77	0.168	0.671	0.45	0.47	0.74
		56	0.168	0.543	0.37	0.38	0.7
		28	0.168	0.371	0.25	0.26	0.64
		0	0.168	0.200	0.14	0.14	0.58
HLW	89	89	0.168	0.800	0.54	0.56	0.79
		72	0.168	0.685	0.46	0.48	0.75
		58	0.168	0.591	0.4	0.41	0.72
		37	0.168	0.449	0.3	0.32	0.67
		14	0.168	0.294	0.2	0.21	0.61
		0	0.168	0.200	0.14	0.14	0.58
LAW	68	68	0.168	0.800	0.54	0.56	0.79
		48	0.168	0.624	0.42	0.44	0.73
		28	0.168	0.447	0.3	0.32	0.67
		3	0.168	0.226	0.16	0.16	0.59
LAB	35	35	0.168	0.800	0.54	0.56	0.79
		17	0.168	0.491	0.33	0.35	0.68
		0	0.168	0.200	0.14	0.14	0.58

Notes:

(1) UBC Formula 32-2 minimum seismic acceleration [*g*] as follows: $F_p \geq 0.7 C_a I_p W_p$

(2) UBC Formula 32-2 for seismic acceleration [*g*] as follows: $\frac{a_p C_a I_p}{R_p}\left(1+3\frac{h_x}{h_r}\right) \leq 4 C_a I_p$

Note that I_p for SC-IV is 1.0 and R_p for ductile failure is 3, all other coefficients are defined in section 4.5.2

(3) Vertical seismic acceleration is 2/3 the lateral acceleration, see section 4.5.2

(4) Horizontal seismic load reduction factor: this factor should be applied for supports design loads per Span Tables 2-2 and 2-4 of this criteria, horizontal direction only

(5) Vertical seismic load reduction factor: based on gravity + vertical seismic acceleration over 1.96*g*. This factor should be applied for vertical supports design loads per Span Tables 2-2 and 2-4 of this criteria.

9.2 APPENDIX 2, Span and Support Load Tables

1) **Table 2.1 - Deleted**
2) **Table 2.2 - Span and Support Loads for SC-III(Non-Chem) and SC-IV C. S. Piping (For Mechanical / Erosion / Corrosion Allowances ≥ 50% of The Nominal Wall Thickness, See Section 4.10.2)**
3) **Table 2.3 -Deleted**
4) **Table 2.4 - Span and Support Loads for SC-III(Non-Chem) and SC-IV S. S. Piping (For Mechanical / Erosion / Corrosion Allowances ≥ 50% of The Nominal Wall Thickness, See Section 4.10.2)**

TABLE 2. 1 – Span and Support Loads for SC-I, SC-II, and SC-III(Chem) C. S. Piping (For Reference Use)

Deleted

TABLE 2. 2 – Span and Support Loads for SC-III(Non-Chem) and SC-IV C. S. Piping
(For Mechanical / Erosion / Corrosion Allowances ≥ 50% 0f The Nominal Wall Thickness, See Section 4.10.2)
A). Lateral Seismic Support at Every Third Weight Span

pipe size	sch	Weight Span		Seismic Span		Support Loads (lbs)			
		ft	ft	ft	ft	Weight		Seismic	
		Empty	w/ water	Empty	w/ water	empty	w/ water	empty	w/ water
3/8 in	40	7.7	7.3	23.0	22.1	7	7	30	32
	80	7.8	7.6	23.4	22.8	8	9	36	37
1/2 in	40	9.2	8.7	27.7	26.3	11	11	47	50
	80	9.2	8.9	27.9	26.9	13	14	57	59
3/4 in	40	10.7	10.1	32.7	30.3	15	17	68	73
	80	10.7	10.4	32.9	31.2	19	20	85	89
1 in	40	12.1	11.3	36.7	33.9	26	28	113	122
	80	12.0	11.6	37.0	35.0	32	34	140	148
1-1/2 in	40	14.9	13.5	46.1	40.8	48	56	216	243
	80	14.8	14.1	46.5	42.6	62	69	279	303
2 in	40	15.6	13.8	46.8	41.5	83	93	358	404
	80	16.0	14.7	48.5	44.4	107	117	466	509
2-1/2 in	40	17.8	16.8	60.8	53.9	141	168	696	779
	80	17.8	17.1	62.3	57.0	175	199	881	958
3 in	40	20.1	18.7	70.2	60.5	192	239	967	1113
	80	20.1	19.1	71.6	64.3	246	289	1262	1398
4 in	40	23.1	21.2	81.3	67.9	303	395	1538	1824
	80	23.1	21.7	82.9	72.8	401	485	2068	2339
6 in	40	28.5	25.5	101.1	80.3	628	880	3211	3997
	80	28.5	26.4	103.2	88.2	903	1135	4702	5457
8 in	20	32.7	28.0	116.5	84.7	855	1360	4387	5933
	40	32.8	28.9	116.9	89.8	1061	1559	5443	6989
	80	32.8	30.1	119.1	99.5	1548	2013	8090	9599
10 in	20	36.6	29.5	130.0	89.1	1198	2024	6130	8796
	40	36.8	32.0	131.4	98.5	1664	2536	8548	11240
	80	36.8	33.5	133.9	110.7	2540	3357	13314	15963
12 in	20	40.0	30.7	141.7	92.3	1551	2759	7917	11949
	40	40.3	34.7	144.0	105.8	2375	3725	12222	16369
	80	40.2	36.5	146.7	120.5	3777	5038	19849	23941
14 in	10	42.1	31.3	149.1	94.0	1774	3269	9060	14123
	20	42.2	33.6	151.4	101.4	2160	3768	11155	16365
	40	42.4	36.3	151.8	110.6	2916	4630	15048	20315
	80	42.2	38.3	154.5	126.5	4714	6315	24829	30032
16 in	10	45.0	31.9	159.2	96.2	2171	4150	11054	18003
	20	45.2	34.4	161.8	104.1	2646	4775	13635	20839
	40	45.4	38.9	163.3	118.7	4039	6433	20910	28287
	80	45.2	41.0	165.7	135.2	6452	8696	34033	41327
18 in	10	47.8	32.6	168.6	97.8	2594	5165	13164	22321
	20	48.0	35.2	171.5	106.2	3164	5931	16263	25803
	40	48.3	41.3	173.9	126.1	5386	8610	27940	37887
	80	48.1	43.4	176.2	143.3	8535	11559	45066	54898
20 in	10	50.5	32.6	177.3	99.2	3041	6194	15382	27095
	20	50.8	38.1	182.8	115.5	4379	8090	22669	35269
	40	51.0	43.3	183.6	131.2	6648	10857	34480	47402
	80	50.7	45.8	186.1	151.0	10976	14918	58004	70824
22 in	10	53.0	33.1	185.6	100.2	3508	7405	17691	32268
	20	53.3	38.8	191.1	117.2	5077	9656	26199	41994
	30	53.5	41.9	190.3	126.7	6591	11447	33762	49880
	80	53.2	48.0	195.5	158.2	13801	18821	72969	89292
24 in	10	55.4	33.5	193.2	101.0	4003	8724	20111	37870
	20	55.8	39.4	199.7	118.8	5776	11334	29772	49168
	40	56.0	47.3	201.8	142.6	10079	16748	52328	72749
	80	55.7	50.1	204.5	165.2	16992	23245	89911	110246

Limitations:
1. For pipe content with specific gravity other than 1.0, span reduction factors specified in Attachment 4 of Reference 8.15 or Attachment A of Reference 8.73 shall be used.
2. Any concentrated weight such as valve, riser, piping component, etc., shall be located as close to support as possible, and 100% of the concentrated weight shall be added to the adjacent support.
3. For pipe with horizontal elbow, reduce by 25% the listed span for design span. A reduction factor of 0.75 is applied.
4. The every vertical support load for support design shall be the weight support load plus the vertical seismic load that is 0.96 of weight support load (i.e., 1.96*Weight Support Load).
5. Insulation density of 8 lb/ft^3 has been used to develop this Table. For insulation density other than 8 lb/ft^3, the maximum weight or seismic spans may be adjusted by the formulas below:
   For pipe without water content: $L_s' = L_s[(w_p + w_i)/(w_p + w_i')]^{1/2}$
   For pipe with water content: $L_s' = L_s[(w_p + w_i + w_w)/(w_p + w_i' + w_w)]^{1/2}$
   where, w_p, w_i, w_w see Attachment 1 of Reference 8.15; w_i'= new insulation weight, lb/ft; L_s is the span from Table, L_s' is the adjusted span due to specific insulation.
6. This Table only applies to SC-III without containing a significant Chemical release hazard (SC-III(Non-Chem)) and SC-IV piping.
7. For SC-IV piping, use the listed seismic support loads multiplied by a factor of 0.667, or use Reduction Factor provided in Table 1-2.

TABLE 2. 2 (cont'd) –
B). Lateral Seismic Support at Every Weight Span

pipe size	sch	Weight Span		Seismic Span		Support Loads (lbs)			
		ft	ft	ft	ft	Weight		Seismic	
		Empty	w/ water	Empty	w/ water	empty	w/ water	empty	w/ water
3/8 in	40	7.7	7.3	7.7	7.3	7	7	10	10
	80	7.8	7.6	7.8	7.6	8	9	12	12
1/2 in	40	9.2	8.7	9.2	8.7	11	11	16	16
	80	9.2	8.9	9.2	8.9	13	14	19	20
3/4 in	40	10.7	10.1	10.7	10.1	15	17	22	24
	80	10.7	10.4	10.7	10.4	19	20	27	29
1 in	40	12.1	11.3	12.1	11.3	26	28	37	41
	80	12.0	11.6	12.0	11.6	32	34	45	49
1-1/2 in	40	14.9	13.5	14.9	13.5	48	56	70	81
	80	14.8	14.1	14.8	14.1	62	69	89	100
2 in	40	15.6	13.8	15.6	13.8	83	93	119	134
	80	16.0	14.7	16.0	14.7	107	117	154	168
2-1/2 in	40	17.8	16.8	17.8	16.8	141	168	203	242
	80	17.8	17.1	17.8	17.1	175	199	252	287
3 in	40	20.1	18.7	20.1	18.7	192	239	277	344
	80	20.1	19.1	20.1	19.1	246	289	355	416
4 in	40	23.1	21.2	23.1	21.2	303	395	437	568
	80	23.1	21.7	23.1	21.7	401	485	577	698
6 in	40	28.5	25.5	28.5	25.5	628	880	905	1268
	80	28.5	26.4	28.5	26.4	903	1135	1300	1634
8 in	20	32.7	28.0	32.7	28.0	855	1360	1231	1958
	40	32.8	28.9	32.8	28.9	1061	1559	1528	2245
	80	32.8	30.1	32.8	30.1	1548	2013	2229	2899
10 in	20	36.6	29.5	36.6	29.5	1198	2024	1726	2914
	40	36.8	32.0	36.8	32.0	1664	2536	2396	3653
	80	36.8	33.5	36.8	33.5	2540	3357	3658	4834
12 in	20	40.0	30.7	40.0	30.7	1551	2759	2234	3973
	40	40.3	34.7	40.3	34.7	2375	3725	3419	5364
	80	40.2	36.5	40.2	36.5	3777	5038	5439	7255
14 in	10	42.1	31.3	42.1	31.3	1774	3269	2555	4707
	20	42.2	33.6	42.2	33.6	2160	3768	3110	5426
	40	42.4	36.3	42.4	36.3	2916	4630	4199	6667
	80	42.2	38.3	42.2	38.3	4714	6315	6788	9093
16 in	10	45.0	31.9	45.0	31.9	2171	4150	3126	5976
	20	45.2	34.4	45.2	34.4	2646	4775	3810	6877
	40	45.4	38.9	45.4	38.9	4039	6433	5816	9263
	80	45.2	41.0	45.2	41.0	6452	8696	9292	12523
18 in	10	47.8	32.6	47.8	32.6	2594	5165	3735	7437
	20	48.0	35.2	48.0	35.2	3164	5931	4556	8540
	40	48.3	41.3	48.3	41.3	5386	8610	7755	12398
	80	48.1	43.4	48.1	43.4	8535	11559	12291	16645
20 in	10	50.5	32.6	50.5	32.6	3041	6194	4379	8919
	20	50.8	38.1	50.8	38.1	4379	8090	6305	11650
	40	51.0	43.3	51.0	43.3	6648	10857	9574	15634
	80	50.7	45.8	50.7	45.8	10976	14918	15805	21482
22 in	10	53.0	33.1	53.0	33.1	3508	7405	5052	10663
	20	53.3	38.8	53.3	38.8	5077	9656	7311	13905
	30	53.5	41.9	53.5	41.9	6591	11447	9491	16483
	80	53.2	48.0	53.2	48.0	13801	18821	19873	27102
24 in	10	55.4	33.5	55.4	33.5	4003	8724	5765	12563
	20	55.8	39.4	55.8	39.4	5776	11334	8318	16321
	40	56.0	47.3	56.0	47.3	10079	16748	14514	24117
	80	55.7	50.1	55.7	50.1	16992	23245	24469	33473

Limitations:
1. For pipe content with specific gravity other than 1.0, span reduction factors specified in Attachment 4 of Reference 8.15 or Attachment A of Reference 8.73 shall be used.
2. Any concentrated weight such as valve, riser, piping component, etc., shall be located as close to support as possible, and 100% of the concentrated weight shall be added to the adjacent support.
3. For pipe with horizontal elbow, reduce 25% the listed span as design span. A reduction factor of 0.75 is applied.
4. The every vertical support load for support design shall be the weight support load plus the vertical seismic load that is 0.96 of weight support load (i.e., 1.96*Weight Support Load).
5. Insulation density of 8 lb/ft^3 has been used to develop this Table. For insulation density other than 8 lb/ft^3, the maximum weight or seismic spans may be adjusted by the formulas below:
   For pipe without water content: $L_s' = L_s[(w_p + w_i)/(w_p + w_i')]^{1/2}$
   For pipe with water content: $L_s' = L_s[(w_p + w_i + w_w)/(w_p + w_i' + w_w)]^{1/2}$
   where,
   w_p, w_i, w_w see Attachment 1 of Reference 8.15; w_i'= new insulation weight, lb/ft; L_s is the span from Table, L_s' is the adjusted span due to specific insulation.
6. This Table only applies to SC-III without containing a significant Chemical release hazard (SC-III(Non-Chem)) and SC-IV piping.
7. For SC-IV piping, use the listed seismic support loads multiplied by a factor of 0.667, or use Reduction Factor provided in Table 1-2.

TABLE 2. 2 (cont'd) –
C). Lateral Seismic Support at Every Other Weight Span

pipe size	sch	Weight Span		Seismic Span		Support Loads (lbs)			
		ft	ft	ft	ft	Weight		Seismic	
		Empty	w/ water	Empty	w/ water	empty	w/ water	empty	w/ water
3/8 in	40	7.7	7.3	15.3	14.7	7	7	20	21
	80	7.8	7.6	15.5	15.1	8	9	24	25
1/2 in	40	9.2	8.7	18.4	17.5	11	11	31	33
	80	9.2	8.9	18.5	17.9	13	14	38	39
3/4 in	40	10.7	10.1	21.5	20.2	15	17	45	49
	80	10.7	10.4	21.3	20.7	19	20	55	59
1 in	40	12.1	11.3	24.1	22.5	26	28	74	81
	80	12.0	11.6	24.0	23.2	32	34	91	98
1-1/2 in	40	14.9	13.5	29.8	27.0	48	56	140	161
	80	14.8	14.1	29.7	28.2	62	69	178	200
2 in	40	15.6	13.8	31.1	27.6	83	93	238	269
	80	16.0	14.7	32.1	29.4	107	117	308	337
2-1/2 in	40	17.8	16.8	35.5	33.5	141	168	407	484
	80	17.8	17.1	35.7	34.2	175	199	505	574
3 in	40	20.1	18.7	40.2	37.4	192	239	554	687
	80	20.1	19.1	40.3	38.2	246	289	710	831
4 in	40	23.1	21.2	46.2	42.3	303	395	874	1136
	80	23.1	21.7	46.3	43.4	401	485	1155	1396
6 in	40	28.5	25.5	57.0	50.9	628	880	1810	2535
	80	28.5	26.4	57.0	52.8	903	1135	2599	3268
8 in	20	32.7	28.0	65.4	55.9	855	1360	2461	3916
	40	32.8	28.9	65.6	57.7	1061	1559	3056	4490
	80	32.8	30.1	65.6	60.1	1548	2013	4457	5797
10 in	20	36.6	29.5	73.2	59.0	1198	2024	3451	5828
	40	36.8	32.0	73.6	64.0	1664	2536	4791	7305
	80	36.8	33.5	73.6	67.1	2540	3357	7315	9669
12 in	20	40.0	30.7	80.0	61.4	1551	2759	4468	7946
	40	40.3	34.7	80.6	69.3	2375	3725	6839	10728
	80	40.2	36.5	80.4	73.1	3777	5038	10878	14511
14 in	10	42.1	31.3	84.1	62.7	1774	3269	5109	9414
	20	42.2	33.6	84.4	67.3	2160	3768	6219	10852
	40	42.4	36.3	84.7	72.6	2916	4630	8397	13335
	80	42.2	38.3	84.5	76.6	4714	6315	13576	18186
16 in	10	45.0	31.9	90.1	63.8	2171	4150	6252	11952
	20	45.2	34.4	90.4	68.7	2646	4775	7620	13753
	40	45.4	38.9	90.8	77.8	4039	6433	11631	18527
	80	45.2	41.0	90.5	81.9	6452	8696	18583	25045
18 in	10	47.8	32.6	95.7	65.2	2594	5165	7470	14875
	20	48.0	35.2	96.1	70.3	3164	5931	9111	17080
	40	48.3	41.3	96.5	82.6	5386	8610	15511	24796
	80	48.1	43.4	96.1	86.9	8535	11559	24581	33290
20 in	10	50.5	32.6	100.9	65.3	3041	6194	8758	17839
	20	50.8	38.1	101.7	76.3	4379	8090	12610	23299
	40	51.0	43.3	101.9	86.6	6648	10857	19147	31269
	80	50.7	45.8	101.4	91.6	10976	14918	31611	42965
22 in	10	53.0	33.1	106.0	66.2	3508	7405	10104	21326
	20	53.3	38.8	106.7	77.6	5077	9656	14621	27811
	30	53.5	41.9	107.0	83.7	6591	11447	18982	32966
	80	53.2	48.0	106.5	96.0	13801	18821	39746	54204
24 in	10	55.4	33.5	110.7	67.0	4003	8724	11530	25125
	20	55.8	39.4	111.6	78.9	5776	11334	16635	32642
	40	56.0	47.3	112.0	94.5	10079	16748	29029	48234
	80	55.7	50.1	111.3	100.3	16992	23245	48938	66946

Limitations:
1. For pipe content with specific gravity other than 1.0, span reduction factors specified in Attachment 4 of Reference 8.15 or Attachment A of Reference 8.73 shall be used.
2. Any concentrated weight such as valve, riser, piping component, etc., shall be located as close to support as possible, and 100% of the concentrated weight shall be added to the adjacent support.
3. For pipe with horizontal elbow, reduce by 25% the listed span as design span. A reduction factor of 0.75 is applied.
4. The every vertical support load for support design shall be the weight support load plus the vertical seismic load that is 0.96 of weight support load (i.e., 1.96*Weight Support Load).
5. Insulation density of 8 lb/ft^3 has been used to develop this Table. For insulation density other than 8 lb/ft^3, the maximum weight or seismic spans may be adjusted by the formulas below:
   For pipe without water content: $L_s' = L_s[(w_p + w_i)/(w_p + w_i')]^{1/2}$
   For pipe with water content: $L_s' = L_s[(w_p + w_i + w_w)/(w_p + w_i' + w_w)]^{1/2}$
   where,
   w_p, w_i, w_w see Attachment 1 of Reference 8.15; w_i'= new insulation weight, lb/ft; L_s is the span from Table, L_s' is the adjusted span due to specific insulation.
6. This Table only applies to SC-III without containing a significant Chemical release hazard (SC-III(Non-Chem)) and SC-IV piping.
7. For SC-IV piping, use the listed seismic support loads multiplied by a factor of 0.667., or use Reduction Factor provided in Table 1-2.

TABLE 2. 3 – Span and Support Loads for SC-I, SC-II, and SC-III(Chem) S. S. Piping (For Reference Use)

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TABLE 2. 4 – Span and Support Loads for SC-III(Non-Chem) and SC-IV S. S. Piping
(For Mechanical / Erosion / Corrosion Allowances ≥ 50% 0f The Nominal Wall Thickness, See Section 4.10.2)

A) Seismic Support at Every Third Weight Span

pipe size	sch	Weight Span		Seismic Span		Support Loads (lbs)			
		ft	ft	ft	ft	Weight		Seismic	
		Empty	w/ water	empty	w/ water	empty	w/ water	empty	w/ water
3/8 in	10s	6.7	6.3	20.3	19.1	5	5	22	24
	40s	7.0	6.7	21.0	20.1	6	7	28	29
	80s	7.1	6.9	21.4	20.8	8	8	33	34
1/2 in	10s	8.2	7.7	24.9	23.1	8	9	36	38
	40s	8.4	8.0	25.2	23.9	10	10	43	45
	80s	8.4	8.1	25.4	24.6	12	12	52	54
3/4 in	10s	9.7	8.8	29.3	26.5	11	13	49	55
	40s	9.9	9.2	29.8	27.2	14	15	62	67
	80s	9.9	9.5	29.2	27.5	18	19	77	81
1 in	10s	11.0	10.0	33.2	29.9	21	23	89	98
	40s	11.1	10.3	33.4	30.2	24	26	103	112
	80s	11.2	10.6	32.9	30.8	29	31	128	135
1-1/2 in	10s	13.7	11.7	41.2	34.1	36	42	157	183
	40s	13.9	12.3	40.6	35.3	45	51	196	221
	80s	13.9	12.8	40.1	36.5	58	63	254	276
2 in	10s	13.5	11.6	40.9	35.0	58	68	253	296
	40s	14.2	12.5	42.7	37.8	75	85	326	368
	80s	14.6	13.4	44.2	40.3	97	106	425	464
2-1/2 in	10s	17.1	14.4	51.6	43.4	97	116	423	504
	40s	17.8	16.2	55.0	48.9	142	163	631	707
	80s	17.9	17.1	56.5	50.9	176	199	799	868
3 in	10s	19.7	15.9	60.0	47.3	125	157	546	684
	40s	20.2	18.2	63.5	52.9	193	233	876	1009
	80s	20.2	19.2	63.1	55.5	247	290	1144	1267
4 in	10s	22.6	17.2	69.0	50.1	180	243	791	1052
	40s	23.2	20.5	72.1	58.2	304	383	1392	1653
	80s	23.2	21.8	71.8	61.9	402	486	1874	2119
6 in	10s	27.9	19.7	86.1	55.6	346	514	1535	2227
	40s	28.6	24.2	87.4	67.3	631	835	2905	3624
	80s	28.6	26.3	87.3	73.5	906	1129	4261	4943
8 in	10s	32.2	21.4	99.9	59.9	554	874	2472	3803
	40s	32.9	26.9	99.5	74.5	1065	1453	4921	6340
	80s	32.9	29.4	99.7	82.1	1553	1972	7329	8700
10 in	10s	36.2	23.2	111.2	64.1	848	1400	3790	6073
	40s	37.0	29.6	110.8	81.1	1670	2343	7724	10197
	80s	37.0	31.7	111.3	87.8	2198	2912	10329	12784
12 in	10s	39.7	24.7	120.8	67.5	1176	2023	5274	8746
	40s	40.4	31.2	120.2	84.7	2221	3241	10241	14033
	80s	40.4	33.5	121.0	91.8	2865	3944	13418	17240
14 in	10s	41.9	25.4	131.0	75.4	1389	2443	6256	10637
	std	42.5	31.7	135.8	93.6	2550	3795	11739	16526
	xs	42.5	34.1	137.1	101.7	3298	4612	15431	20294
16 in	10s	44.7	25.9	138.9	76.2	1708	3137	7634	13577
	std	45.5	32.7	144.6	95.8	3128	4836	14316	20928
	xs	45.6	35.4	146.2	104.9	4053	5860	18886	25671
18 in	10s	47.5	26.1	146.8	76.8	2037	3877	9056	16840
	std	48.3	33.3	152.7	97.4	3743	5942	17034	25803
	xs	48.4	36.2	154.5	107.3	4858	7184	22543	31638
20 in	10s	50.5	28.1	157.5	82.5	2702	5156	12139	22449
	std	51.0	33.7	160.1	98.7	4394	7142	19878	31130
	xs	51.1	37.4	162.3	109.4	5710	8776	26383	38097
22 in	10s	52.9	28.4	164.0	82.9	3132	6176	13981	26745
	std	53.5	34.3	166.5	99.6	5095	8525	22882	36921
	xs	53.7	38.2	169.4	111.0	6614	10449	30416	45149
24 in	5s	55.4	28.5	171.5	83.3	3542	7204	15774	31335
	std	56.0	34.5	173.2	100.4	5797	9911	25900	43082
	xs	56.2	38.6	175.4	112.5	7546	12137	34560	52710

Limitations:
1. For pipe content with specific gravity other than 1.0, span reduction factors specified in Attachment 4 of Reference 8.15 or Attachment A of Reference 8.73 shall be used.
2. Any concentrated weight such as valve, riser, piping component, etc., shall be located as close to support as possible, and 100% of the concentrated weight shall be added to the adjacent support.
3. For pipe with horizontal elbow, reduce by 25% the listed span as design span. A reduction factor of 0.75 is applied.
4. The every vertical support load for support design shall be the weight support load plus the vertical seismic load that is 0.96 of weight support load (i.e., 1.96*Weight Support Load).
5. Pipe insulation is not considered in this Table. For insulation density, the maximum weight or seismic spans may be adjusted by the formulas below:
   For pipe without water content: $L_s' = L_s[(w_p)/(w_p + w_i')]^{1/2}$
   For pipe with water content: $L_s' = L_s[(w_p + w_w)/(w_p + w_i' + w_w)]^{1/2}$
   where, w_p, w_w see Attachment 1 of Reference 8.15; w_i'= new insulation weight, lb/ft; L_s is the span from Table, L_s' is the adjusted span due to specific insulation.
6. This Table only applies to SC-III without containing a significant Chemical release hazard (SC-III(Non-Chem)) and SC-IV piping.
7. For SC-IV piping, use the listed seismic support loads multiplied by a factor of 0.667., or use Reduction Factor provided in Table 1-2.

TABLE 2. 4 (cont'd) –

B) Seismic Support at Every Weight Span

pipe size	sch	Weight Span		Seismic Span		Support Loads (lbs)			
		ft	ft	ft	ft	Weight		Seismic	
		Empty	w/ water	empty	w/ water	empty	w/ water	empty	w/ water
3/8 in	10s	6.7	6.3	6.7	6.3	5	5	7	8
	40s	7.0	6.7	7.0	6.7	6	7	9	10
	80s	7.1	6.9	7.1	6.9	8	8	11	11
1/2 in	10s	8.2	7.7	8.2	7.7	8	9	12	13
	40s	8.4	8.0	8.4	8.0	10	10	14	15
	80s	8.4	8.1	8.4	8.1	12	12	17	18
3/4 in	10s	9.7	8.8	9.7	8.8	11	13	16	18
	40s	9.9	9.2	9.9	9.2	14	15	21	22
	80s	9.9	9.5	9.9	9.5	18	19	26	27
1 in	10s	11.0	10.0	11.0	10.0	21	23	30	33
	40s	11.1	10.3	11.1	10.3	24	26	34	37
	80s	11.2	10.6	11.2	10.6	29	31	42	45
1-1/2 in	10s	13.7	11.7	13.7	11.7	36	42	52	60
	40s	13.9	12.3	13.9	12.3	45	51	65	73
	80s	13.9	12.8	13.9	12.8	58	63	84	91
2 in	10s	13.5	11.6	13.5	11.6	58	68	84	98
	40s	14.2	12.5	14.2	12.5	75	85	108	122
	80s	14.6	13.4	14.6	13.4	97	106	140	153
2-1/2 in	10s	17.1	14.4	17.1	14.4	97	116	140	167
	40s	17.8	16.2	17.8	16.2	142	163	204	234
	80s	17.9	17.1	17.9	17.1	176	199	253	287
3 in	10s	19.7	15.9	19.7	15.9	125	157	179	227
	40s	20.2	18.2	20.2	18.2	193	233	278	335
	80s	20.2	19.2	20.2	19.2	247	290	356	417
4 in	10s	22.6	17.2	22.6	17.2	180	243	259	351
	40s	23.2	20.5	23.2	20.5	304	383	438	551
	80s	23.2	21.8	23.2	21.8	402	486	579	700
6 in	10s	27.9	19.7	27.9	19.7	346	514	498	740
	40s	28.6	24.2	28.6	24.2	631	835	908	1203
	80s	28.6	26.3	28.6	26.3	906	1129	1304	1625
8 in	10s	32.2	21.4	32.2	21.4	554	874	798	1258
	40s	32.9	26.9	32.9	26.9	1065	1453	1533	2092
	80s	32.9	29.4	32.9	29.4	1553	1972	2237	2840
10 in	10s	36.2	23.2	36.2	23.2	848	1400	1221	2017
	40s	37.0	29.6	37.0	29.6	1670	2343	2404	3374
	80s	37.0	31.7	37.0	31.7	2198	2912	3165	4193
12 in	10s	39.7	24.7	39.7	24.7	1176	2023	1694	2914
	40s	40.4	31.2	40.4	31.2	2221	3241	3199	4667
	80s	40.4	33.5	40.4	33.5	2865	3944	4126	5680
14 in	10s	41.9	25.4	41.9	25.4	1389	2443	2000	3517
	std	42.5	31.7	42.5	31.7	2550	3795	3672	5465
	xs	42.5	34.1	42.5	34.1	3298	4612	4749	6641
16 in	10s	44.7	25.9	44.7	25.9	1708	3137	2459	4517
	std	45.5	32.7	45.5	32.7	3128	4836	4504	6964
	xs	45.6	35.4	45.6	35.4	4053	5860	5836	8438
18 in	10s	47.5	26.1	47.5	26.1	2037	3877	2933	5583
	std	48.3	33.3	48.3	33.3	3743	5942	5390	8556
	xs	48.4	36.2	48.4	36.2	4858	7184	6996	10346
20 in	10s	50.5	28.1	50.5	28.1	2702	5156	3890	7425
	std	51.0	33.7	51.0	33.7	4394	7142	6328	10285
	xs	51.1	37.4	51.1	37.4	5710	8776	8222	12638
22 in	10s	52.9	28.4	52.9	28.4	3132	6176	4510	8894
	std	53.5	34.3	53.5	34.3	5095	8525	7337	12276
	xs	53.7	38.2	53.7	38.2	6614	10449	9525	15047
24 in	5s	55.4	28.5	55.4	28.5	3542	7204	5101	10374
	std	56.0	34.5	56.0	34.5	5797	9911	8347	14272
	xs	56.2	38.6	56.2	38.6	7546	12137	10867	17478

Limitations:
1. For pipe content with specific gravity other than 1.0, span reduction factors specified in Attachment 4 of Reference 8.15 or Attachment A of Reference 8.73 shall be used.
2. Any concentrated weight such as valve, riser, piping component, etc., shall be located as close to support as possible, and 100% of the concentrated weight shall be added to the adjacent support.
3. For pipe with horizontal elbow, reduce by 25% the listed span as design span. A reduction factor of 0.75 is applied.
4. The every vertical support load for support design shall be the weight support load plus the vertical seismic load that is 0.96 of weight support load (i.e., 1.96*Weight Support Load).
5. Pipe insulation is not considered in this Table. For insulation density, the maximum weight or seismic spans may be adjusted by the formulas below:
   For pipe without water content: $L_s' = L_s[(w_p)/(w_p + w_i')]^{1/2}$
   For pipe with water content: $L_s' = L_s[(w_p + w_w)/(w_p + w_i' + w_w)]^{1/2}$
   where,
   w_p, w_w see Attachment 1 of Reference 8.15; w_i'= new insulation weight, lb/ft; L_s is the span from Table, L_s' is the adjusted span due to specific insulation.
6. This Table only applies to SC-III without containing a significant Chemical release hazard (SC-III(Non-Chem)) and SC-IV piping.
7. For SC-IV piping, use the listed seismic support loads multiplied by a factor of 0.667., or use Reduction Factor provided in Table 1-2.

TABLE 2. 4 (cont'd) –

C) Seismic Support at Every Other Weight Span

pipe size	sch	Weight Span		Seismic Span		Support Loads (lbs)			
		ft	ft	ft	ft	Weight		Seismic	
		Empty	w/ water	empty	w/ water	empty	w/ water	empty	w/ water
3/8 in	10s	6.7	6.3	13.4	12.6	5	5	15	16
	40s	7.0	6.7	14.0	13.4	6	7	18	19
	80s	7.1	6.9	14.2	13.8	8	8	22	23
1/2 in	10s	8.2	7.7	16.5	15.3	8	9	24	25
	40s	8.4	8.0	16.8	15.9	10	10	29	30
	80s	8.4	8.1	16.9	16.3	12	12	34	36
3/4 in	10s	9.7	8.8	19.5	17.6	11	13	33	36
	40s	9.9	9.2	19.8	18.4	14	15	41	44
	80s	9.9	9.5	19.9	18.9	18	19	51	54
1 in	10s	11.0	10.0	22.0	20.0	21	23	59	65
	40s	11.1	10.3	22.3	20.5	24	26	69	74
	80s	11.2	10.6	22.4	21.2	29	31	85	90
1-1/2 in	10s	13.7	11.7	27.3	23.4	36	42	103	121
	40s	13.9	12.3	27.7	24.6	45	51	130	147
	80s	13.9	12.8	27.9	25.6	58	63	167	182
2 in	10s	13.5	11.6	27.0	23.1	58	68	167	196
	40s	14.2	12.5	28.3	25.1	75	85	217	244
	80s	14.6	13.4	29.2	26.7	97	106	281	306
2-1/2 in	10s	17.1	14.4	34.1	28.7	97	116	280	333
	40s	17.8	16.2	35.6	32.4	142	163	408	469
	80s	17.9	17.1	35.8	34.1	176	199	507	573
3 in	10s	19.7	15.9	39.4	31.7	125	157	359	454
	40s	20.2	18.2	40.3	36.5	193	233	556	671
	80s	20.2	19.2	40.4	38.3	247	290	712	834
4 in	10s	22.6	17.2	45.2	34.5	180	243	518	701
	40s	23.2	20.5	46.4	41.0	304	383	877	1102
	80s	23.2	21.8	46.4	43.6	402	486	1159	1401
6 in	10s	27.9	19.7	55.9	39.4	346	514	996	1480
	40s	28.6	24.2	57.2	48.3	631	835	1816	2406
	80s	28.6	26.3	57.2	52.6	906	1129	2609	3251
8 in	10s	32.2	21.4	64.5	42.8	554	874	1596	2516
	40s	32.9	26.9	65.8	53.8	1065	1453	3067	4184
	80s	32.9	29.4	65.8	58.9	1553	1972	4473	5680
10 in	10s	36.2	23.2	72.4	46.4	848	1400	2441	4033
	40s	37.0	29.6	73.9	59.1	1670	2343	4808	6748
	80s	37.0	31.7	74.0	63.5	2198	2912	6330	8386
12 in	10s	39.7	24.7	79.4	49.5	1176	2023	3388	5828
	40s	40.4	31.2	80.8	62.3	2221	3241	6397	9335
	80s	40.4	33.5	80.9	66.9	2865	3944	8252	11359
14 in	10s	41.9	25.4	83.7	50.7	1389	2443	4001	7035
	xs	42.5	31.7	84.9	63.4	2550	3795	7345	10930
	std	42.5	34.1	85.0	68.3	3298	4612	9499	13281
16 in	10s	44.7	25.9	89.5	51.8	1708	3137	4918	9034
	xs	45.5	32.7	91.0	65.4	3128	4836	9008	13928
	std	45.6	35.4	91.2	70.8	4053	5860	11672	16876
18 in	10s	47.5	26.1	95.1	52.2	2037	3877	5866	11166
	std	48.3	33.3	96.7	66.5	3743	5942	10781	17112
	xs	48.4	36.2	96.9	72.3	4858	7184	13991	20691
20 in	10s	50.5	28.1	101.0	56.1	2702	5156	7781	14851
	std	51.0	33.7	102.0	67.3	4394	7142	12655	20569
	xs	51.1	37.4	102.3	74.9	5710	8776	16445	25275
22 in	10s	52.9	28.4	105.8	56.8	3132	6176	9021	17788
	std	53.5	34.3	107.0	68.5	5095	8525	14673	24552
	xs	53.7	38.2	107.4	76.4	6614	10449	19049	30094
24 in	5s	55.4	28.5	110.9	57.0	3542	7204	10201	20747
	std	56.0	34.5	112.0	69.0	5797	9911	16695	28545
	xs	56.2	38.6	112.3	77.2	7546	12137	21733	34955

Limitations:
1. For pipe content with specific gravity other than 1.0, span reduction factors specified in Attachment 4 of Reference 8.15 or Attachment A of Reference 8.73 shall be used.
2. Any concentrated weight such as valve, riser, piping component, etc., shall be located as close to support as possible, and 100% of the concentrated weight shall be added to the adjacent support.
3. For pipe with horizontal elbow, reduce by 25% the listed span as design span. A reduction factor of 0.75 is applied.
4. The every vertical support load for support design shall be the weight support load plus the vertical seismic load that is 0.96 of weight support load (i.e., 1.96*Weight Support Load).
5. Pipe insulation is not considered in this Table. For insulation density, the maximum weight or seismic spans may be adjusted by the formulas below:
   For pipe without water content: $L_s' = L_s[(w_p)/(w_p + w_i')]^{1/2}$
   For pipe with water content: $L_s' = L_s[(w_p + w_w)/(w_p + w_i' + w_w)]^{1/2}$
   where,
   w_p, w_w see Attachment 1 of Reference 8.15; w_i'= new insulation weight, lb/ft; L_s is the span from Table, L_s' is the adjusted span due to specific insulation.
6. This Table only applies to SC-III without containing a significant Chemical release hazard (SC-III(Non-Chem)) and SC-IV piping.
7. For SC-IV piping, use the listed seismic support loads multiplied by a factor of 0.667. or use Reduction Factor provided in Table 1-2.

9.3 APPENDIX 3, SC-III and SC-IV Anchor Load Tables

1) **Deleted**
2) **Table 3.2.1 –SC-III(Non-Chem) and SC-IV C.S. ANCHOR LOADS**
3) **Deleted**
4) **Table 3.4.1 – SC-III(Non-Chem) and SC-IV S.S. ANCHOR LOADS**

TABLE 3.1. 1 – SC-I, SC-II, and SC-III(Chem) C.S. VESSEL NOZZLE LOADS

Deleted

TABLE 3.2. 1 – SC-III(Non-Chem) and SC-IV C.S. ANCHOR LOADS[(1)(2)]

Pipe Size	Load Type	FORCES			MOMENTS			RESULTANT	
		Fx (lbs)	Fy (lbs)	Fz (lbs)	Mx (ft-lb)	My (ft-lb)	Mz (ft-lb)	Fr (lbs)	Mr (ft-lb)
3/8 in	Weight	5	4	2	2	1	1	7	3
	Seismic	17	12	17	18	27	27	27	43
	Thermal	8	7	11	9	17	17	16	26
1/2 in	Weight	4	6	4	4	2	2	8	5
	Seismic	27	18	27	34	51	51	42	79
	Thermal	13	12	17	16	32	32	25	49
3/4 in	Weight	6	9	6	7	4	4	13	9
	Seismic	41	27	41	59	89	89	64	139
	Thermal	20	17	26	28	57	57	37	85
1 in	Weight	10	16	10	13	8	8	21	17
	Seismic	68	45	68	110	166	166	107	259
	Thermal	33	29	44	53	106	106	62	159
1-1/2 in	Weight	20	32	20	31	20	20	43	42
	Seismic	139	93	139	275	412	412	218	645
	Thermal	67	60	89	132	265	265	127	397
2 in	Weight	34	54	34	55	34	34	72	73
	Seismic	234	156	234	480	721	721	365	1,127
	Thermal	113	101	151	232	465	465	214	697
2-1/2 in	Weight	57	92	57	109	68	68	122	145
	Seismic	440	294	440	1,162	1,743	1,743	688	2,726
	Thermal	210	187	280	555	1,110	1,110	397	1,666
3 in	Weight	83	132	83	176	110	110	177	234
	Seismic	642	428	642	1,910	2,865	2,865	1,003	4,479
	Thermal	307	273	410	915	1,830	1,830	581	2,744
4 in	Weight	139	222	139	335	209	209	296	447
	Seismic	1,071	715	1,071	3,612	5,418	5,418	1,675	8,472
	Thermal	516	459	688	1,739	3,479	3,479	974	5,218
6 in	Weight	323	517	323	949	593	593	690	1,267
	Seismic	2,487	1,659	2,487	10,162	15,242	15,242	3,889	23,831
	Thermal	1,208	1,074	1,610	4,934	9,868	9,868	2,282	14,802
8 in	Weight	469	751	469	1,445	903	903	1,002	1,929
	Seismic	3,582	2,389	3,582	13,445	20,168	20,168	5,601	31,532
	Thermal	1,761	1,566	2,348	6,611	13,221	13,221	3,327	19,832
10 in	Weight	384	615	384	2,607	1,629	1,629	821	3,480
	Seismic	2,924	1,950	2,924	23,702	35,553	35,553	4,571	55,586
	Thermal	1,446	1,286	1,928	11,723	23,445	23,445	2,732	35,168
12 in	Weight	567	908	567	4,148	2,593	2,593	1,212	5,537
	Seismic	4,314	2,878	4,314	37,088	55,631	55,631	6,746	86,978
	Thermal	2,143	1,906	2,857	18,423	36,846	36,846	4,048	55,269
14 in	Weight	707	1,130	707	5,400	3,375	3,375	1,509	7,207
	Seismic	5,376	3,586	5,376	48,131	72,197	72,197	8,406	112,877
	Thermal	2,674	2,378	3,565	23,939	47,879	47,879	5,052	71,818
16 in	Weight	980	1,567	980	8,037	5,023	5,023	2,092	10,726
	Seismic	7,448	4,968	7,448	71,945	107,917	107,917	11,646	168,726
	Thermal	3,704	3,294	4,938	35,773	71,546	71,546	6,996	107,319
18 in	Weight	1,301	2,081	1,301	11,337	7,086	7,086	2,778	15,131
	Seismic	9,885	6,593	9,885	101,639	152,459	152,459	15,456	238,365
	Thermal	4,950	4,402	6,599	50,892	101,784	101,784	9,350	152,676
20 in	Weight	1,642	2,628	1,642	14,932	9,332	9,332	3,507	19,929
	Seismic	12,474	8,320	12,474	131,774	197,661	197,661	19,505	309,037
	Thermal	6,296	5,599	8,395	66,511	133,021	133,021	11,894	199,532
22 in	Weight	1,898	3,037	1,898	15,397	9,623	9,623	4,053	20,550
	Seismic	14,406	9,609	14,406	135,362	203,043	203,043	22,526	317,453
	Thermal	7,325	6,515	9,767	68,828	137,657	137,657	13,838	206,485
24 in	Weight	2,510	4,016	2,510	24,845	15,528	15,528	5,359	33,158
	Seismic	19,045	12,703	19,045	217,025	325,538	325,538	29,779	508,970
	Thermal	9,758	8,678	13,010	111,192	222,384	222,384	18,433	333,576

Notes:

1. For qualification of vessel nozzles, use Project-approved vendor nozzle allowable loads, or the nozzle load tables specified in Reference 8.22.
2. Use as Reference for structural anchor design but subject to CS&A acceptance.

TABLE 3.3. 1 – SC-I, SC-II, and SC-III(Chem) S.S. VESSEL NOZZLE LOADS

Deleted

TABLE 3.4. 1 – SC-III(Non-Chem) and SC-IV S.S. ANCHOR LOADS[(1)(2)]

Pipe Size	Load Type	FORCES			MOMENTS			RESULTANT	
		Fx (lbs)	Fy (lbs)	Fz (lbs)	Mx (ft-lb)	My (ft-lb)	Mz (ft-lb)	Fr (lbs)	Mr (ft-lb)
3/8 in	Weight	2	4	2	2	1	1	5	2
	Seismic	17	11	17	15	23	23	26	36
	Thermal	7	6	9	6	13	13	13	19
1/2 in	Weight	4	6	4	3	2	2	8	4
	Seismic	26	17	26	28	42	42	41	66
	Thermal	11	10	14	12	23	23	20	35
3/4 in	Weight	6	9	6	6	4	4	12	8
	Seismic	40	26	40	49	74	74	62	115
	Thermal	17	15	22	21	41	41	31	62
1 in	Weight	10	15	10	11	7	7	20	14
	Seismic	66	44	66	92	137	137	104	215
	Thermal	28	25	37	38	77	77	52	115
1-1/2 in	Weight	20	32	20	26	16	16	42	35
	Seismic	139	92	139	228	342	342	217	535
	Thermal	58	52	78	96	192	192	110	288
2 in	Weight	35	56	35	46	29	29	75	61
	Seismic	244	162	244	398	597	597	381	934
	Thermal	103	92	137	169	337	337	195	506
2-1/2 in	Weight	64	102	64	109	68	68	136	146
	Seismic	445	297	445	954	1,431	1,431	695	2,237
	Thermal	188	167	250	403	805	805	355	1,208
3 in	Weight	93	149	93	180	112	112	199	240
	Seismic	654	436	654	1,565	2,347	2,347	1,022	3,669
	Thermal	277	247	370	664	1,327	1,327	524	1,991
4 in	Weight	159	255	159	342	214	214	340	456
	Seismic	1,111	741	1,111	2,956	4,435	4,435	1,738	6,933
	Thermal	474	422	632	1,261	2,523	2,523	896	3,784
6 in	Weight	385	616	385	951	595	595	823	1,270
	Seismic	2,700	1,801	2,700	8,291	12,436	12,436	4,221	19,444
	Thermal	1,165	1,036	1,554	3,579	7,157	7,157	2,201	10,736
8 in	Weight	445	711	445	1,156	723	723	949	1,543
	Seismic	3,138	2,093	3,138	10,197	15,295	15,295	4,907	23,914
	Thermal	1,407	1,251	1,876	4,795	9,589	9,589	2,657	14,384
10 in	Weight	361	578	361	2,210	1,382	1,382	772	2,950
	Seismic	2,539	1,693	2,539	19,379	29,068	29,068	3,970	45,447
	Thermal	1,114	991	1,485	8,502	17,004	17,004	2,104	25,506
12 in	Weight	502	803	502	3,236	2,023	2,023	1,071	4,320
	Seismic	3,509	2,340	3,509	28,083	42,124	42,124	5,486	65,860
	Thermal	1,550	1,378	2,066	12,404	24,807	24,807	2,927	37,211
14 in	Weight	591	946	591	3,865	2,416	2,416	1,262	5,158
	Seismic	4,162	2,776	4,162	33,924	50,886	50,886	6,508	79,559
	Thermal	1,845	1,641	2,460	15,036	30,072	30,072	3,485	45,107
16 in	Weight	757	1,211	757	5,083	3,177	3,177	1,617	6,784
	Seismic	5,307	3,540	5,307	44,069	66,104	66,104	8,299	103,352
	Thermal	2,381	2,118	3,175	19,774	39,548	39,548	4,499	59,322
18 in	Weight	1,204	1,927	1,204	8,189	5,118	5,118	2,572	10,929
	Seismic	8,486	5,660	8,486	71,497	107,246	107,246	13,268	167,676
	Thermal	2,986	2,656	3,982	25,160	50,320	50,320	5,641	75,480
20 in	Weight	1,283	2,052	1,283	8,632	5,395	5,395	2,739	11,520
	Seismic	8,908	5,941	8,908	75,915	113,872	113,872	13,928	178,036
	Thermal	3,660	3,255	4,880	31,194	62,388	62,388	6,915	93,582
22 in	Weight	1,375	2,201	1,375	9,382	5,864	5,864	2,937	12,522
	Seismic	9,509	6,342	9,509	81,467	122,200	122,200	14,868	191,056
	Thermal	4,421	3,932	5,895	37,876	75,752	75,752	8,352	113,629
24 in	Weight	1,603	2,565	1,603	10,986	6,866	6,866	3,424	14,663
	Seismic	11,140	7,430	11,140	96,098	144,147	144,147	17,419	225,369
	Thermal	5,241	4,661	6,987	45,206	90,412	90,412	9,900	135,618

Notes:

1. For qualification of vessel nozzles, use Project-approved vendor nozzle allowable loads, or the nozzle load tables specified in Reference 8.22.
2. Use as Reference for structural anchor design but subject to CS&A acceptance.

9.4 APPENDIX 4, Deleted

9.5 APPENDIX 5, Deleted

9.6 APPENDIX 6, Deleted

9.7 APPENDIX 7, ME101 Stress Check Based on Nominal Weight and Eroded/Corroded Pipe Wall Thickness

The following is a sample calculation sheet used for performing

(1) Appendix 7A: Longitudinal and
(2) Appendix 7B: Longitudinal and Occasional

pipe stress check using ME101 output based on nominal pipe weight and eroded/corroded pipe wall thickness.

Appendix 7A

CALCULATION SHEET

ORIGINATOR: DATE:

CHECKER: DATE:

Longitudinal Pipe Stress Check Using ME101 Output Based on Nominal Weight and Eroded/Corroded Pipe Wall Thickness																	
		ME101 Input/Output For Sustained Loads									ASME B31.3 - S_L Stress Calculation						
No	Stress Calculation Number	Data Point	Pipe D_o (inch)	Nominal Pipe, t_n (inch)	SIF Value i_i	SIF Value i_o	Pressure (psig)	Torsion M_A (ft-lbs)	Bending M_B (ft-lbs)	Bending M_C (ft-lbs)	Erosion and Corrosion c (inch)	Eroded & Corroded Pipe Thickness t_C (inch)	Pipe Section Modulus Z_C (in^3)	Longitudinal Stress, S_L (Weight + Pressure) (Notes 1) (psi)	ASME B31.3 Code Stress Allowable (psi)	Pipe Stress Ratio	ASME B31.3 Code Stress Check
0	1	2	3	4	5a	5b	6	7	8	9	10	11	12	13	14	15	16
1	SAMPLE STRESS CALC. NO.	5	2.375	0.218	2.1	2.1	105	24	153	14	0.0937	0.1243	0.4945	6,325	16,700	0.379	PASS
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

1. The stress intensity formula of S_L is

$$\frac{p(D_o - 2t_c)^2}{D_o^{\,2} - (D_o - 2t_c)^2} + \sqrt{S_b^{\,2} + 4S_t^{\,2}} \quad \text{in which} \quad S_b = \frac{\sqrt{(0.75 i_i M_i)^2 + (0.75 i_o M_o)^2}}{Z_c} \qquad S_t = \frac{M_t}{2Z_c}$$

where $0.75i_i$ or $0.75i_o$ is not less than 1.0 and
S_b = Bending Stress due to weight
S_t = Torsional Stress due to weight
M_i = In-plane moment due to weight
M_o = Out-of-plane moment due to weight
M_t = Torsional moment due to weight

2. Sustained and longitudinal stresses can be calculated based on a single stress intensification which is the maximum SIF of i_i and i_o per note (3) of Appendix D of ASME B31.3

SPREADSHEET NOTES:
1. COLUMNS 2-9 & 14 ARE TAKEN FROM THE APPLICABLE ME101 STRESS CALCULATION.
2. COLUMN 10 IS TAKEN FROM THE APPLICABLE PIPING CLASS SHEET.
3. COLUMNS 11, 12, 13 & 15 ARE CALCULATED BASED ON PRE-SET EXCEL FORMULAS.

Appendix 7B

CALCULATION SHEET

ORIGINATOR: DATE:

CHECKER: DATE:

Occasional Pipe Stress Check Using ME101 Output Based on Nominal Weight and Eroded/Corroded Pipe Wall Thickness																	
		ME101 Input/Output For Sustained Loads									ASME B31.3 - S_L Stress Calculation						
No	Stress Calculation Number	Data Point	Pipe D_o (inch)	Nominal Pipe, t_n (inch)	SIF Value i_i	SIF Value i_o	Pressure (psig)	Torsion M_A (ft-lbs)	Bending M_B (ft-lbs)	Bending M_C (ft-lbs)	Erosion and Corrosion c (inch)	Eroded & Corroded Pipe Thickness t_C (inch)	Pipe Section Modulus Z_C (in^3)	Occasional Stress (S_L plus Seismic) (Notes 1 & 2) (psi)	ASME B31.3 Code Stress Allowable (psi)	Pipe Stress Ratio	ASME B31.3 Code Stress Check
0	1	2	3	4	5a	5b	6	7	8	9	10	11	12	13	14	15	16
1	SAMPLE STRESS CALC. NO.	45	2.375	0.218	2.1	2.1	105	57	195	13	0.0937	0.1243	0.4945	7,596	22,211	0.342	PASS
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

1. Occasional stress $S_{OCC} = S_P + S_W + S_{SEIS} = S_L + S_{SEIS}$

$$\frac{p(D_o - 2t_c)^2}{D_o^{\,2} - (D_o - 2t_c)^2} + \sqrt{S_b^{\,2} + 4S_t^{\,2}}$$

The stress intensity formula is

$$S_b = \frac{\sqrt{(0.75 i_i M_i)^2 + (0.75 i_o M_o)^2}}{Z_c}$$

$$S_t = \frac{M_t}{2Z_c}$$

where $0.75i_i$ or $0.75i_o$ is not less than 1.0 and
S_b = Bending Stress due to weight
S_t = Torsional Stress due to weight
M_i = In-plane moment due to weight
M_o = Out-of-plane moment due to weight
M_t = Torsional moment due to weight

2. Sustained and longitudinal stresses can be calculated based on a single stress intensification which is the maximum SIF of i_i and i_o per note (3) of Appendix D of ASME B31.3

SPREADSHEET NOTES:
1. COLUMNS 2-9 & 14 ARE TAKEN FROM THE APPLICABLE ME101 STRESS CALCULATION.
2. COLUMN 10 IS TAKEN FROM THE APPLICABLE PIPING CLASS SHEET.
3. COLUMNS 11, 12, 13 & 15 ARE CALCULATED BASED ON PRE-SET EXCEL FORMULAS.

9.8 APPENDIX 8, Criteria for Critical Piping

- Piping in black cells.
- Piping with a seismic category of SC-I, SC-II, SC-III(Chem), and SC-IIIE.
- Piping of any diameter with a design temperature above 250°F.
- Piping of any diameter with a design temperature of -100°F or lower.
- Piping greater than 3” in diameter with a design temperature of -50°F or lower.
- Piping with a design pressure of 400 psi or greater.
- Piping greater than 6” in diameter with a design temperature of -20°F or lower.
- Piping greater than 12” in diameter with a design temperature of 20°F or lower.
- Piping greater than 12” in diameter with a design temperature of 150°F or greater.
- Piping greater than 24” in diameter.
- Piping that is jacketed.
- Piping greater than 3” in diameter that is connected to pump and has a design temperature of 0°F or lower.
- Piping greater than 6” in diameter that is connected to pump and has a design temperature of 150°F or higher.
- Piping greater than 6” in diameter that is connected to pump and has a design temperature of 20°F or lower.
- Piping fabricated from material other than metals, i.e. fiberglass, thermoplastic, etc.
- Piping for which the stress supervisor deems a formal analysis is required.
- Piping connected to safety pumps, vessels, heat exchangers, major/sensitive equipment, or with significant externally imposed displacements.
- Piping required to be evaluated for pipe break requirements.
- Piping with II over I issue

9.9 APPENDIX 9, ME101 Gap Options:

9.9.1 ME101 Gap Option - Generic Approach.

Whenever the first vertical rigid support adjacent to nozzles at vessels with significant upward movements generates large upward thermal loads, the GAP option may be used to reduce the thermal uplift load when the following are taken into consideration:

1. The GAP beneath the pipe is set to be equal to the calculated thermal movement of the pipe at the pipe support location. The GAP above the pipe is set equal to an arbitrary large number (greater than the thermal movement). This will require a manual iteration to first determine the vertical (upward) thermal movement of the pipe at the support point. This way, the pipe is allowed to move up during thermal condition. In weight analysis, the pipe is allowed to sag (downward displacement), and the gap will close only when the downward displacement equals or is greater than the gap.
2. Once the thermal displacement is moving upward, the support load may be shifted from the support to the adjacent nozzle and/or other vertical supports. For conservatism, two weight analyses are required:
   - Hot Condition - with the support active but with GAP equal to the upward THRM movement
   - Cold condition - with the support active and no GAP

   The following are design practices when ME101 Gap option is used at the first vertical support adjacent to the nozzle to take the dead weight and also permit the upward thermal movement using:
   1. Set GAP1 in THRM and WT02 (hot) load cases equal to the actual calculated thermal displacement
   2. Set GAP2 in THRM and WT03 (cold) load cases to an arbitrary number larger than the actual calculated thermal displacement.
   3. Envelope two weight cases for stress check as well as support/nozzle load summary:
      WT01 = SMAX(WT02,WT03), where:
      WT02: The hot condition with the support active but with GAP1 equal to the upward thermal movement.
      WT03: The cold condition with the support active and no GAP
   4. Run one single SEIS case with the support inactive (i.e. no seismic load is considered for the unidirectional support) for stress check.

   The above definition of GAP1 and GAP2 are based on direction cosines of -1.00 (negative 1.00) and the ME101 input example for gap option is attached below:

Appendix 9.9.1 (Cont'd)

ME101 Example for Gap Option

```
RUN                                                  LDCASE=WT02(H+A),
RUN                                                  LDCASE=WT03(C+A),
RUN                                                  LDCASE=WTHY(C+W)
RUN                                                  LDCASE=THRM01(H),
RUN                                                  LDCASE=SEISDB(A),
                                                     WT01=SMAX(WT02,WT03),

ANC   10  -0.01      0.196      0.074                OD=4"40S,
                                                     TEMP=212,
                                                     SPG=1.47,              *A
                                                     SPG=1.00,              *W


      15             8-11-15/16            3D
      20  10-0-5/8   1.4321:    0:                   DTI=PWD-H90066,
RAD   20             -1                              ETI=PWD-H90066,        *C
                                                     GAP1=0.000,GAP2=1.0    *C

RAD   20             -1                              ETI=PWD-H90066,        *H
                                                     GAP1=0.202, GAP2=1.0,*H

      3010-10        1.4321:    0:                   DTI=PWD-H00257,
END
```

9.9.2 ME101 Gap Option - Special Approach

Whenever the piping has significant thermal load in the opposite direction of existing steel members which is not a real restraint at that direction, for example:

1). Piping is sitting on steel member such as an undersupport which is not required to be a pipe support but has significant thermal load in upward direction, or

2). Piping interfaces with a steel structure which is not considered as a pipe support. However, CS&A needs the design loads from Plant Design for their steel design.

A special practice described below to aim at the above situations is acceptable although it may become redundant in pipe stress analysis.

Make Two ME101 Runs. One run is to include the supports with gaps, and one is to have no supports at the locations where gapped supports were modeled. The loads from the two runs should then be enveloped to design the supports. The stress summaries from both runs shall demonstrate that the Code requirements are satisfied. The stress summaries from both runs shall be included in the documented stress calculation.

It should be noted to the support designer that the support is to be designed to allow the movement in the gapped direction. The seismic load in the restraint load summary and/or the pipe support design load table is to be applied only in the restraint direction.

9.10 APPENDIX 10, Use of UBC and Alternate Stress Criteria for SC-III(Non-Chem) and SC-IV

I. Scope and Purpose

The main purpose of this Appendix is to show that the methods and criteria that are used to calculate piping stresses result in a system in verbatim compliance with B31.3 for SC-III(Non-Chem) and SC-IV piping systems. The focus of the paper is all future evaluations, using the revised methods and criteria DOE has approved in Reference 3 (References refer to those listed for this Appendix, see Section V of this Appendix). BNI will develop a calculation to determine the impact of the methods and criteria defined herein on piping and supports already designed. The scope of this paper is only SC-III(Non-Chem) and SC-IV systems.

II SC-III and SC-IV Demand

The demand on the piping system is defined by pressure, weight, thermal expansion, and seismic loading. Pressure, weight, and thermal expansion "demand" are well understood, and will not be discussed further, with the following clarification:

- B31.3 requires that the "end-of-life" thickness (nominal less corrosion or erosion allowance) be used for calculating sustained (S_L) stresses (B31.3, 302.3.5) and, by analogy, for occasional stresses, which was confirmed in Interpretation 2-15
- B31.3 provides no guidance on what thickness (nominal, end-of-life) to use to develop the forces and moments for the sustained or occasional loadings. Interpretation 4-10 implies that the simplified design methods in B31.3 would normally employ nominal thickness when calculating forces and moments and corroded thickness when calculating stresses. That approach will conservatively be used for the SC-III/IV piping, i.e., base forces and moments for weight (and seismic) on nominal dimensions and stresses on corroded dimensions.
- For thermal expansion and any displacement controlled loads (building settlement, for example), B31.3 clearly requires use of nominal dimensions for both determining loads and stresses (319.3.5, "Nominal dimensions...shall be used in flexibility calculations"). This is reiterated in Interpretation 4-10.

Seismic demand for SC-III and SC-IV piping systems is defined by the Uniform Building Code 1997 (UBC), as indicated in the SRD (Reference 1, Table 4-2) and ABAR 24590-WTP-SE-ENS-06-0022 (incorporated at Rev 4f of the SRD). UBC seismic demand is defined in Equation 32-1 (conservative maximum) and Equation 32-2 from Section 1632. BNI will use Equation 32-2 for all future evaluations:

$$0.7C_a I_p W_p \le F_p = \frac{a_p C_a I_p}{R_p}\left(1+3\frac{h_x}{h_r}\right)W_p \le 4C_a I_p W_p$$

C_a = Seismic Coefficient, as set forth in UBC Table 16-Q, taken as 0.24 for WTP
I_p = Importance Factor specified in UBC Table 16-K, taken as 1.5 for SC-III and 1.0 for SC-IV for WTP

W_p = The weight of an element or component
F_p = Total design lateral seismic force (as defined in UBC 1632.2)
a_p = In-structure component amplification factor from UBC Table 16-O
R_p = Component Response Modification Factor from UBC Table 16-O
h_x = Element or Component elevation with respect to grade, not less than 0.0
h_r = Structure roof elevation with respect to grade

The strict verbatim requirements from UBC are as follows (with appropriate paragraphs or tables referenced):

- Lateral force only (UBC 1632)
- Only one horizontal direction of load (UBC 1632)
- 1.4 reduction factor applied to the earthquake load when using allowable stress design (UBC 1612.3.2)
- a_p = 1.0 for piping (UBC Table 16-O, Item 3B)
- R_p = 3.0 (UBC Table 16-O, Item 3B) for piping and for supports that don't use Concrete Expansion Anchors (CEAs) or have a buckling issue (no change from above).
- R_p = 1.5 for non-ductile failure modes based on Table 16-O, Item 4B (buckling, CEA pullout) (no change from above).

DOE has requested that BNI use methods for SC-III(Non-Chem) and SC-IV that are more consistent with the methods chosen for SC I and SC II piping. These changes result in a much more conservative seismic loading (demand) than required by UBC. In doing so, DOE has permitted BNI relief in the allowable stresses for piping and component standard supports (capacity). The following list indicates the requirements that BNI will follow for SC-III/IV piping and supports designed to the DOE accepted criteria:

- Lateral and vertical seismic loading, with the vertical force equal to 2/3 the lateral force, which is consistent with typical Nuclear Power Plant (NPP) requirements (vertical loading not required by UBC)
- Lateral force applied in both horizontal directions (only one direction required by UBC)
- The three directions of force (both horizontals and the vertical) combined SRSS
- No reduction factor applied to the earthquake load (loss of 1.4 factor)
- a_p = 2.5 for piping (UBC Table 16-O, maximum possible value)
- R_p = 3.0 (UBC Table 16-O, Item 3B) for piping and for supports that don't use Concrete Expansion Anchors (CEAs) or have a buckling issue (same as standard UBC)
- R_p = 1.5 for non-ductile failure modes based on Table 16-O, Item 4B (buckling, CEA pullout) (same as standard UBC)

Thus, the amount of conservatism in the proposed demand can be compared easily to that from strict verbatim requirements from UBC:

Increase in earthquake load due to ignoring 1.4 factor = 1.4
Increase in earthquake load due to a_p difference = 2.5
Increase in earthquake load due to considering a vertical Earthquake equal to 2/3 horizontal = 1.2 (see below)

$$Minimum\ increase = \sqrt{1.0^2 + 0.667^2} = 1.2$$

Note that the 1.2 factor is a minimum; a vertical run would be higher since the result would be the SRSS of two equal earthquakes, or a factor of 1.4. Also note that since support loads tend to be dominated by one direction of seismic load, whereas pipe stresses are an SRSS of all directions of moments, the 1.2 factor will not be applied to supports.

Total demand increase factor for stress = 2.5*1.4*1.2 = 4.2
Total demand increase factor for supports = 2.5*1.4 = 3.5

The result of the DOE/BNI/WTP requirements is that the earthquake load used to evaluate piping and supports is higher than strict verbatim compliance with UBC would require. This higher demand has been offset by a higher permitted allowable stress. As will be shown below, if the correct UBC demand were used, the B31.3 allowable stress criteria (capacity) would easily be met. That is, designing piping and supports using the conservative BNI demand and higher BNI capacity is more conservative than using the correct UBC demand and lower B31.3 capacity.

III Capacity

Prior to discussing seismic loading, the following is presented to clarify exactly how normal longitudinal stresses in piping (weight, thermal expansion/displacement) will be determined, since there has been some discussion on that issue in the past.

Pipe Stresses (Sustained and Displacement Loads)

Longitudinal Pipe Stresses for Sustained Loads will meet the Requirements of B31.3, 302.3.5. Since the 1996 B31.3 does not provide guidance concerning how the longitudinal stress is to be determined, the following equation is used based on the guidance in B31.3 Code Case 178 (Reference 2):

$$\frac{PD_O}{4t_c} + \frac{\sqrt{(0.75 i_o M_{oA})^2 + (0.75 i_i M_{iA})^2 + M_{TA}^{\ 2}}}{Z'} \le 1.0 S_h$$

Where:

M_{oA}, M_{iA}, M_{TA}	= out-of-plane bending, in-plane bending, and torsional moments due to Sustained Loads (typically weight), respectively.
i_o, i_i	= out-of-plane and in-plane bending stress intensification factors, respectively
D_o	= Pipe nominal outside diameter
t_c	= Nominal pipe wall thickness less corrosion/erosion allowance
Z'	= pipe section modulus based on nominal OD and corroded thickness.
S_h	= Basic Allowable Stress at maximum metal temperature from B31.3

As indicated earlier in Section II of this paper, the bending and torsional moments will be derived from an analysis based on the nominal dimensions of the pipe.

The above equation is slightly different from the Code Case, in that the Code Cases recommends including the stress due to the axial force. As this stress is typically small in well supported piping systems, and it is not used in the displacement stress equation, BNI has chosen not to consider that component of stress.

Displacement Stresses for Thermal Expansion and Displacement Controlled loads will meet the requirements of B31.3, 319.4.4:

$$\frac{\sqrt{(i_o M_{oC})^2 + (i_i M_{iC})^2 + M^2{}_{TC}}}{Z} \le S_A$$

Where:

M_{oC}, M_{iC}, M_{TC}	= out-of-plane bending, in-plane bending, and torsional moments due to Displacement Controlled Loads (typically thermal expansion), respectively.
Z	= pipe section modulus based on nominal OD and thickness.
S_A	= Allowable Displacement Stress Range, as defined in 302.3.5(d) of B31.3

As indicated earlier in Section II of this paper, the bending and torsional moments will be derived from an analysis based on the nominal dimensions of the pipe.

Pipe Stresses (Occasional Loads)

The normal limit for occasional stress in B31.3 is $1.33S_h$ (302.3.6). However, as indicated in 300(c)(3), B31.3 is based on a simplified approach to design. It permits a designer capable of a more rigorous analysis to use that approach, provided the validity is demonstrated. Based on the fact that BNI is using a higher seismic demand that the simplified approach of UBC would require, BNI will use a higher stress limit for piping than the simple approach in B31.3 allows. The proposed stress equation is provided below.

Using the same guidance as for Sustained stresses, the following equation is used:

$$\frac{PD_O}{4t_c} + \frac{\sqrt{(0.75 i_o M_{oB})^2 + (0.75 i_i M_{iB})^2 + M_{TB}{}^2}}{Z'} < \textit{lesser of } k_1 S_h \textit{ or } k_2 S_y$$

M_{oB}, M_{iB}, M_{TB}	= out-of-plane bending, in-plane bending, and torsional moments due to Sustained plus occasional Loads (typically weight plus seismic), respectively.
i_o, i_i	= out-of-plane and in-plane bending stress intensification factors, respectively
D_o	= Pipe nominal outside diameter
t_c	= Nominal pipe wall thickness less corrosion/erosion allowance
Z'	= pipe section modulus based on nominal OD and corroded thickness.
S_h	= Basic Allowable Stress at maximum metal temperature from B31.3

S_y = Yield stress at maximum metal temperature (from ASME Section II, Part D, since B31.3 does not define yield at temperature)
k_1 = 3.0
k_2 = 2.0

The basis for the left hand side of the equation is the same as for sustained loads. The basis for the right hand side (allowable stresses) has been discussed with and accepted by DOE (Reference 3).

In order to simplify the equations to determine demand to capacity ratios, let us look at stresses as a combination of pressure stress (PS), weight stress (WS), and seismic stress (SS) separately, using $3S_h$ as the upper BNI seismic limit and $1.33S_h$ as the upper UBC/B31.3 limit. Note that for materials limited by $2S_y$, the discussion below is conservative.

$PS + WS < S_h$
$PS + WS + SS\ (BNI) < 3S_h$
$PS + WS + SS\ (UBC) < 1.33S_h$

PS + WS can be anything between 0 and S_h. For the moment, assume PS + WS is 0. Then, in the limit

$SS\ (BNI) = 3S_h$; $SS(UBC) = 1.33S_h$
Demand (BNI) = 4.2*Demand (UBC) (from Section II)

Demand (BNI)/Capacity (BNI) = $(4.2*Demand(UBC))/3S_h$ = $1.4*Demand(UBC)/S_h$
Demand (UBC)/Capacity (UBC) = $(Demand\ (UBC))/1.33S_h$ = $0.75*Demand\ (UBC)/S_h$

That is, the demand to capacity ratio for the BNI method and criteria is higher (more conservative) than the standard UBC-B31.3 for PS + WS = 0, by almost a factor of 2 (1.4/0.75 = 1.87).

Clearly, as PS + WS increases, there will eventually be a point at which the demand to capacity (DC) ratio for BNI is not higher than UBC-B31.3, as shown in the following table, using the following equations:

- B31.3 SS Cap = $1.33S_h - S_h*(PS + WS)/S_h$
- BNI SS Cap = $3S_h - S_h*(PS + WS)/S_h$
- UBC Demand = 1.0
- BNI Demand = 4.2*UBC Demand = 4.2
- DC Ratio = [Demand (BNI)/Cap(BNI)]/[Demand (UBC)/Cap (B31.3)] = 4.2*Cap (UBC)/Cap (BNI)

For example, for $(PS + WS) = 0.4S_h$

$(PS + WS)/S_h$	= 0.4	
B31.3 SS Cap	$= 1.33S_h - S_h*0.4$	$= 0.93S_h$
BNI SS Cap	$= 3S_h - S_h*0.4$	$= 2.6S_h$

DC Ratio = (4.2/2.6)/(1.0/0.93) = 1.50, as shown in the table below

(PS + WS)/Sh	B31.3 SS Cap/Sh	BNI SS Cap/Sh	DC Ratio
0	1.33	3	1.86
0.1	1.23	2.9	1.78
0.2	1.13	2.8	1.70
0.3	1.03	2.7	1.60
0.4	0.93	2.6	1.50
0.5	0.83	2.5	1.39
0.6	0.73	2.4	1.28
0.7	0.63	2.3	1.15
0.8	0.53	2.2	1.01
0.9	0.43	2.1	0.86
1	0.33	2	0.69

The cross-over point occurs at $(PS + WS)/S_h = 0.8$. A review of 172 of the SC-III(Non-Chem) and SC-IV piping analyses done to date shows that the maximum ratio of any line is 0.81, with well over 98% of the lines below 0.72, and many much lower. Thus, one would not expect any future lines to have $PS + WS > 0.8S_h$, but BNI will commit to placing this limitation on all future analyses when using the BNI seismic stress criteria.

IV. Conclusion

Based on the above work, the use of the BNI SC-III(Non-Chem)/SC-IV acceptance criteria coupled with a conservative application of UBC loading is conservative compared to strict compliance with B31.3 and UBC, subject to limiting the sustained stresses to $0.8S_h$.

References for Appendix 9.10

1. BNI WTP Document 24590-WTP-SRD-ESH-01-001-02, Revision 4K, “Safety Requirements Document - Volume II”
2. B31 Case 178, “Providing an Equation for Longitudinal Stress for Sustained Loads in ASME B31.3 Construction”
3. DOE Letter 06-WTP-198 to BNI (RJ Schepens to WS Elkins) dated January 9, 2007, “Evaluation of Waste Treatment and Immobilization Plant (WTP) Piping and Supports Qualified to SC I, SC II, SC-III, and SC-IV Requirements”

Summary of BNI SC-III(Non-Chem) and SC-IV Pipe Stress Criteria

Normal Load (Weight, Pressure, Thermal Expansion) Demand:

- Forces and moments determined using nominal outside diameter and thickness
- Sustained conditions stresses determined using a thickness and section modulus based on "end-of-life" (nominal less corrosion or erosion allowance)
- Thermal expansion and any displacement controlled stresses (building settlement, for example) determined using nominal dimensions.

The resulting moments (piping) or moments and forces (supports) are then used in conjunction with pressure, weight, and thermal expansion/thermal anchor motion/seismic anchor motion results to qualify the piping and supports. The attached table shows the criteria used for pipe stress.

Table 1

SC – III(Non-Chem)/SC-IV Piping

NOTE: SC-III Importance Factor (I_p) = 1.5; SC-IV I_p = 1.0

Case	Loading	Loads	Demand	Capacity	Pipe Properties
Design	Primary - Sustained	Pressure (P)	Pressure	$\frac{PD_O}{4t_c} + \frac{\sqrt{(0.75 i_o M_{oA})^2 + (0.75 i_i M_{iA})^2 + M_{TA}^2}}{Z'} \le 1.0 S_h$	Mass is based on the uncorroded pipe plus water plus insulation.
		Deadweight (D)	Vertical: 1g * W_P		
	Primary – Occasional	Pressure (P)	Pressure	$\frac{PD_O}{4t_c} + \frac{\sqrt{(0.75 i_o M_{oB})^2 + (0.75 i_i M_{iB})^2 + M_{TB}^2}}{Z'} \le$ lesser of $k_1 S_h$ or $k_2 S_y$ k_1 = 3.0 k_2 = 2.0	Pipe structural properties (D_O, t_c, Z') are based on corroded pipe properties.
		Deadweight (D)	Vertical 1 g * W_P		
		Seismic-Inertial (SI)	Horizontal (E-W, N-S): F_p from equ 32-2 as defined above Vertical: 2/3 (Horizontal) Total: $(H^2_{N-S} + H^2_{E-W} + V^2)^{1/2}$		
	Secondary – Normal	Thermal (T)	αLΔT	$\frac{\sqrt{(i_o M_{oC})^2 + (i_i M_{iC})^2 + M_{TC}^2}}{Z} \le S_A$	Pipe structural properties (D_O, t, Z) values are based on nominal pipe properties.
	Secondary – Occasional	Thermal (T)	αLΔT	$\sqrt{\frac{(i_o M'_{oC})^2 + (i_i M'_{iC})^2 + M'^2_{TC}}{Z}} \le S_A$	Pipe structural properties (D_O, t, Z) values are based on nominal pipe properties.
		Seismic – Anchor Motion (SAM)	Displacement		

W_P = Weight of (Pipe + fluid + insulation) nominal properties.
g = acceleration of gravity (386 in//sec^2; 32.2 ft/sec^2)
M_{oA}, M_{iA}, M_{TA} = out- and in-plane bending and torsional moment due to D, respectively.
M_{oB}, M_{iB}, M_{TB} = out- and in-plane bending and torsion moment due to |D| + |SI|, respectively.
M_{oC}, M_{iC}, M_{TC} = out- and in-plane bending and torsion moment due to T, respectively.
M'_{oC}, M'_{iC}, M'_{TC} = out- and in-plane bending and torsion moment due to |T| + |SAM|, respectively.
Z = pipe section modulus based on nominal dimensions.
Z′ = pipe section modulus based on corroded dimensions.