

DECONTAMINATION FACTORS

	<u>Iodine</u>	<u>Cesium & Rubidium</u>	<u>Other Nuclides</u>
1. Mixed Bed Demineralizers	10	2	10
2. Cation Bed Demineralizer	1	10	10
3. Reactor Coolant Filter	1	1	1
4. Volume Control Tank ^(a)	—	—	—
System DF	10	20	10 ²

(a) For noble gases, a value of 0.25 is built into the GALE code for the y parameter for the case of continuous VCT purging.

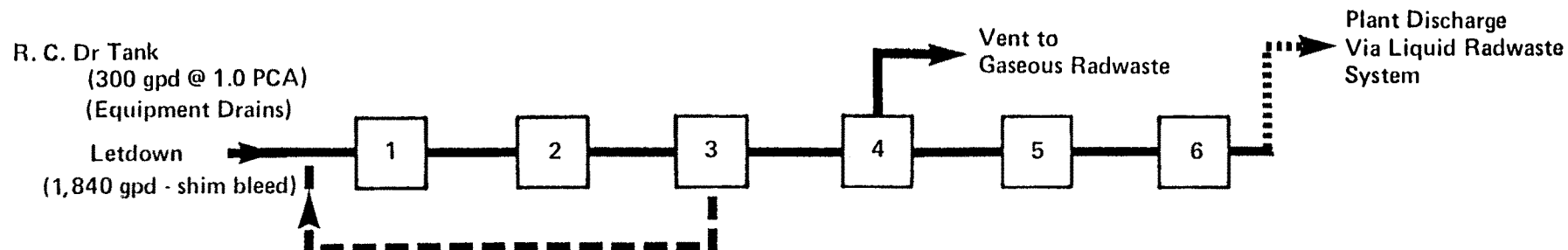
Chemical and Volume Control
System

CALLAWAY PLANT

Figure 11.1A-2
(Sheet 1)

System Decontamination
Factors

HISTORICAL



DECONTAMINATION FACTORS

	Iodine	Cesium & Rubidium	Other Nuclides
1. Recycle Evaporator Demineralizer (a)	10	2	10
2. Recycle Evaporator Feed Filter	1	1	1
3. Recycle Holdup Tank	—	—	—
4. Recycle Evaporator	10^2	10^3	10^3
5. Recycle Evaporator Condensate Demineralizer (b)			
Anion Bed	10^2	1	1
Mixed Bed	10	10	10
6. Recycle Evaporator Condensate Filter	1	1	1
System DF (with anion bed in item 5)	10^5	2×10^3	10^4
(with mixed bed in item 6)	10^4	2×10^4	10^5

Decay Time

Boron Recycle Holdup Tank #2, Collection Time

$$T_c = \frac{0.8 \times 56,000}{2,140} = 20.9 \text{ days}$$

Recycle Process Time

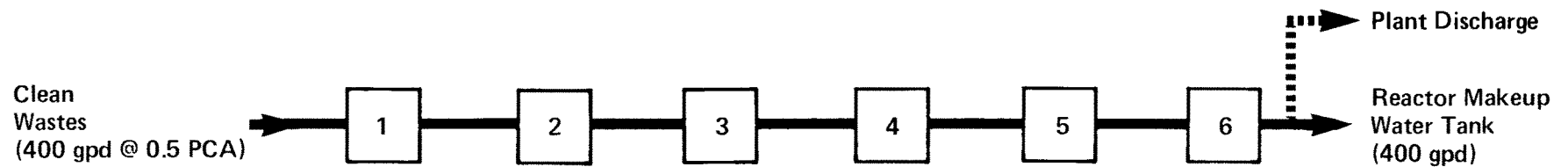
$$T_p = \frac{0.8 \times 56,000}{21,600} = 2 \text{ days}$$

Boron Recycle System

- a. Mixed Bed
b. Anion Bed or Mixed Bed Optional. See Chapter 11.0 of Each Site Addendum.

CALLAWAY PLANT
Figure 11.1A-2 (Sheet 2)
System Decontamination Factors

HISTORICAL



DECONTAMINATION FACTORS

	<u>Iodine</u>	<u>Cesium & Rubidium</u>	<u>Other Nuclides</u>
1. Waste Holdup Tank			
2. Waste Evaporator Feed Filter	1	1	1
3. Waste Evaporator	10^3	10^4	10^4
4. Liquid Waste Charcoal Adsorber	1	1	1
5. Waste Evaporator Condensate Demineralizer	10	10	10
6. Waste Evaporator Condensate Filter	<u>1</u>	<u>1</u>	<u>1</u>
System DF	10^4	10^5	10^5

Decay Time

Waste Holdup Tank #1
Collection Time

$$T_c = \frac{0.4 \times 10,000}{400} = 10 \text{ days}$$

Waste Process
Time

$$T_p = \frac{0.4 \times 10,000}{21,600} = 0.185 \text{ day}$$

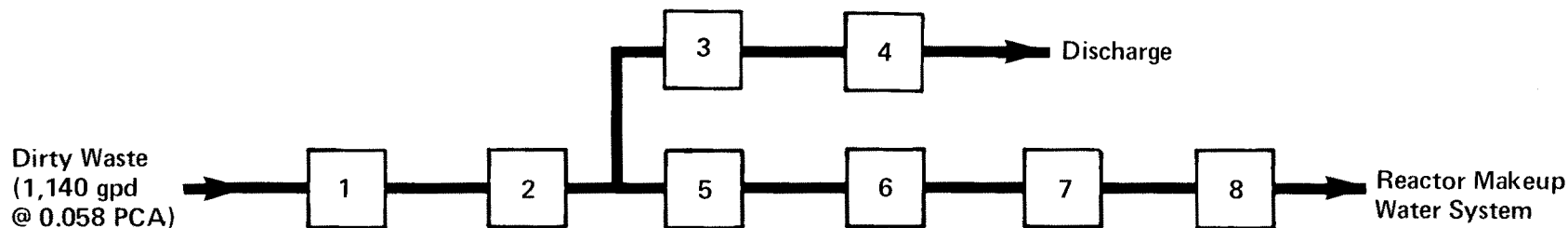
Liquid Radwaste
Train "A" - Clear Waste

CALLAWAY PLANT

Figure 11.1A-2
(Sheet 3)

System Decontamination Factors

HISTORICAL



DECONTAMINATION FACTORS

	<u>Iodine</u>	<u>Cesium & Rubidium</u>	<u>Other Nuclides</u>
1. Floor Drain Tank	—	—	—
2. Floor Drain Tank Filter	1	1	1
3. Waste Monitor Tank Demineralizer (a)	—	—	—
4. Waste Monitor Tank Filter (a)	1	1	1
5. Waste Evaporator (b)	10 ³	10 ⁴	10 ⁴
6. Liquid Waste Charcoal Adsorber	1	1	1
7. Waste Evaporator Condensate Demineralizer	10	10	10
8. Waste Evaporator Condensate Filter	<u>1</u>	<u>1</u>	<u>1</u>
System DF (c)	10 ⁴	10 ⁵	10 ⁵

Decay Times

Floor Drain Tank #2,
Collection Time

$$T_c = \frac{0.8 \times 10,000}{1,140} = 7 \text{ days}$$

Waste Processing Time

$$T_p = \frac{0.8 \times 10,000}{21,600} = 0.37 \text{ day}$$

a) Used only when influent activity < 10⁻⁵ μ Ci/cc

b) Used when influent activity \geq 10⁻⁵ μ Ci/cc

c) Assumes evaporator path

Liquid Radwaste
Train "B" - Dirty Waste

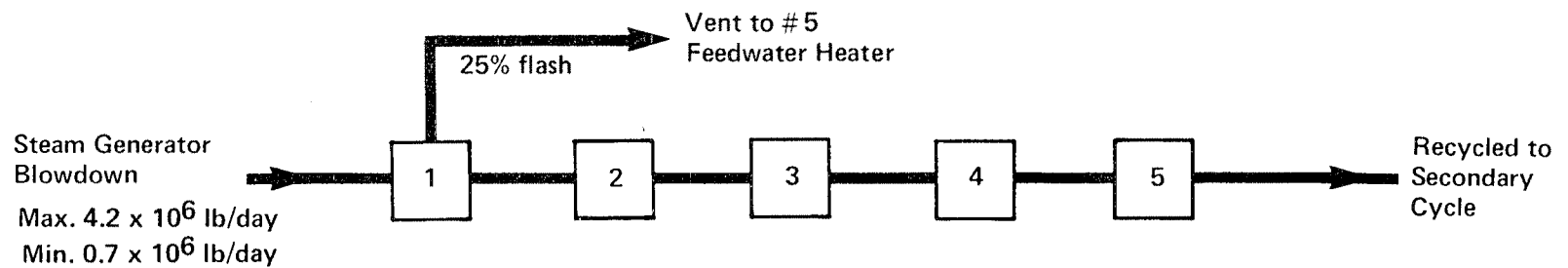
CALLAWAY PLANT

Figure 11.1A-2
(Sheet 4)

System Decontamination Factors

HISTORICAL

Figure 11.1A-2 Sheet 5 is deleted.



DECONTAMINATION FACTORS

	<u>Iodine</u>	<u>Cesium & Rubidium</u>	<u>Other Nuclides</u>
1. Steam Generator Blowdown Flashtank	—	—	—
2. Steam Generator Blowdown Regenerative Heat Exchanger	—	—	—
3. S.G. Blowdown Nonregenerative Heat Exchanger	—	—	—
4. S.G. Blowdown Filters	1	1	1
5. S.G. Blowdown Demineralizers	<u>10²(10)</u>	<u>10(10)</u>	<u>10²(10)</u>
System DF	10 ³	10 ²	10 ³

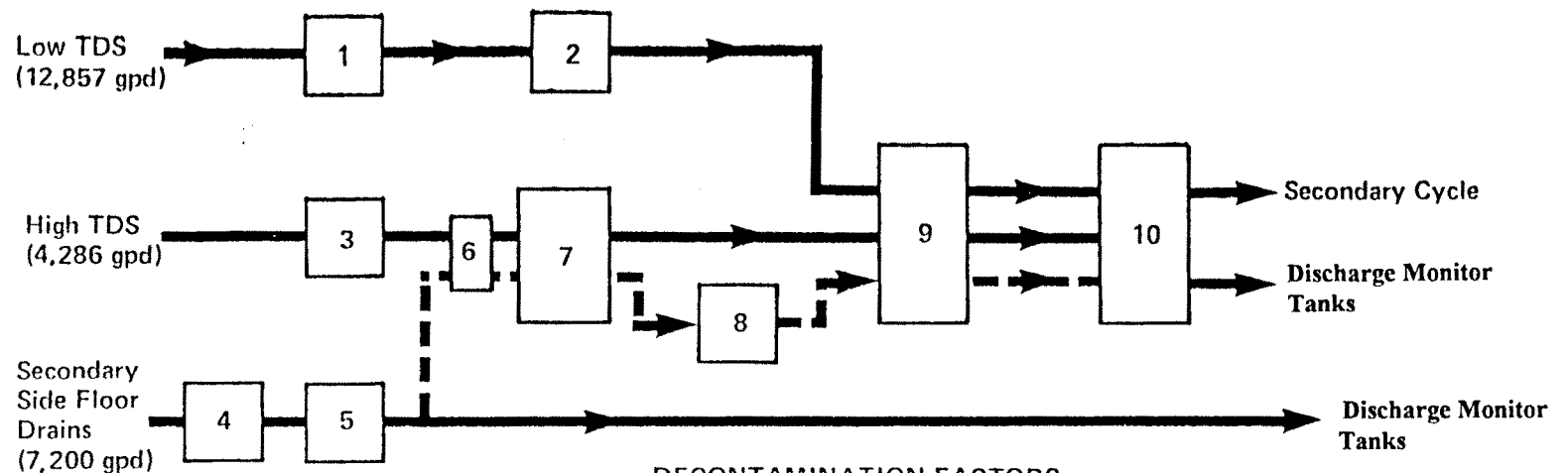
Steam Generator
Blowdown

CALLAWAY PLANT

Figure 11.1A-2
(Sheet 6)

System Decontamination Factors

HISTORICAL



DECONTAMINATION FACTORS

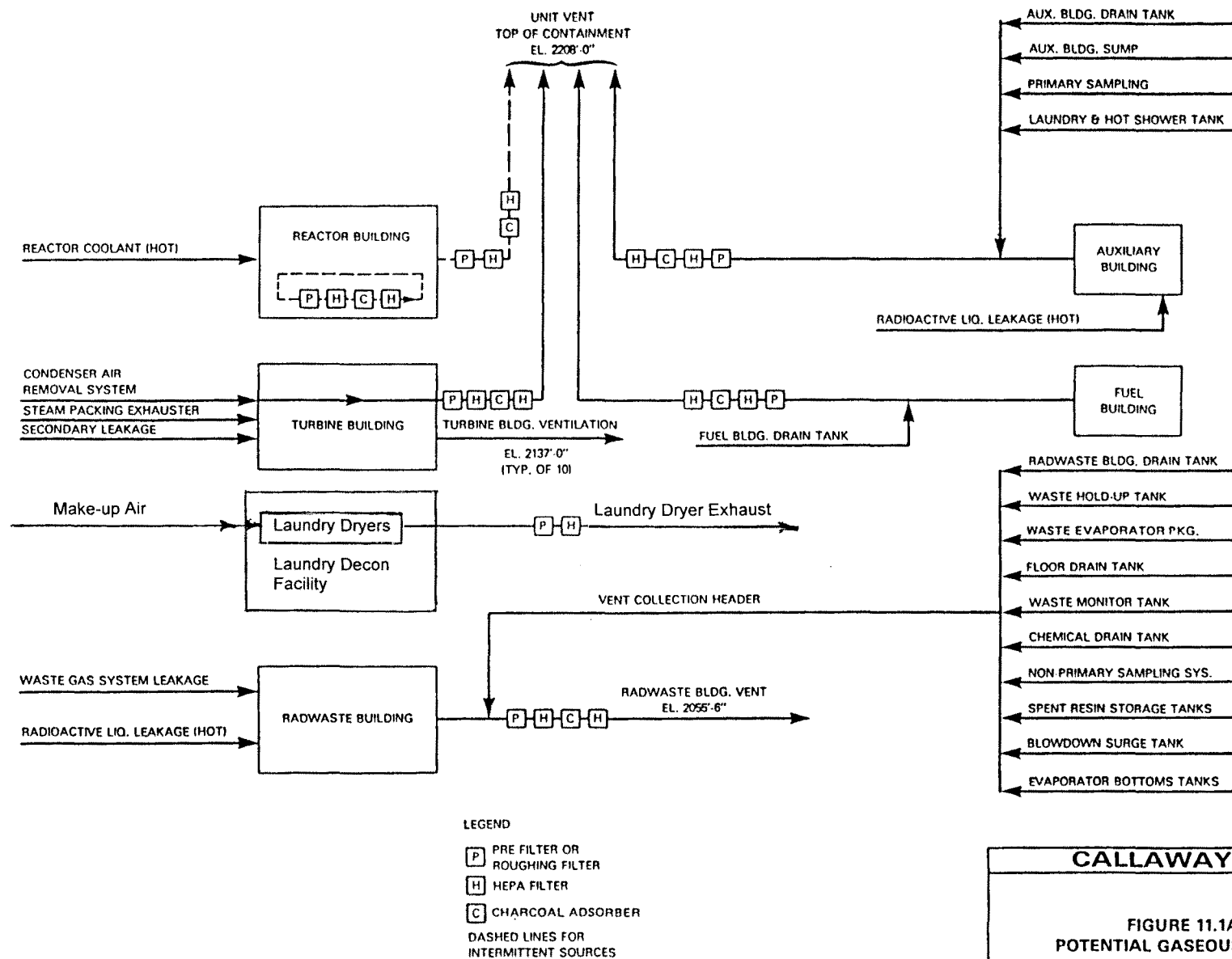
	<u>Iodine</u>	<u>Cesium & Rubidium</u>	<u>Other Nuclides</u>
1. Low TDS Collector Tank	—	—	—
2. Low TDS Filter	1	1	1
3. High TDS Collector Tank	—	—	—
4. Oil Interceptor	—	—	—
5. SLW Drain Collector Tank	—	—	—
6. SLW Filter	1	1	1
7. SLW Evaporator (available only for high TDS)	10^3	10^4	10^4
8. SLW Charcoal Adsorber	—	—	—
9. SLW Demineralizer (C)	$10(10^2)$	$10(2)$	$10(10^2)$
10. SLW Monitor Tank (Low TDS)	—	—	—
System DF - High TDS	10^4	10^5	10^5
Low TDS	10^2	2	10^2

Secondary Liquid
Waste System

- (a) Processing will be subject to chemistry requirements.
 (b) No credit is taken for collection and processing times.
 (c) Second number indicates Low TDS DF.

CALLAWAY PLANT
Figure 11.1A-2 (Sheet 7)
System Decontamination Factors

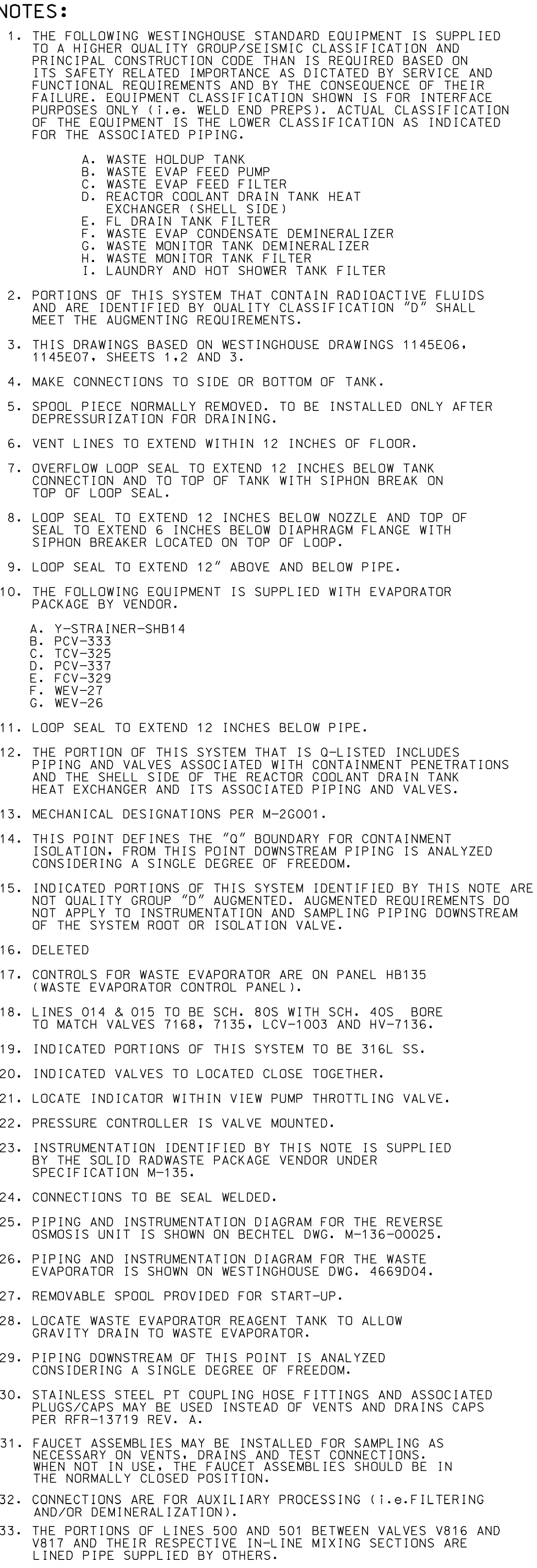
HISTORICAL



CALLAWAY PLANT

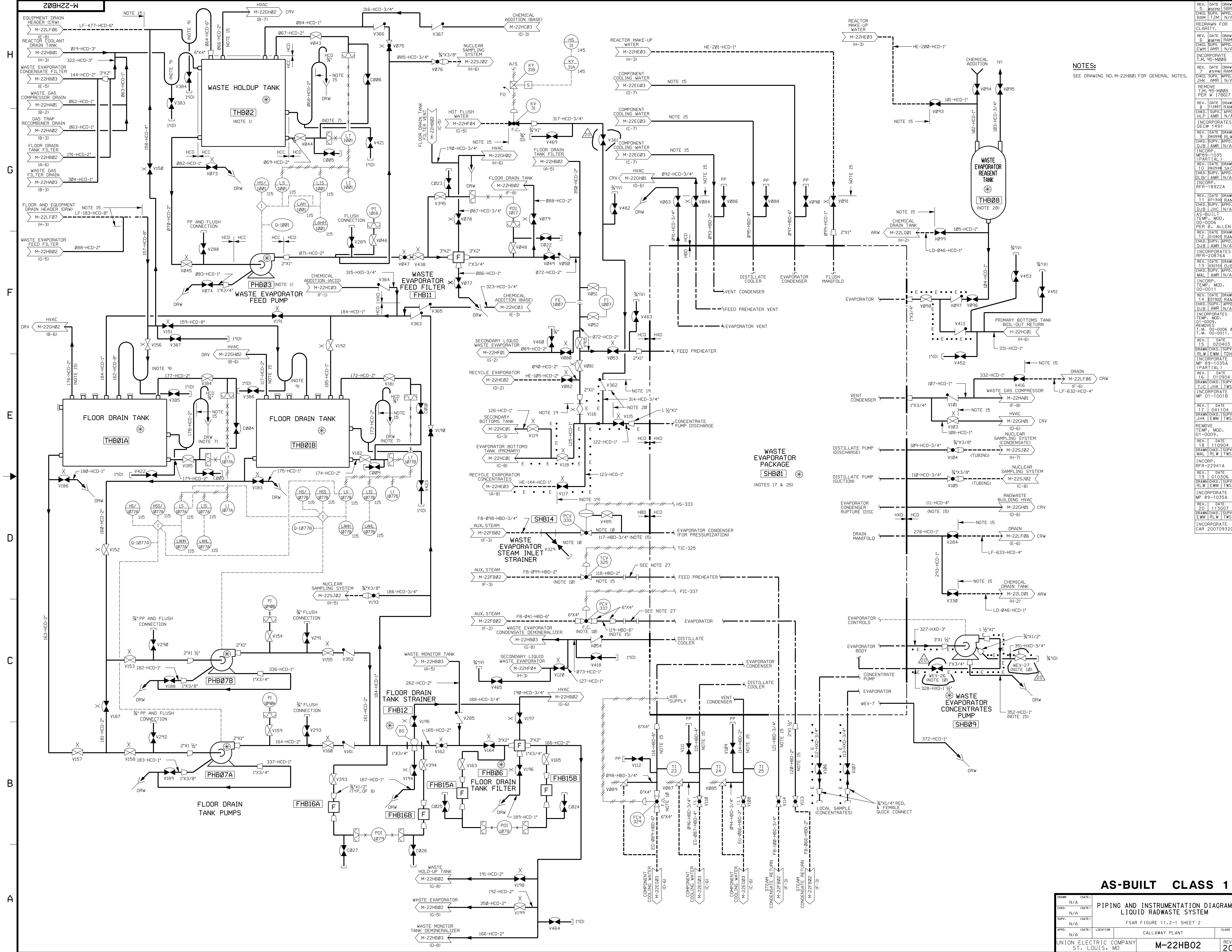
FIGURE 11.1A-3
POTENTIAL GASEOUS RELEASE

HISTORICAL



REV. DATE
36 111105
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RLW EWM LMR
INCORPORATE
MP 89-1035A
(PARTIAL)
REV. DATE
36 050707
DRAIN CHKD, SUPV.
RLW EWM SKC
INCORPORATE
MP 89-1035A
(PARTIAL)
REV. DATE
36 040407
DRAIN CHKD, SUPV.
RLW EWM TWS
INCORPORATE
MP 89-1035A
(PARTIAL)
REV. DATE
36 020108
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RLW EWM TWS
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MP 89-1035A
(PARTIAL)
REV. DATE
36 122908
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RLW EWM LMR
INCORPORATE
MP 89-1035A
(PARTIAL)
REV. DATE
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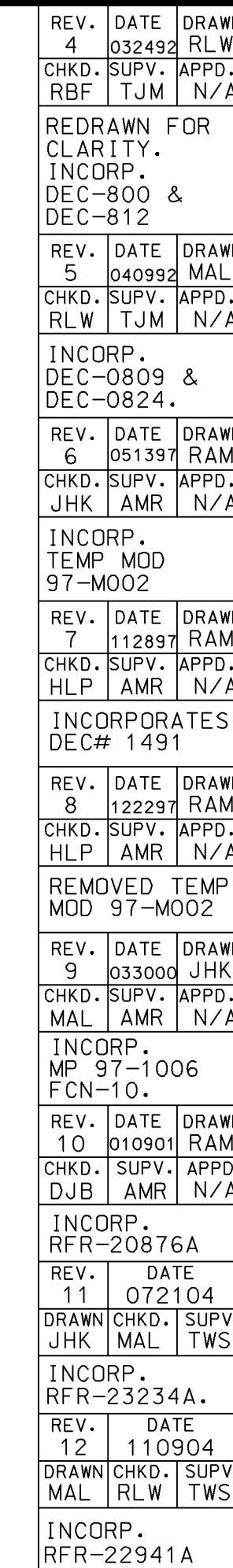
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N/A							
CHEK.	(DATE)						
N/A							
SUPV.	(DATE)						
N/A							
APPD.	(DATE)	LOCATION	CALLAWAY PLANT				CLASS
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UNION ELECTRIC COMPANY ST. LOUIS, MO			M-22HB01(Q)				REV. 39



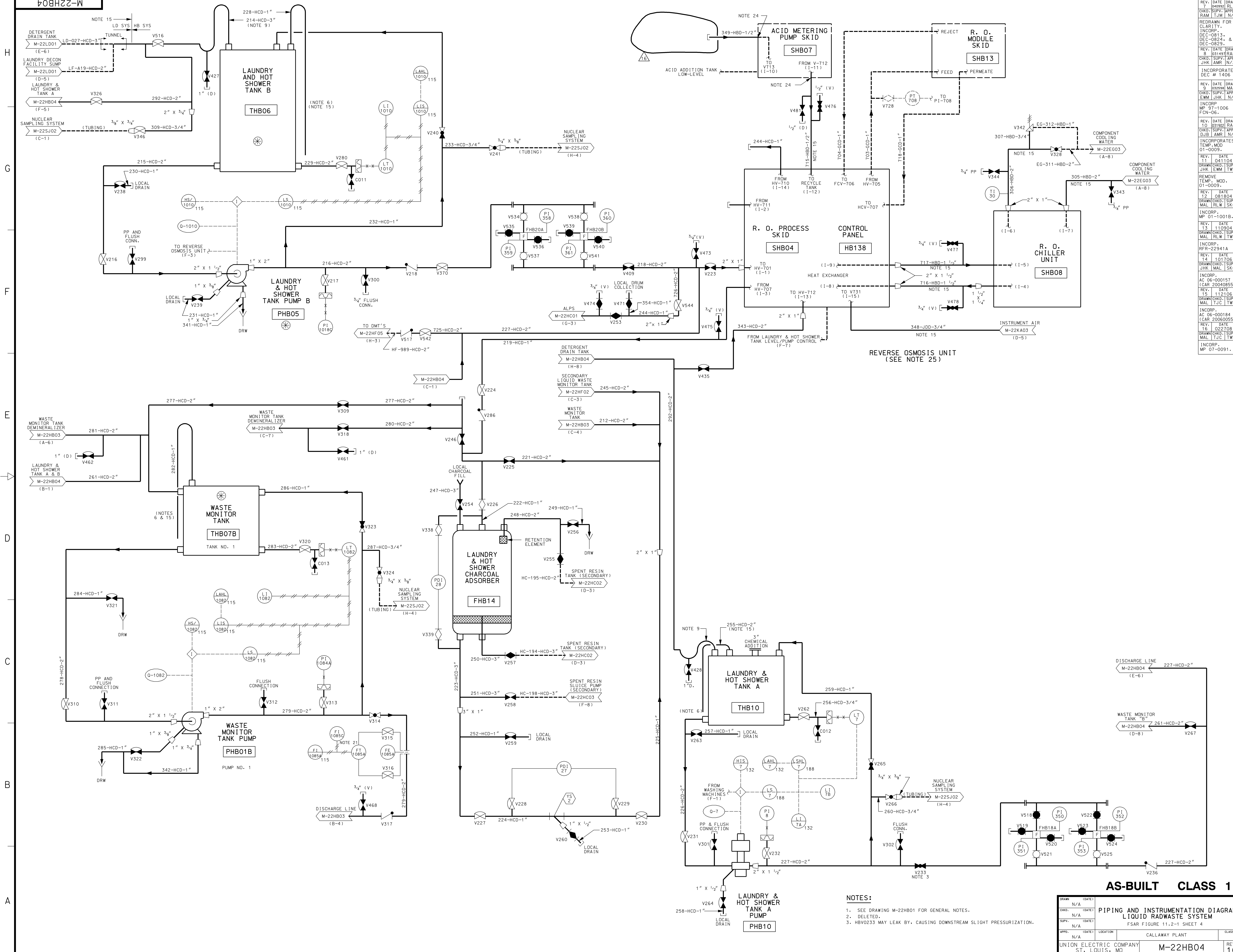
NOTES:
SEE DRAWING NO. M-22HB01 FOR GENERAL NOTES.

AS-BUILT CLASS 1

DRAWING INFORMATION				PROJECT INFORMATION			
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CHKD.	N/A	DATE		LIQUID RADWASTE SYSTEM			
SUPV.	N/A	DATE		FSAR FIGURE 11.2-1 SHEET 2			
APPD.	N/A	DATE		CALLAWAY PLANT			
UNION ELECTRIC COMPANY ST. LOUIS, MO				M-22HB02		REV.	20

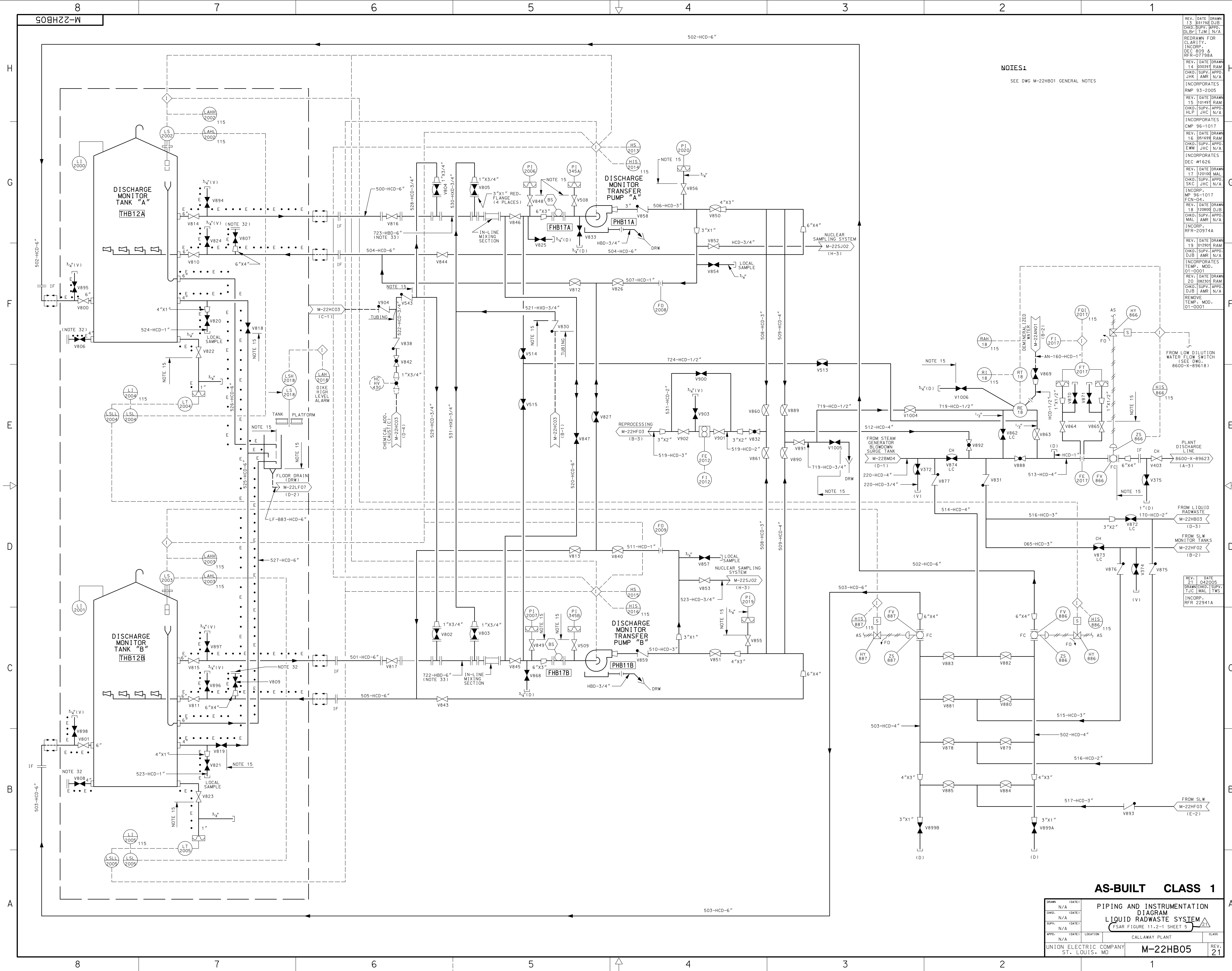


DESIGN	N/A		PIPING & INSTRUMENTATION DIAGRAM LIQUID RADWASTE SYSTEM <div style="border: 1px solid black; border-radius: 50%; padding: 5px; display: inline-block;"> FSAR FIGURE 11.2-1 SHEET 3 </div> <div style="border: 1px solid black; border-radius: 50%; padding: 5px; display: inline-block; margin-left: 20px;"> 12 </div>		
CHKD.	N/A				
SUPV.	N/A				
APPR.	N/A				
	LOCATION	CALLAWAY PLANT			CLASS
UNION ELECTRIC COMPANY ST. LOUIS, MO			M-22HB03		REV 12



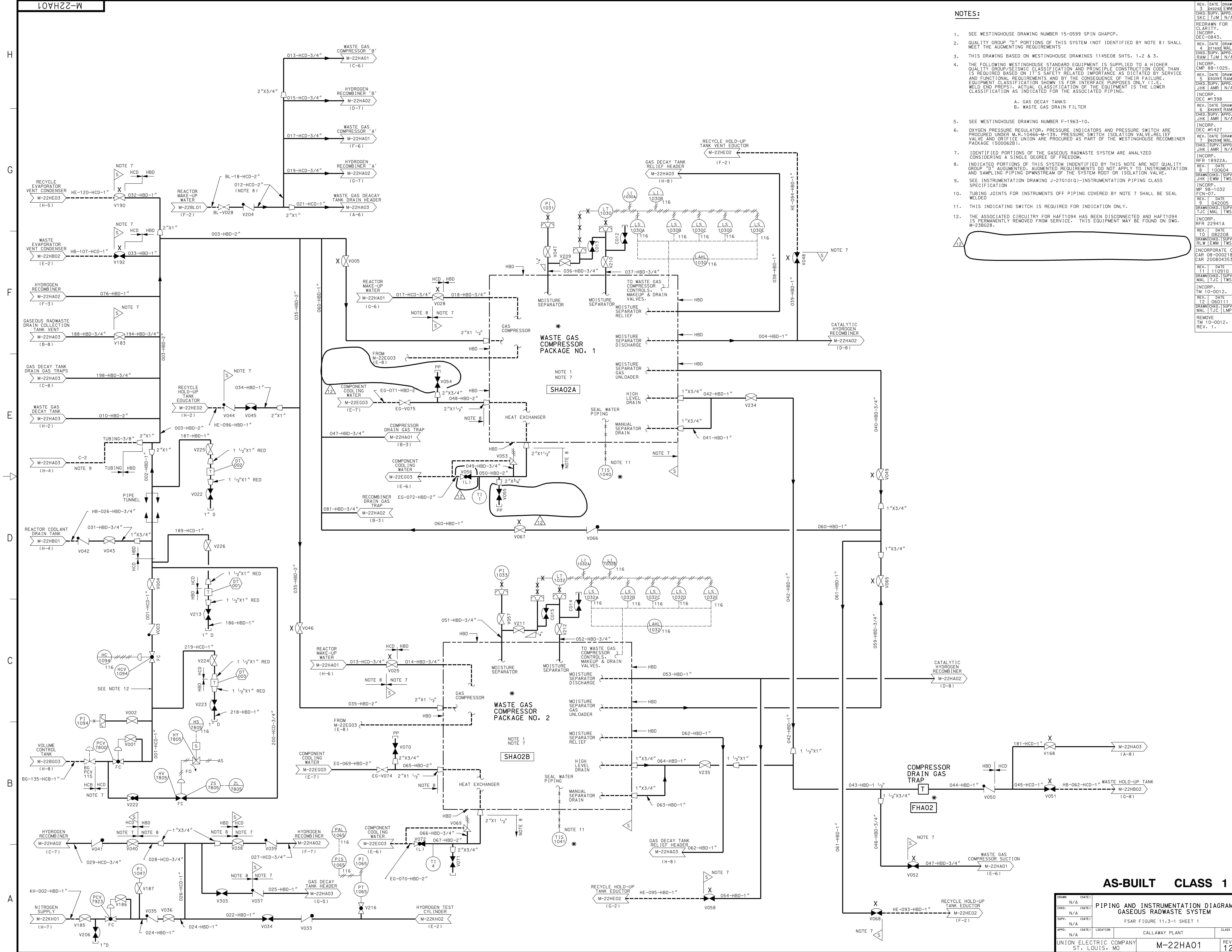
NOTES:
1. SEE DRAWING M-22HB01 FOR GENERAL NOTES.
2. DELETED.
3. HBV0233 MAY LEAK BY, CAUSING DOWNSTREAM SLIGHT PRESSURIZATION.

AS-BUILT CLASS 1				PIPING AND INSTRUMENTATION DIAGRAM			
LIQUID RADWASTE SYSTEM				FSAR FIGURE 11.2-1 SHEET 4			
DRWN	N/A	DATE		APPD	N/A	LOCATION	CALLAWAY PLANT
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ST. LOUIS, MO							



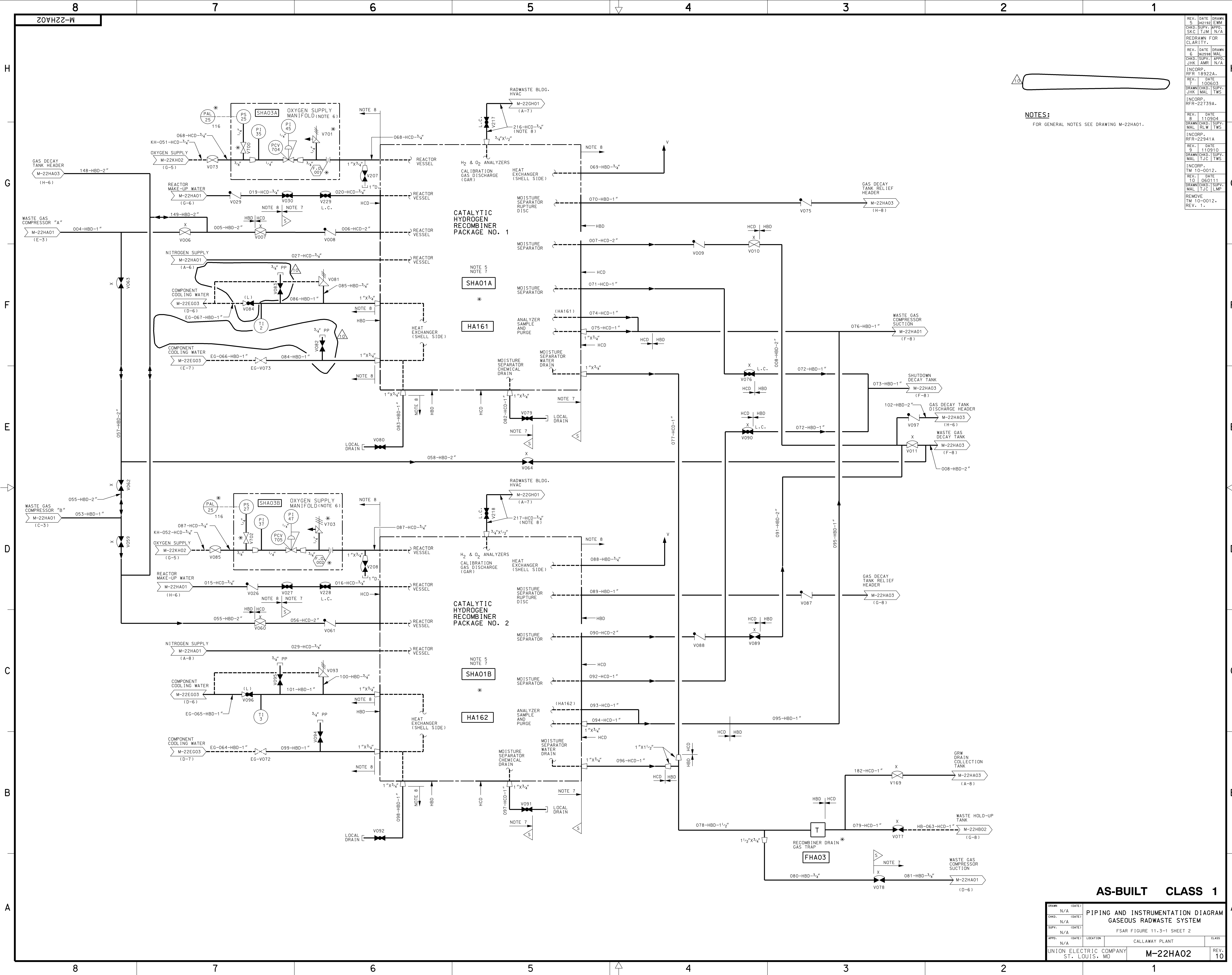
NOTES:
SEE DWG M-22HB01 GENERAL NOTES

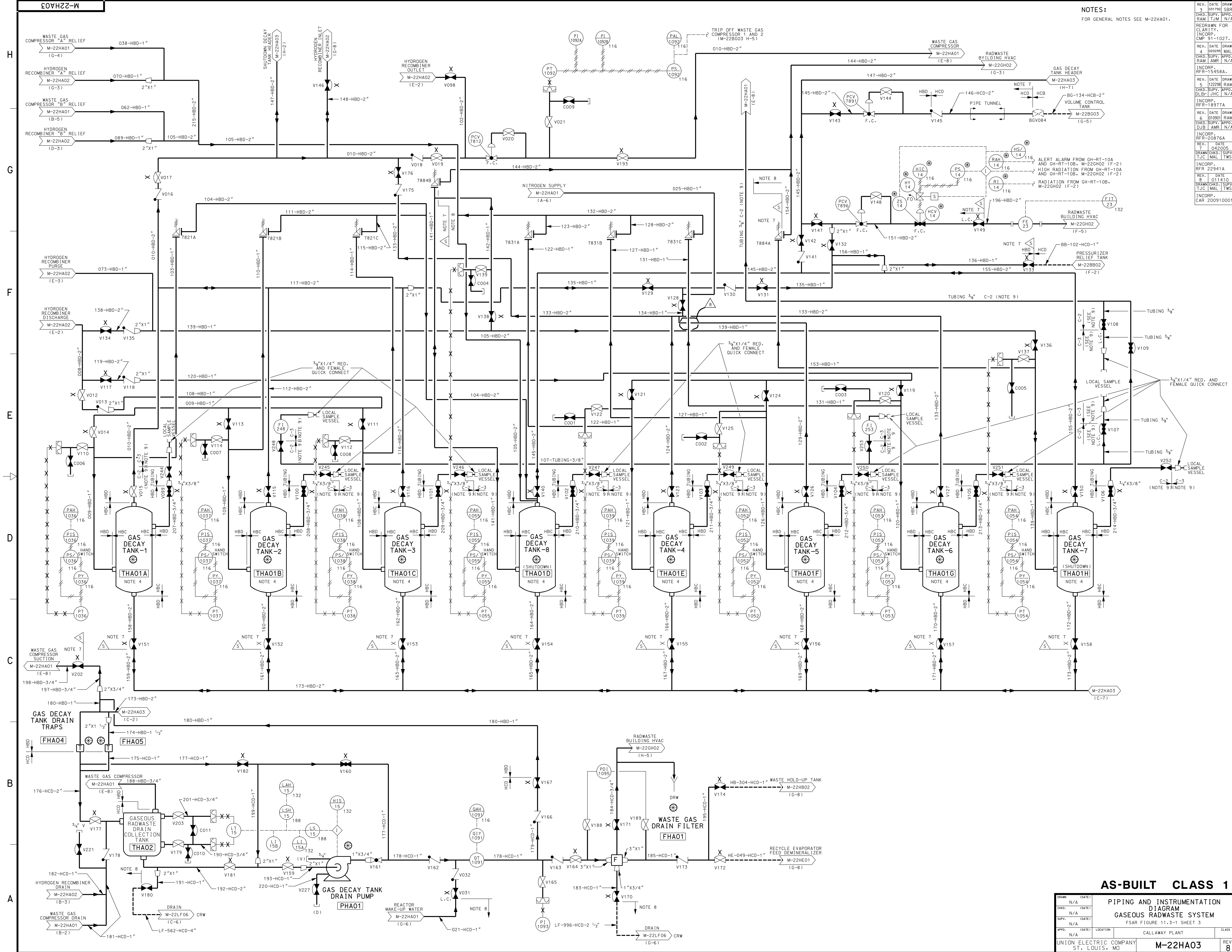
AS-BUILT CLASS 1			
PIPING AND INSTRUMENTATION DIAGRAM			
LIQUID RADWASTE SYSTEM			
FSAR FIGURE 11.2-1 SHEET 5			
UNION ELECTRIC COMPANY ST. LOUIS, MO	M-22HB05		REV. 21



- NOTES:
- SEE WESTINGHOUSE DRAWING NUMBER 15-0599 SPIN GHAPCP.
 - QUALITY GROUP "D" PORTIONS OF THIS SYSTEM (NOT IDENTIFIED BY NOTE 8) SHALL MEET THE AUGMENTING REQUIREMENTS.
 - THIS DRAWING BASED ON WESTINGHOUSE DRAWINGS 1145E08 SHTS. 1,2 & 3.
 - THE FOLLOWING WESTINGHOUSE STANDARD EQUIPMENT IS SUPPLIED TO A HIGHER QUALITY GROUP/SEISMIC CLASSIFICATION AND PRINCIPLE CONSTRUCTION CODE THAN IS REQUIRED BASED ON IT'S SAFETY RELATED IMPORTANCE AS DICTATED BY SERVICE AND FUNCTIONAL REQUIREMENTS AND BY THE CONSEQUENCE OF THEIR FAILURE. EQUIPMENT CLASSIFICATION SHOWN IS FOR INTERFACE PURPOSES ONLY (I.E. WELD END PREPS). ACTUAL CLASSIFICATION OF THE EQUIPMENT IS THE LOWER CLASSIFICATION AS INDICATED FOR THE ASSOCIATED PIPING.
 - A. GAS DECAY TANKS
 - B. WASTE GAS DRAIN FILTER
 - SEE WESTINGHOUSE DRAWING NUMBER F-1963-10.
 - OXYGEN PRESSURE REGULATOR, PRESSURE INDICATORS AND PRESSURE SWITCH ARE PROCURED UNDER M.R.10466-M-139. PRESSURE SWITCH ISOLATION VALVE,RELIEF VALVE AND ORIFICE UNION ARE PROCURED AS PART OF THE WESTINGHOUSE RECOMBINER PACKAGE (500062B).
 - IDENTIFIED PORTIONS OF THE GASEOUS RADWASTE SYSTEM ARE ANALYZED CONSIDERING A SINGLE DEGREE OF FREEDOM.
 - INDICATED PORTIONS OF THIS SYSTEM IDENTIFIED BY THIS NOTE ARE NOT QUALITY GROUP "D" AUGMENTED. AUGMENTED REQUIREMENTS DO NOT APPLY TO INSTRUMENTATION AND SAMPLING PIPING DOWNSTREAM OF THE SYSTEM ROOT OR ISOLATION VALVE.
 - SEE INSTRUMENTATION DRAWING J-27G10(Q)-INSTRUMENTATION PIPING CLASS SPECIFICATION
 - TUBING JOINTS FOR INSTRUMENTS OFF PIPING COVERED BY NOTE 7 SHALL BE SEAL WELDED
 - THIS INDICATING SWITCH IS REQUIRED FOR INDICATION ONLY.
 - THE ASSOCIATED CIRCUITRY FOR HAF1094 HAS BEEN DISCONNECTED AND HAF1094 IS PERMANENTLY REMOVED FROM SERVICE. THIS EQUIPMENT MAY BE FOUND ON DWG. M-23B628.

AS-BUILT CLASS 1			
PIPING AND INSTRUMENTATION DIAGRAM			
GASEOUS RADWASTE SYSTEM			
FSAR FIGURE 11.3-1 SHEET 1			
DESIGN	N/A	DATE	
CHKD.	N/A	DATE	
SUPV.	N/A	DATE	
APPD.	N/A	LOCATION	CALLAWAY PLANT
UNION ELECTRIC COMPANY		M-22HA01	
ST. LOUIS, MO		REV. 12	



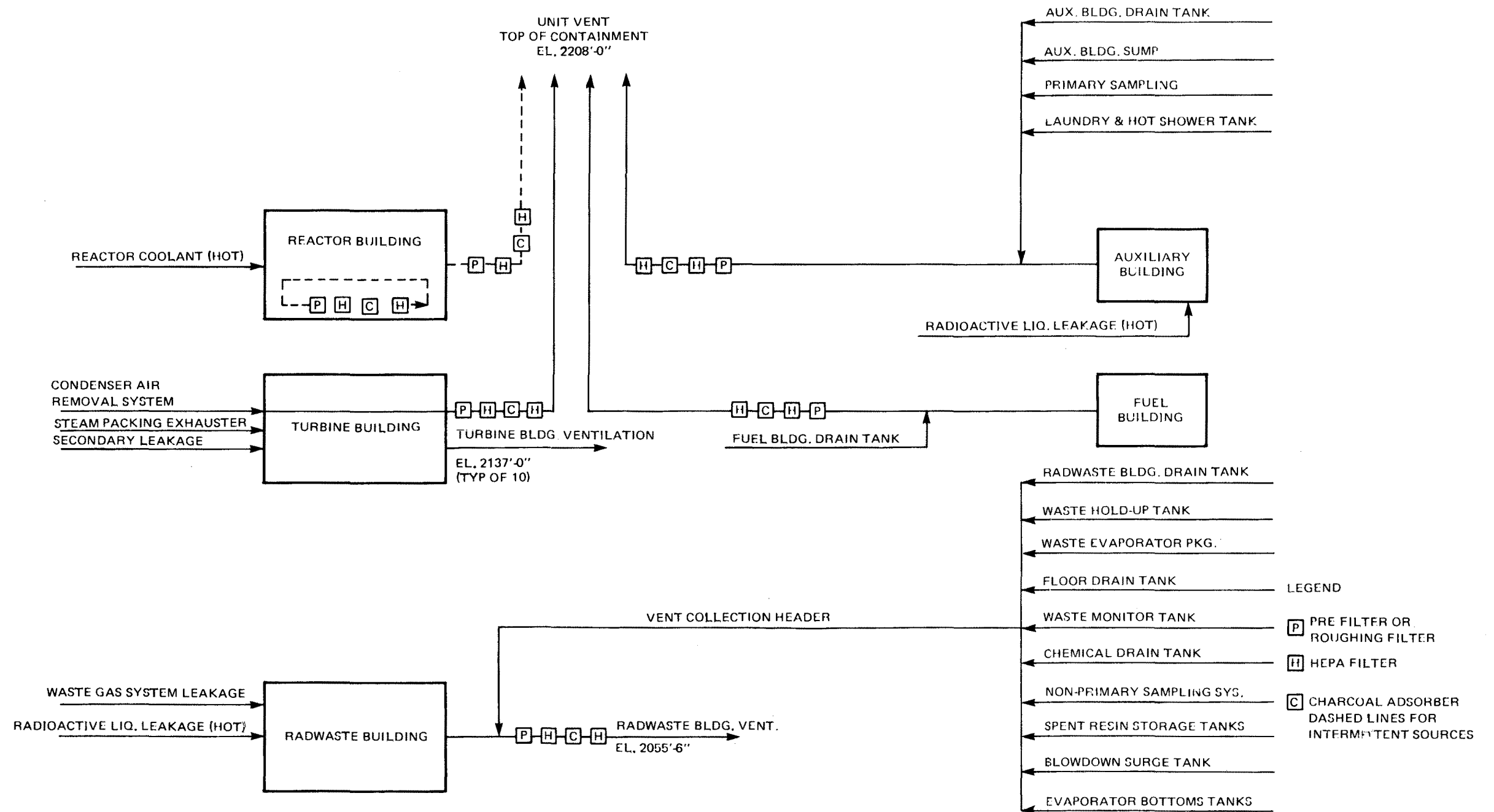


NOTES:
FOR GENERAL NOTES SEE M-22HA01.

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INCORP.					
CMP	91-1027.				
REV.	DATE	DRAWN	4	03/09/91	MAJ
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INCORP.					
REF	18977A				
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INCORP.					
REF	20910001.				

AS-BUILT CLASS 1

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SUPV.	N/A	DATE	1
APPR.	N/A	DATE	1
LOCATION	CALLAWAY PLANT	CLASS	
UNION ELECTRIC COMPANY	ST. LOUIS, MO	M-22HA03	REV. 8

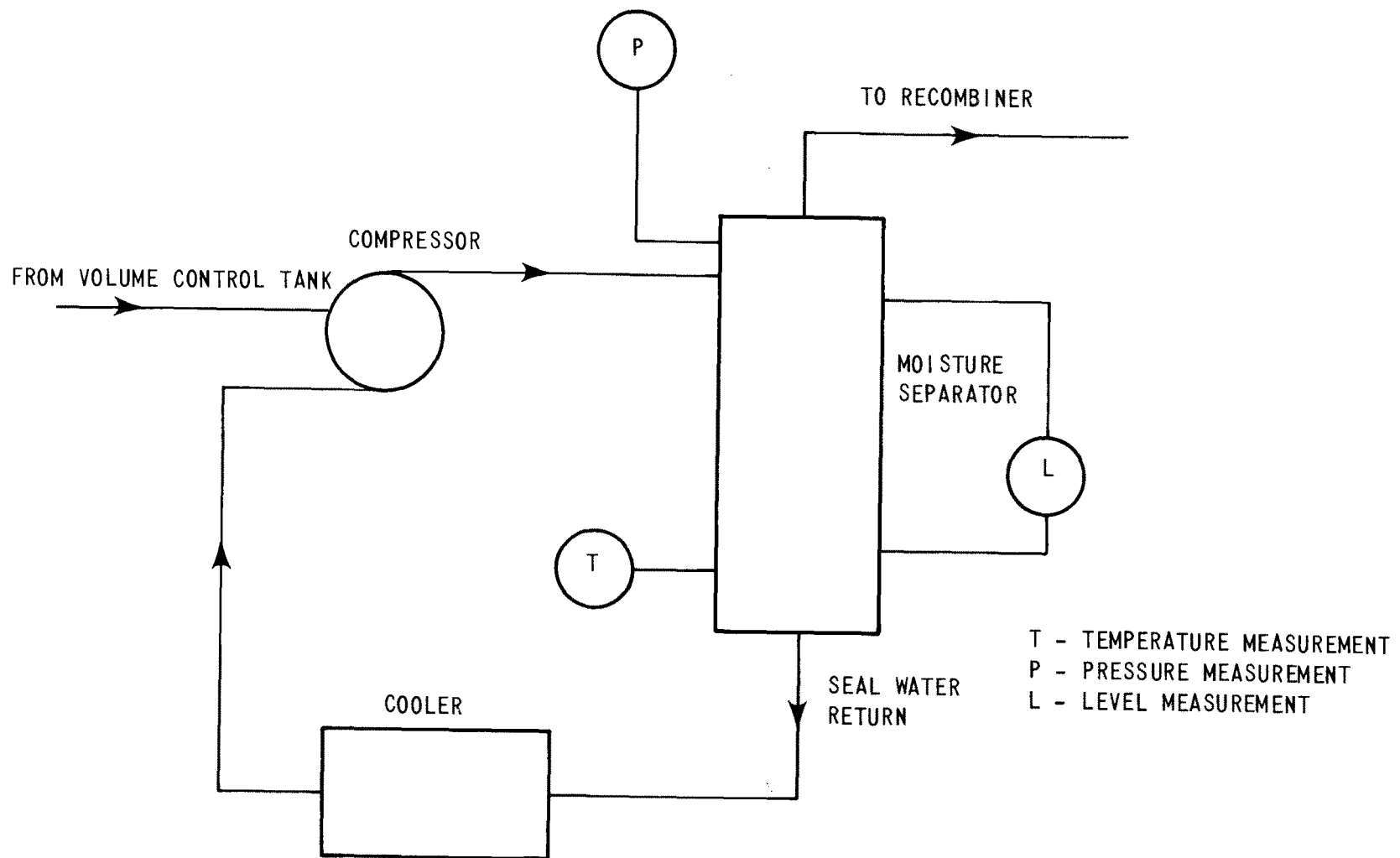


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6/86

CALLAWAY PLANT

FIGURE 11.3-2

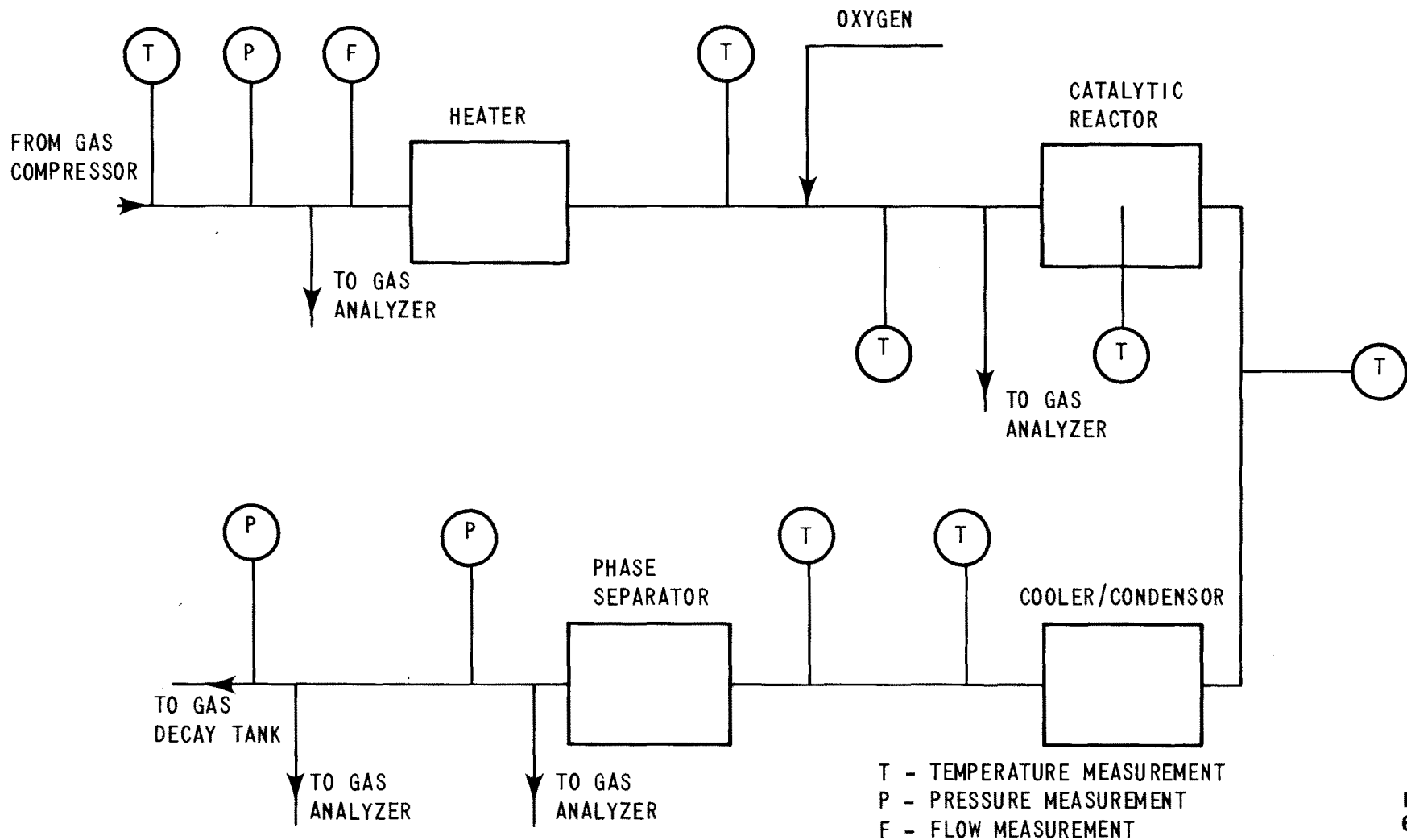
POTENTIAL GASEOUS RELEASE



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6/86

CALLAWAY PLANT

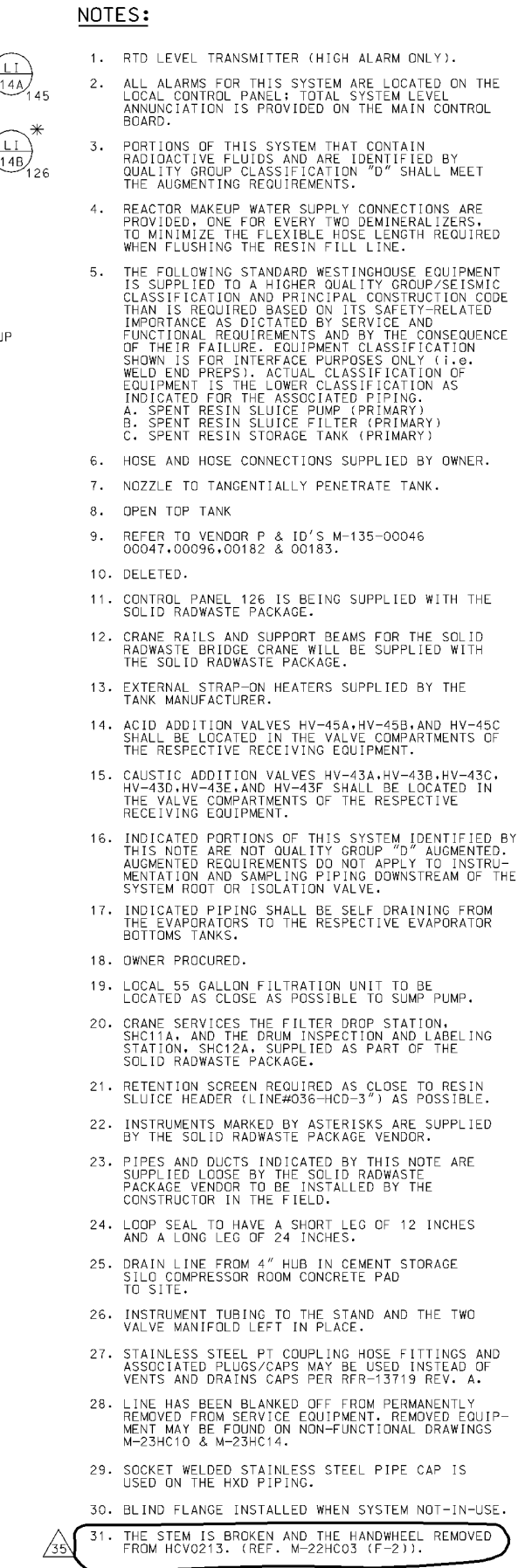
FIGURE 11.3-3
COMPRESSOR PACKAGE INSTRUMENTS



Rev. OL-0
6/86

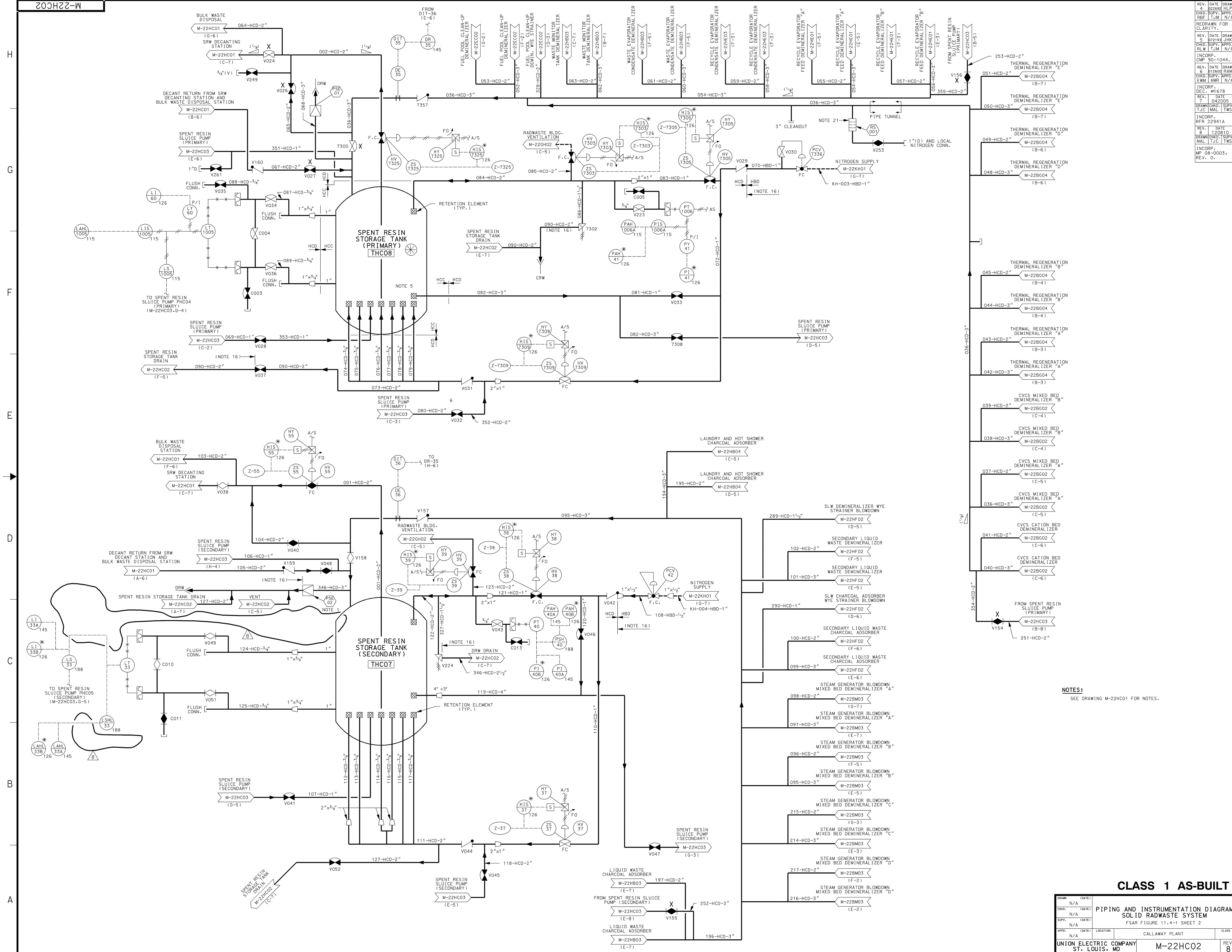
CALLAWAY PLANT

FIGURE 11.3-4
HYDROGEN RECOMBINER INSTRUMENTS



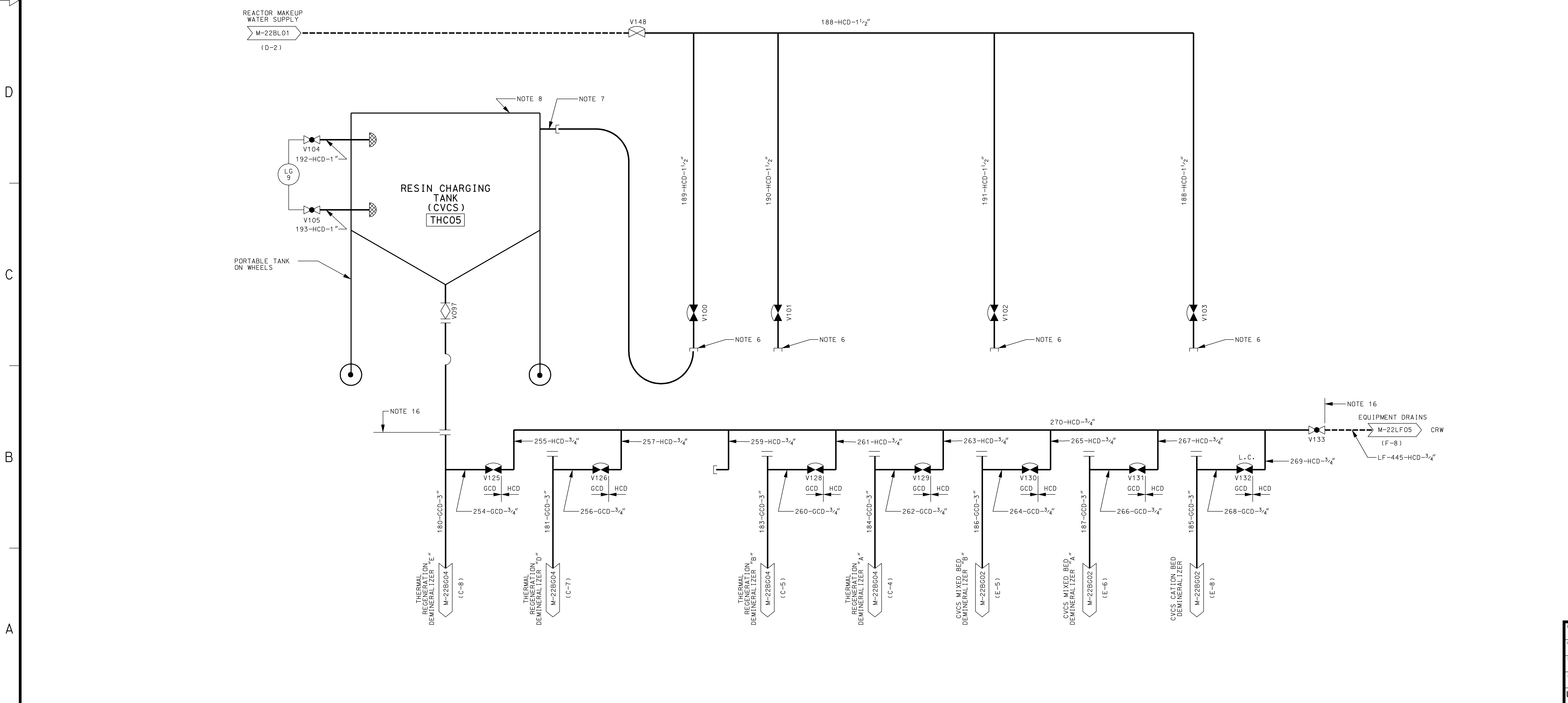
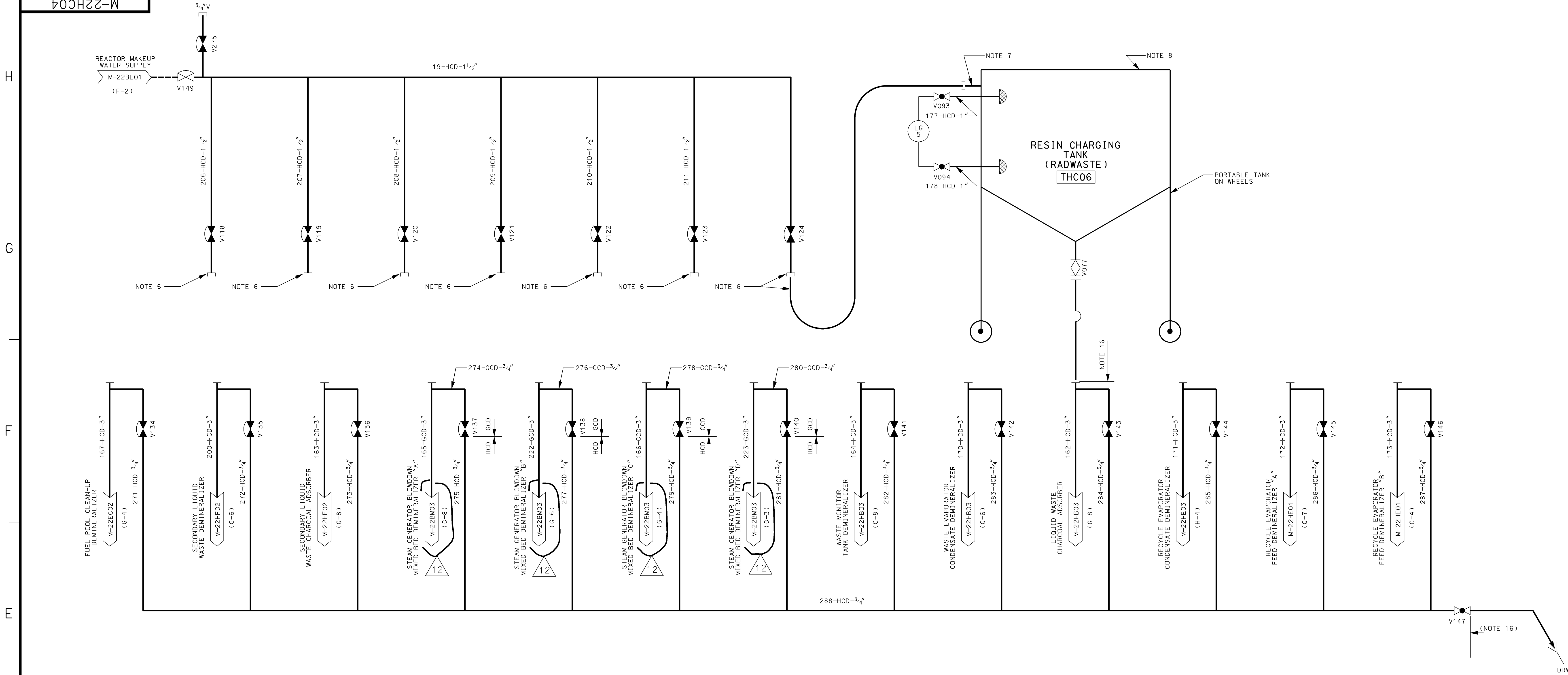
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N/A		
CHKD.	[DATE]	
N/A		

SUPP.	(DATE)	FSAR FIGURE 11.4-1 SHEET 1		
N/A				
APPO.	(DATE)	LOCATION	CALLAWAY ENERGY CENTER	CLASS
N/A				
UNION ELECTRIC COMPANY ST. LOUIS, MO			M-22HC01	REV 35



NOTES:
SEE DRAWING M-22HC01 FOR NOTES.

CLASS 1 AS-BUILT			
PIPING AND INSTRUMENTATION DIAGRAM			
SOLID RADWASTE SYSTEM			
FSAR FIGURE 11.4-1 SHEET 2			
DRWN	N/A	DATE	
CHD	N/A	DATE	
SUPV	N/A	DATE	
APPD	N/A	DATE	
UNION ELECTRIC COMPANY		M-22HC02	
ST. LOUIS, MO		REV. 8	



NOTES:
FOR NOTES SEE DRAWING M-22HC01.

AS-BUILT CLASS 1			
PIPING AND INSTRUMENTATION DIAGRAM SOLID RADWASTE SYSTEM			
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CALLAWAY ENERGY CENTER			
UNION ELECTRIC COMPANY ST. LOUIS, MO			
M-22HC04			
REV. 12			

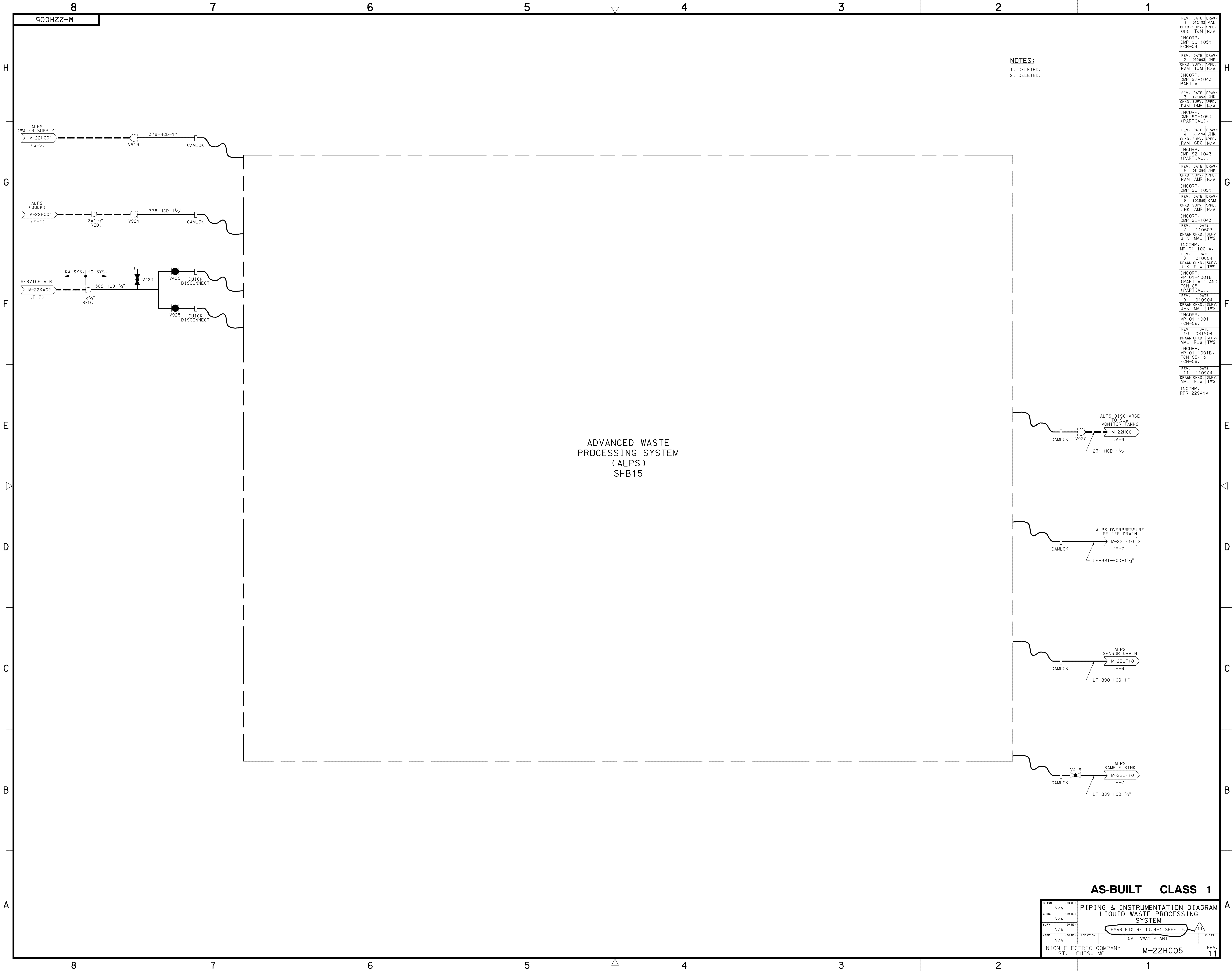


Figure 11.4-2 has been deleted.