

CPCC ENGINEERING PACKAGE

EP No: ECR-25-000862 Rev 00

EP Title: Replace 400A Water Tank Heaters Q39 and Q41

Document Action Only Physical Modification Drawing Change Only WPE

1.0 PACKAGE DESCRIPTION

RELEASE Radiological Record

Request and Justification:
 The T-58 and T-87 water tank heaters Q39 and Q41 respectively, will be replaced as they are no longer functioning. NFPA 22 16.1.2 requires that the heating system shall keep the water in the tanks at or above 42° F during the coldest weather. Replacement heaters will be installed to prevent the water from experiencing freezing temperatures.



Work Package No: 4W-25-05225
Project No: N/A

Area: 400
Facility: FFTF
Building: 482A, 482B
System ID: IAES-400-WATER-MECH

Release
 Work Complete

Design Authority

Change Description and Scope:
 The current water tank heaters Q39 and Q41 will be removed from water tanks T-58 and T-87, and replacements will be installed. The current heaters have 3-inch inlet/outlet, the replacement heaters have 2-1/2-inch inlet/outlet, reducing flanges will be installed to account for this. The current heaters are 47-1/4-inches from inlet to outlet; the replacement heaters are 52-inches from inlet to outlet. At the inlet, a piping assembly (see Sketch-02) including a reducing flange (2-1/2 x 2), 2 90-degree elbows, 3 fully threaded pipe nipples, and a second reducing flange (2 x 3) will be utilized to accommodate the 4-3/4-inch difference in inlet to outlet dimension from the current heaters to the replacement heaters. At the outlet, a piping assembly (see Sketch-02), including a reducing flange (2-1/2 x 3) and a 9-inch pipe nipple will be utilized to accommodate the dimensional difference created by the new piping configuration at the inlet. Replacement heaters will be installed in the same orientation as the current heaters (see Sketch-02).

2.0 PACKAGE INDEX

9/29/2025 YV/CJ PER TELECON

Action	Document No.	Rev. No.	E/S/R	Section Description/Title	Page No.
RWC-Revise Work Complete	H-4-11008-01	31	E-Essential	SKETCH-01	4
I-Information	SKETCH-02	0	-	Circulation Heater Q39 and Q41 Assembly Details	5-6
I-Information	A-6004-795	7	-	Design Verification Record	7-9

3.0 DESIGN REQUIREMENTS

Functional Requirements:
 Provide supplemental heat to tank when water drops below 42° F.
 Sufficient rating of 125 kW, like for similar.
 Size of replacement heaters fits in allowed space.

Design Criteria:
 Installation to meet NFPA 70, NEC.

Hazard Analysis/Requirements:
 Standard Industrial Hazards

4.0 ACCEPTANCE CRITERIA and METHODS

Acceptance Criteria	Acceptance Method
NEC Inspection	<input checked="" type="checkbox"/> Inspection <input type="checkbox"/> Testing
In service leak test at operating pressure	<input type="checkbox"/> Inspection <input checked="" type="checkbox"/> Testing

5.0 RELATED/AFFECTED ECRs/FMPs AND OTHER AFFECTED DOCUMENTS

Document Type	Document No.	Rev. No.	Owning Organization	Technical Authority
N/A	N/A	N/A	N/A	N/A

6.0 DESIGN VERIFICATION

Verification by: Peer Review Formal Design Review Alternate Calculations Qualification Testing

The following verification(s) have been performed per the requirements of CPCC-PRO-EN-8336, Design Verification and the design is adequate and satisfactorily implements the stated design requirements. Design verification record (site form A-6004-795 or equivalent) is attached.

Verification Scope	Design Verifier
Mechanical	H0386002 - DANA F MILLER 9/22/2025 1:39:32 PM

7.0 REVIEWS

USQ: USQ GCX No: N/A per CPCC-PRO-NS-062 Section 1.3 Not Required

H2139501 - PATRICK J BARNES 9/22/2025 1:45:12 PM

Reviewer Print Name Signature Date

Environmental: NEPA Screened Ref: DOE/CX-00073 Not Required

H0363424 - STEWART A MCMAHAND 9/22/2025 1:50:59 PM

ECO Print Name Signature Date

8.0 APPROVALS and DISTRIBUTION

Approvals

H9875363 - YANETH VALENCIA 9/24/2025 5:44:36 AM

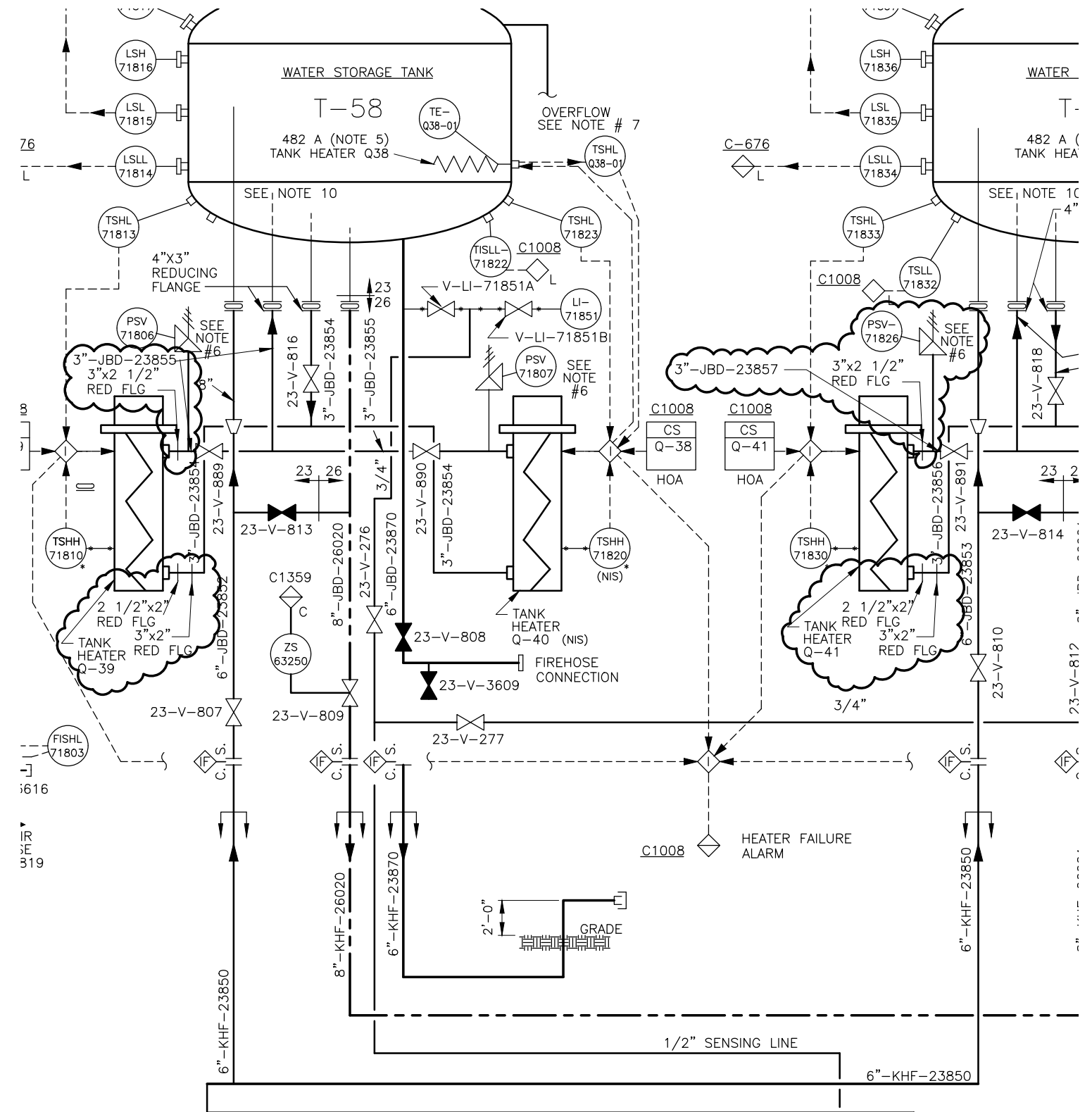
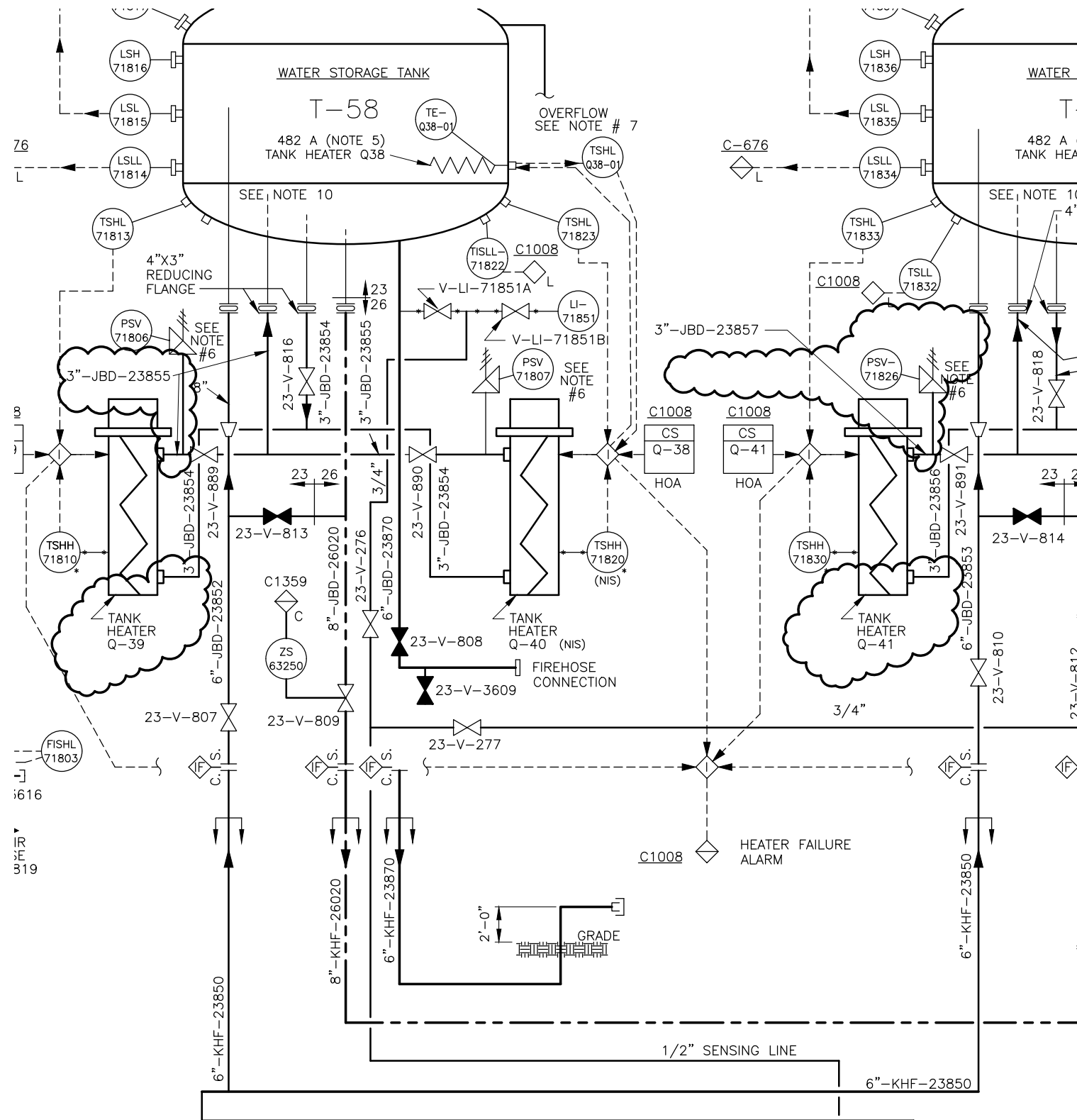
EP Author: Print Name Signature Date

H2139501 - PATRICK J BARNES 9/23/2025 4:05:33 PM

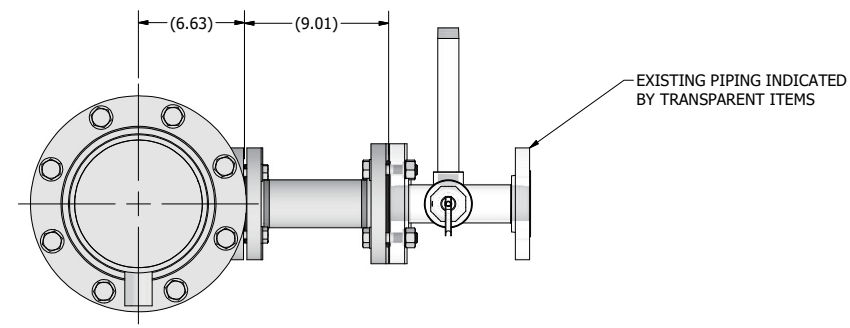
Design Authority: Print Name	Signature	Date
<u>H8948458 - PHILLIP A HARMON</u>		<u>9/24/2025 11:27:31 AM</u>
Engineering Manager: Print Name	Signature	Date
<input checked="" type="checkbox"/> <u>Not Required</u>		
<u>DOE Number:</u>		
DOE Approval: Print Name	Signature	Date
<u>H3297525 - BRANDON J HAYDEN</u>		<u>9/24/2025 11:05:20 AM</u>
Title: Electrical Engineer Print Name	Signature	Date
Title: Print Name N/A	Signature	Date
Title: Print Name	Signature	Date
Title: Print Name	Signature	Date
Title: Print Name	Signature	Date
Distribution		
HID	Name	
H0386002	Dana F Miller	
H2139501	Patrick J Barnes	
H9875363	Yaneth Valencia	
H0363424	Stewart A McMahand	
H0036297	Cory W Reeves	
H8948458	Phillip A Harmon	
H3297525	Brandon J Hayden	

WAS: ZONE E6

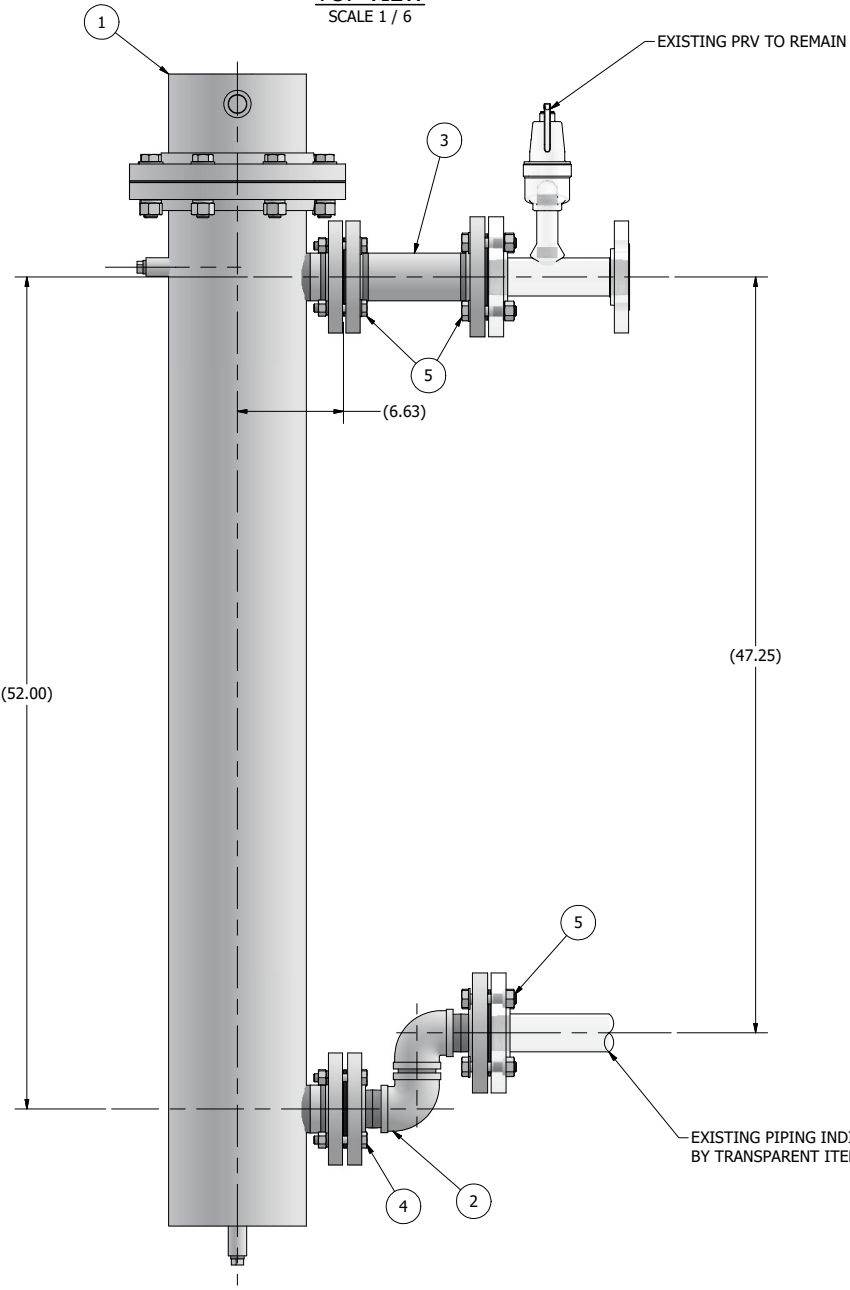
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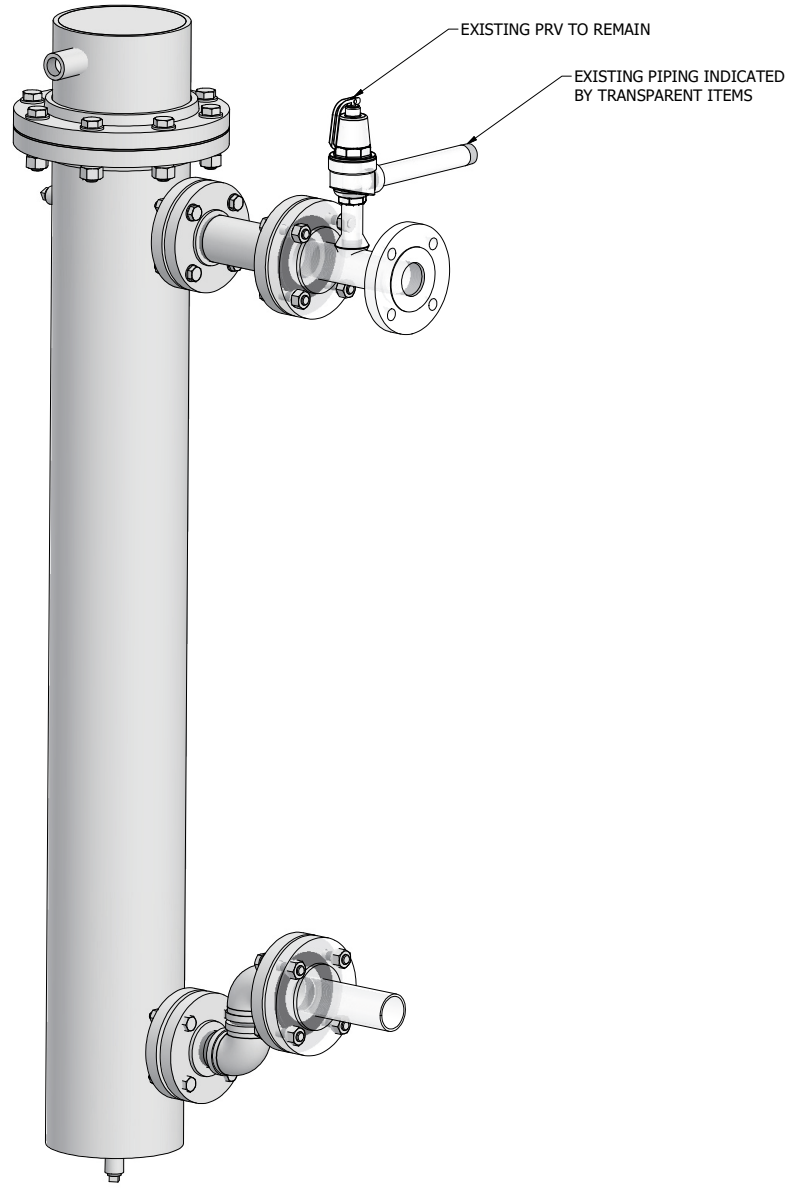
ITEM	QTY	DESCRIPTION	PARTS LIST	
			MATERIAL	PART NUMBER
1	1	ASSEMBLY, CIRCULATION HEATER, WATER	-	WATLOW CFPN750R5XS
2	1	ASSEMBLY, PIPE SPOOL, THREADED, BOTTOM	316/316L SST	SEE SHEET 2
3	1	ASSEMBLY, PIPE SPOOL, THREADED, TOP	316/316L SST	SEE SHEET 2
4	4	ASSEMBLY, BOLTED, 1/2 INCH x 3in LONG	ASTM A193, A962 316/316L, 18-8 SST	-
4-1	1	BOLT, HEX, HEAVY 1/2-13 UNC-2A x 3in LONG	ASTM GRADE B8, A193, A962 316/316L SST	1/2-13 UNC x 3IN LONG McMASTER-CARR 92790A248 OR ENG APP EQ
4-2	1	WASHER, PLAIN, 1/2 INCH TYPE B	ASME B18.21.1, 18-8 SST	1/2IN NARROW -TYPE B McMASTER-CARR 92217A540 OR ENG APP EQ
4-3	1	WASHER, LOCK, HELICAL SPRING, 1/2 INCH	ASME B18.21.1, 18-8 SST	1/2IN McMASTER-CARR 92146A033 OR ENG APP EQ
4-4	1	NUT, HEX, HEAVY 1/2-13 UNC-2B	ASTM GRADE 8M, A194 316/316L SST	1/2 - 13UNC, McMASTER-CARR 97619A440 OR ENG APP EQ
5	12	ASSEMBLY, BOLTED, 5/8 INCH x 3in LONG	ASTM A193, A962 316/316L, 18-8 SST	-
5-1	1	BOLT, HEX, HEAVY 5/8-11 UNC-2A x 3in LONG	ASTM GRADE B8, A193, A962 316/316L SST	5/8-11 UNC x 3IN LONG McMASTER-CARR 92790A356 OR ENG APP EQ
5-2	1	WASHER, PLAIN, 5/8 INCH TYPE B	ASME B18.21.1, 18-8 SST	5/8IN NARROW -TYPE B McMASTER-CARR 92217A199 OR ENG APP EQ
5-3	1	WASHER, LOCK, HELICAL SPRING, 5/8 INCH	ASME B18.21.1, 18-8 SST	5/8IN McMASTER-CARR 91007A676 OR ENG APP EQ
5-4	1	NUT, HEX, HEAVY 5/8-11 UNC-2B	ASTM GRADE 8M, A194 316/316L SST	5/8-11UNC, McMASTER-CARR 97619A550 OR ENG APP EQ



TOP VIEW
SCALE 1 / 6



FRONT VIEW
SCALE 1 / 6



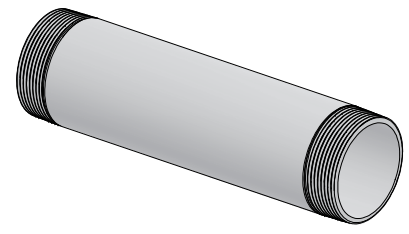
ISOMETRIC VIEW
SCALE 1 / 6

CIRCULATION HEATER ASSEMBLY (2 REQ'D)

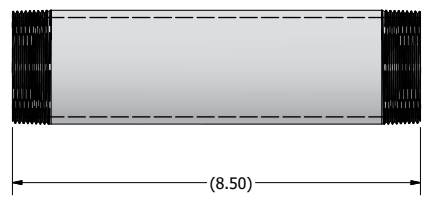
NOTE:
SEE SHEET 2 FOR SPOOL PARTS AND DETAILS

DRAWN CW REEVES	8/11/2025	TITLE ECR-25-000862
CHECKED Y VALENCIA	8/12/2025	
QA		CIRCULATION HEATER ASSEMBLY DETAILS
MFG		
APPROVED		SIZE D
		DWG NO Sketch02
		REV 0
		SCALE SHOWN
		SHEET 1 OF 2

ITEM	QTY	DESCRIPTION	MATERIAL	PART NUMBER
1	2	ELBOW, 90DEG, 2IN FNPT	ASTM A351 CLASS 150 316/316L SST	McMASTER-CARR 4452K419 OR ENGINEERING APPROVED EQUAL
2	1	FLANGE, 2 1/2IN FNPT	ASME B16.5 CLASS 150 316/316L SST	McMASTER-CARR 44695K17 OR ENGINEERING APPROVED EQUAL
3	1	FLANGE, REDUCING, 2 1/2IN TO 2IN FNPT	ASME B16.5 CLASS 150 316/316L SST	McMASTER-CARR 44695K268 OR ENGINEERING APPROVED EQUAL
4	1	FLANGE, REDUCING, 3IN TO 2 1/2IN FNPT	ASME B16.5 CLASS 150 316/316L SST	McMASTER-CARR 44685K244 OR ENGINEERING APPROVED EQUAL
5	1	FLANGE, REDUCING, 3IN TO 2IN FNPT	ASME B16.5 CLASS 150 316/316L SST	McMASTER-CARR 44695K145 OR ENGINEERING APPROVED EQUAL
6	2	GASKET, WATER RESISTANT, 2 1/2IN FLANGE	PLAIN, ANSI CLASS 150 ARAMID REINFORCED SBR	McMASTER-CARR 4459K76 OR ENGINEERING APPROVED EQUAL
7	2	GASKET, WATER RESISTANT, 3IN FLANGE	PLAIN, ANSI CLASS 150 ARAMID REINFORCED SBR	McMASTER-CARR 4459K77 OR ENGINEERING APPROVED EQUAL
8	1	NIPPLE, 2 1/2IN NPT EA END, MODIFIED TO 8 1/2IN LONG	ASTM A733, ASME B1.20.1CLASS 150 316/316L SST	McMASTER-CARR 4548K255 OR ENGINEERING APPROVED EQUAL
9	2	NIPPLE, CLOSE, 2IN NPT	ASTM A733, ASME B1.20.1CLASS 150 316/316L SST	McMASTER-CARR 4548K281 OR ENGINEERING APPROVED EQUAL
10	1	NIPPLE, CLOSE, 2IN NPT, MODIFIED TO 1 3/4IN LG	ASTM A733, ASME B1.20.1CLASS 150 316/316L SST	McMASTER-CARR 4548K281 OR ENGINEERING APPROVED EQUAL



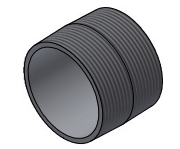
ISOMETRIC VIEW
SCALE 1 / 2



FRONT VIEW
SCALE 1 / 2



END VIEW
SCALE 1 / 2



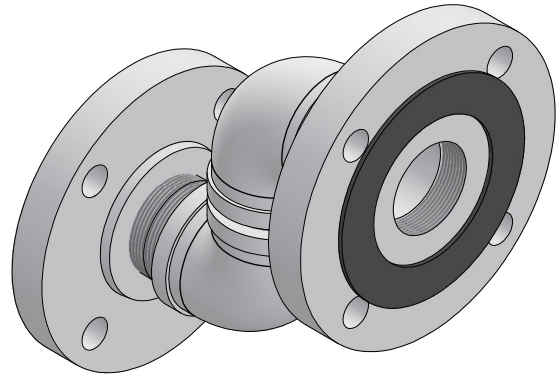
ISOMETRIC VIEW
SCALE 1 / 2



FRONT VIEW
SCALE 1 / 2

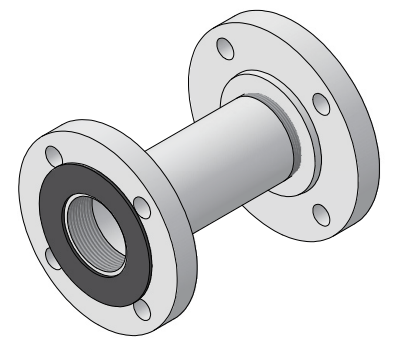


END VIEW
SCALE 1 / 2



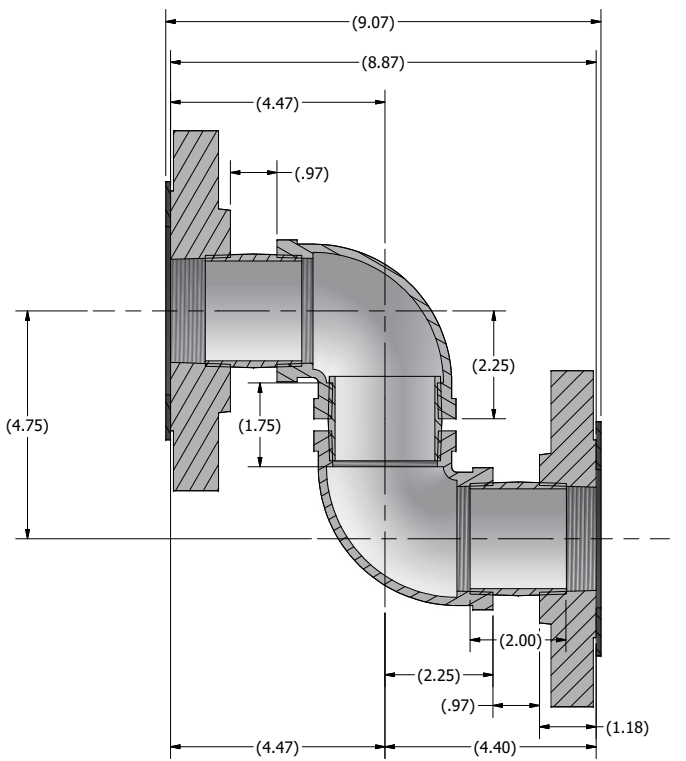
ISOMETRIC VIEW
SCALE 1 / 2

8 MODIFIED PIPE NIPPLE
SHT 2

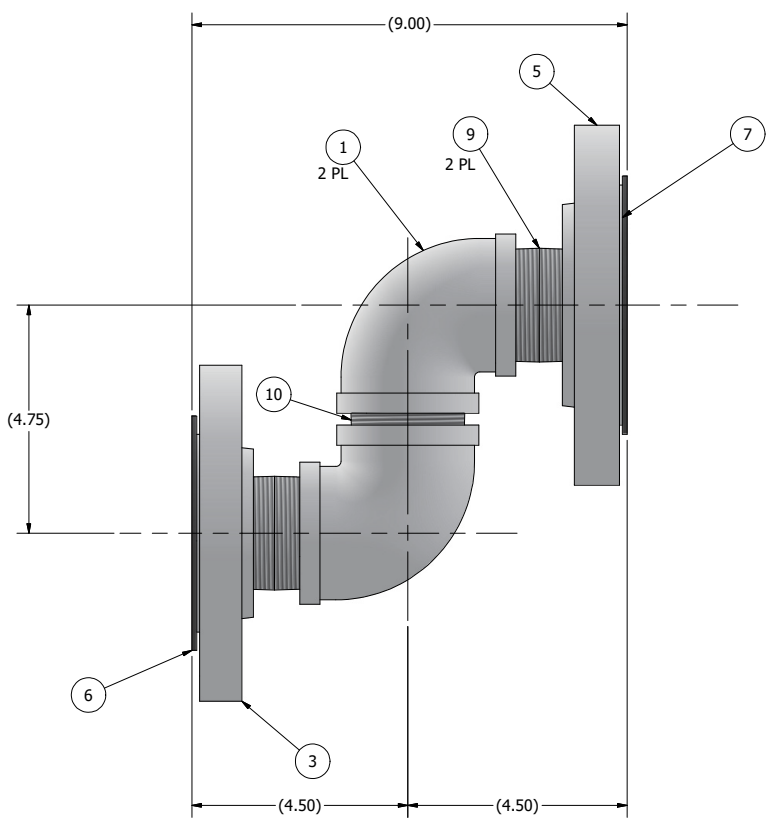


ISOMETRIC VIEW
SCALE 1 / 3

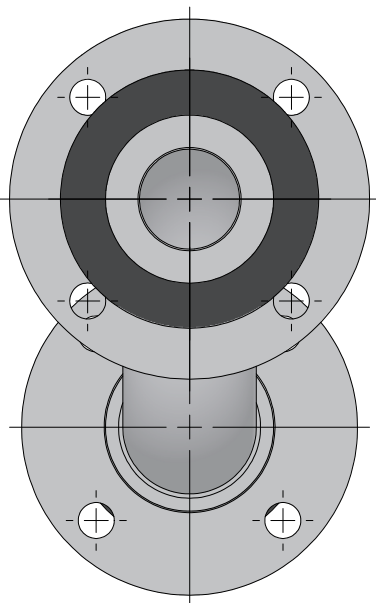
10 MODIFIED CLOSE NIPPLE
SHT 2



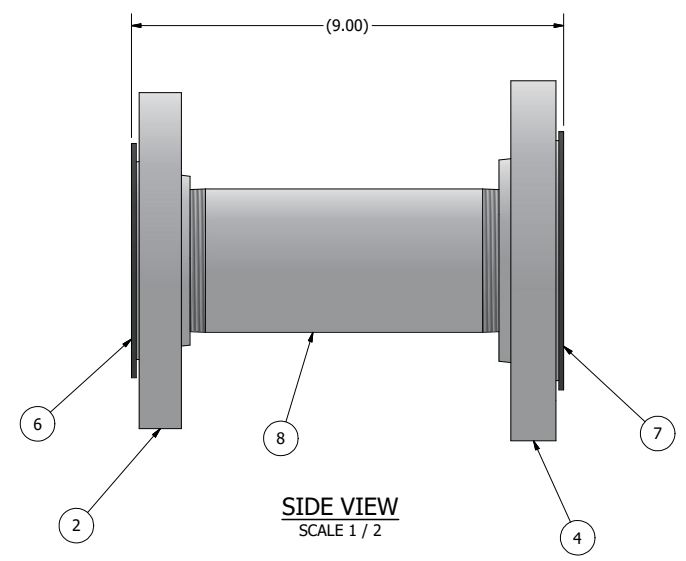
SECTION A-A
SCALE 1 / 2



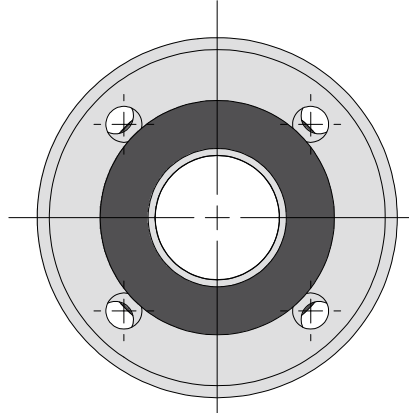
SIDE VIEW
SCALE 1 / 2



END VIEW
SCALE 1 / 2



SIDE VIEW
SCALE 1 / 2



END VIEW
SCALE 1 / 2

NOTE:
SEE SHEET 1 FOR ASSEMBLY AND DETAILS

2 PIPE SPOOL THREADED BOTTOM ASSEMBLY
SHT 1

3 PIPE SPOOL THREADED TOP ASSEMBLY
SHT 1

DRAWN CW REEVES	8/11/2025	TITLE ECR-25-000862
CHECKED Y VALENCIA	8/12/2025	
QA		
MFG		
APPROVED		TITLE CIRCULATION HEATER ASSEMBLY DETAILS
		SIZE D
		DWG NO Sketch02
		REV 0
		SCALE SHOWN
		SHEET 2 OF 2

Central Plateau Cleanup Company (CPCCo)
DESIGN VERIFICATION RECORD

SECTION 1:

Document/Package To Be Verified:

ECR-25-000862 Rev 00 - Replace 400A Water Tank Heaters Q39 and Q41

Design Originator: Yaneth Valencia

Scope: All

Safety Class

Safety Significant

General Service

Peer (*Independent*) Review

Alternate Calculation

Qualification Testing

Formal Design Review

SECTION 2: (To Be Completed by Design Verifier)

Results of Verification:

DESCRIPTION	YES	NO	N/A*
Are the Functional Requirements, Design Criteria, inputs and assumptions appropriately selected?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reviewed Documents/Comments: New heaters required to meet NFPA 22.16.1.2. Replacement heaters need to fit in the location of current equipment. Piping assembly required to accommodate dimensional differences. Replacement heaters provide heating capability of the current heaters (when they were operable). No assumptions.			
Are assumptions necessary to perform the design activity adequately described and reasonable?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Reviewed Documents/Comments: No assumptions necessary.			
Does the design meet the stated assumption, functions, requirements, and design criteria?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reviewed Documents/Comments: Installation drawings/sketches show the replacement heaters are capable of fitting in the location of the current heaters. Heater replacements meet requirements and design criteria.			
Where necessary, are the assumptions that require subsequent re-verifications when the detailed design activities are completed, identified?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Reviewed Documents/Comments: No assumptions needing verification.			
Are appropriate design methods and computer programs used?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reviewed Documents/Comments: Replacement heaters provide the necessary heating requirements. Sketch 02 provides design layout verifying heaters will fit in the allotted area or current heaters.			
Were the design inputs correctly incorporated into the design?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reviewed Documents/Comments: Yes. Replacement design provides appropriate heating capacity and proposed equipment physically fits in allotted area.			
Is the design output reasonable compared to design inputs?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reviewed Documents/Comments: Yes. Replacement design provides appropriate heating capacity and proposed equipment physically fits in allotted area.			
Are the necessary design input and verification requirements for interfacing organizations specified in the design document or in implementing documents?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Reviewed Documents/Comments: No design input or verification requirements for interfacing organizations.			

Central Plateau Cleanup Company (CPCCo)
DESIGN VERIFICATION RECORD (Continued)

DESCRIPTION	YES	NO	N/A*
Have suitable materials, parts, and processes, been specified?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reviewed Documents/Comments: Yes. Replacement design provides appropriate heating capacity and proposed equipment physically fits in allotted area. eBOMs have been initiated for the replacement parts and pieces. CIDs for pieces and parts have been initiated.			
Have suitable inspection, acceptance, and testing criteria been specified?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reviewed Documents/Comments: Yes. NEC Inspection and Leak testing of the assembly have been specified.			
Are all affected design documents identified and appropriately changes?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reviewed Documents/Comments: Physical modification affects H-4-11008, Rev 31. WAS/IS Sketch has been provided for the this essential drawing.			
Have constructibility, maintenance, and operability been adequately addressed in the design?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reviewed Documents/Comments: Yes. Design and layout provide appropriate heating capacity and proposed equipment physically fits in allotted area.			

***NOTE: All questions answered N/A shall have justification provided in the comments**

Comments, Errors, or Deficiencies Identified: Yes No

Verification Performed By: (Design Verifier/Review Chairman)

_____ Dana Miller

Print First and Last Name

Miller, Dana F

*Digitally signed by Miller, Dana F
Date: 2025.08.28 12:32:20 -07'00'*

Signature

SECTION 3: RESOLUTION

Resolution of Comments, Errors, or Deficiencies:

Resolution Provided By: NA

_____ *Print First and Last Name*

_____ *Signature*

Resolution Accepted By: NA

_____ *Print First and Last Name*

_____ *Signature*

Central Plateau Cleanup Company (CPCCo)
DESIGN VERIFICATION RECORD (Continued)