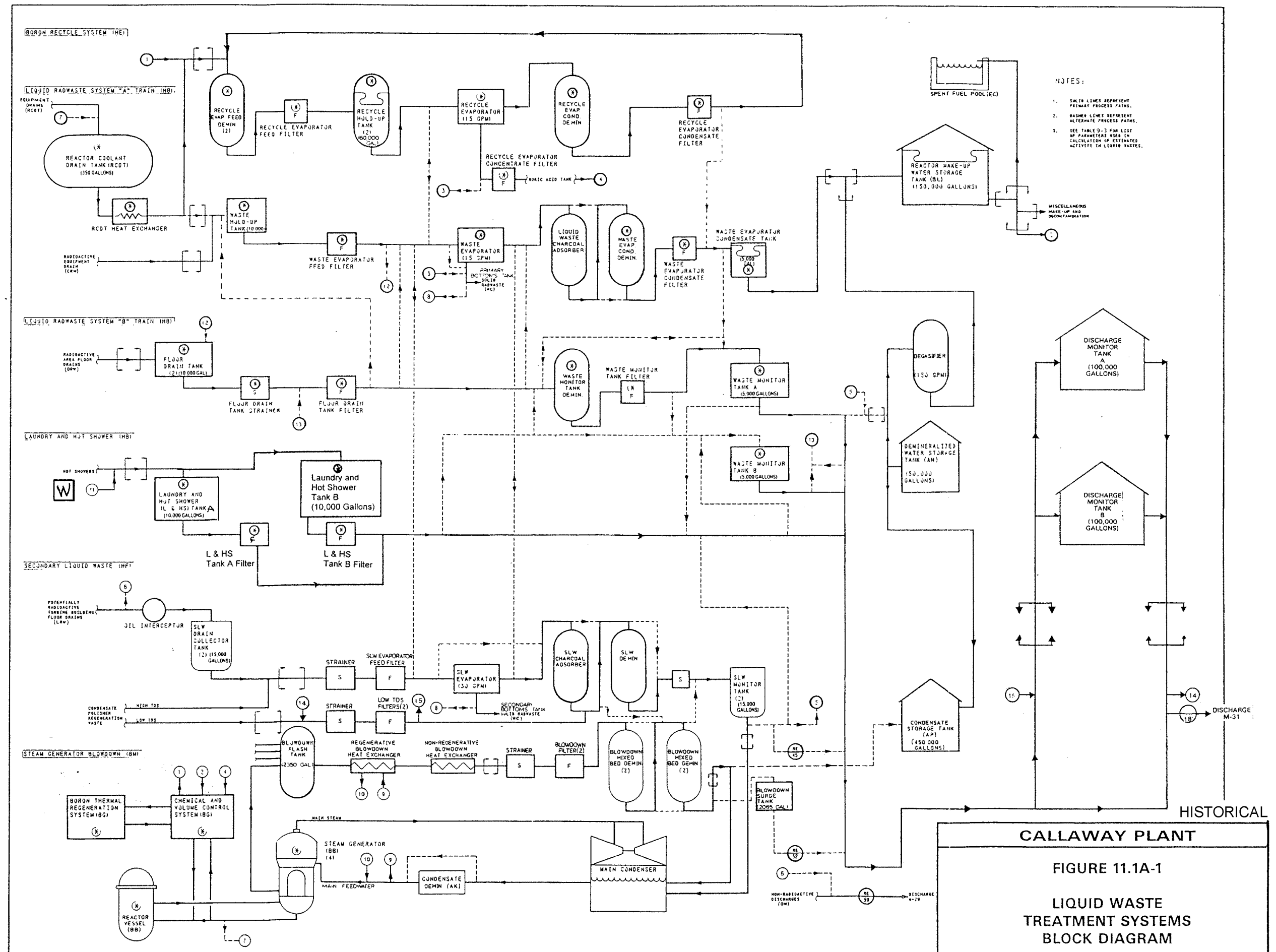
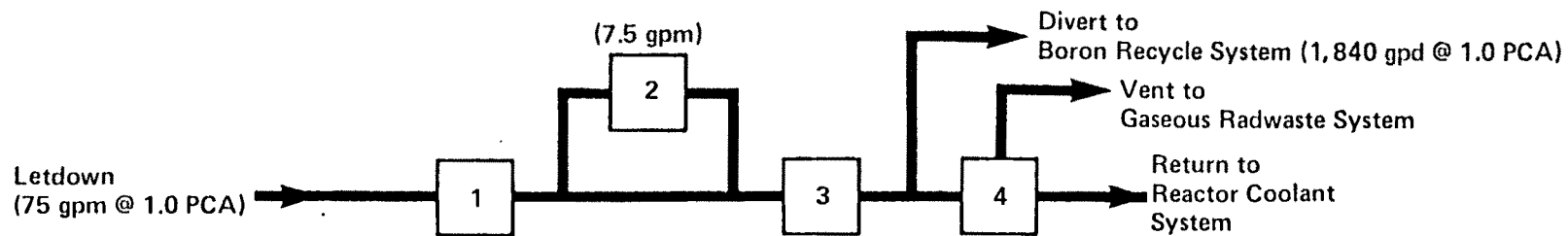






DECONTAMINATION FACTORS

	<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.

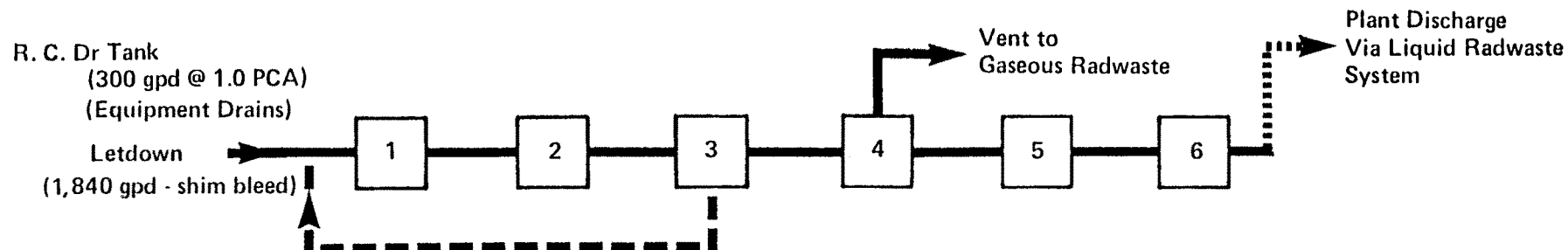
Chemical and Volume Control
System

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

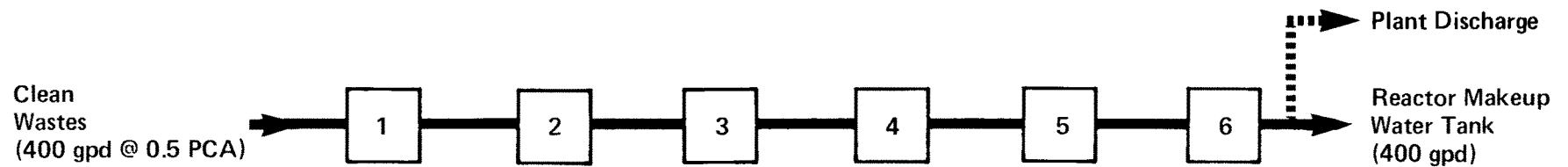
$$T_p = \frac{0.8 \times 56,000}{21,600} = 2 \text{ days}$$

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

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

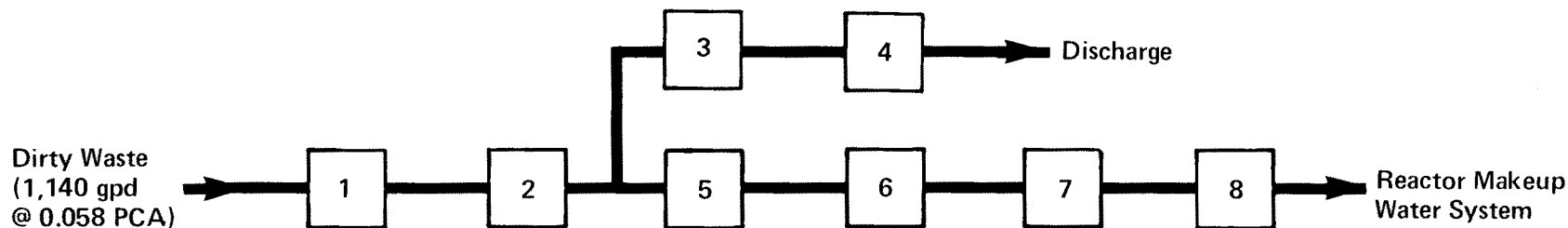
Liquid Radwaste
Train "A" - Clear Waste

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

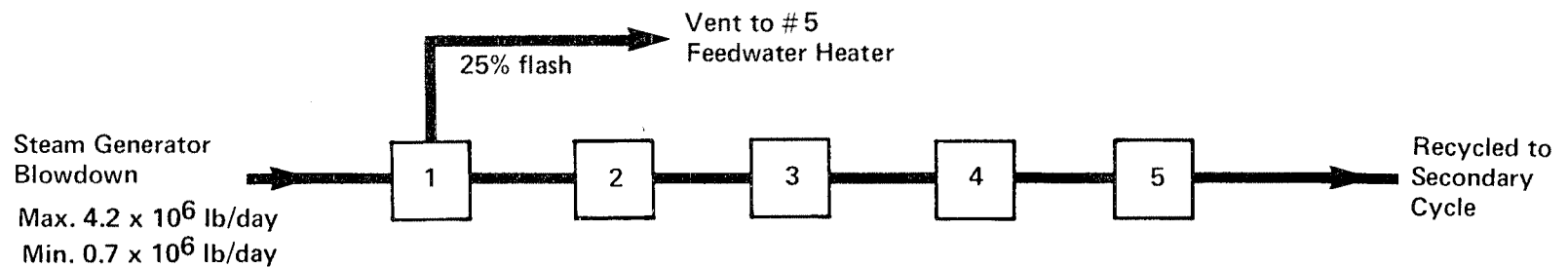
CALLAWAY PLANT

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

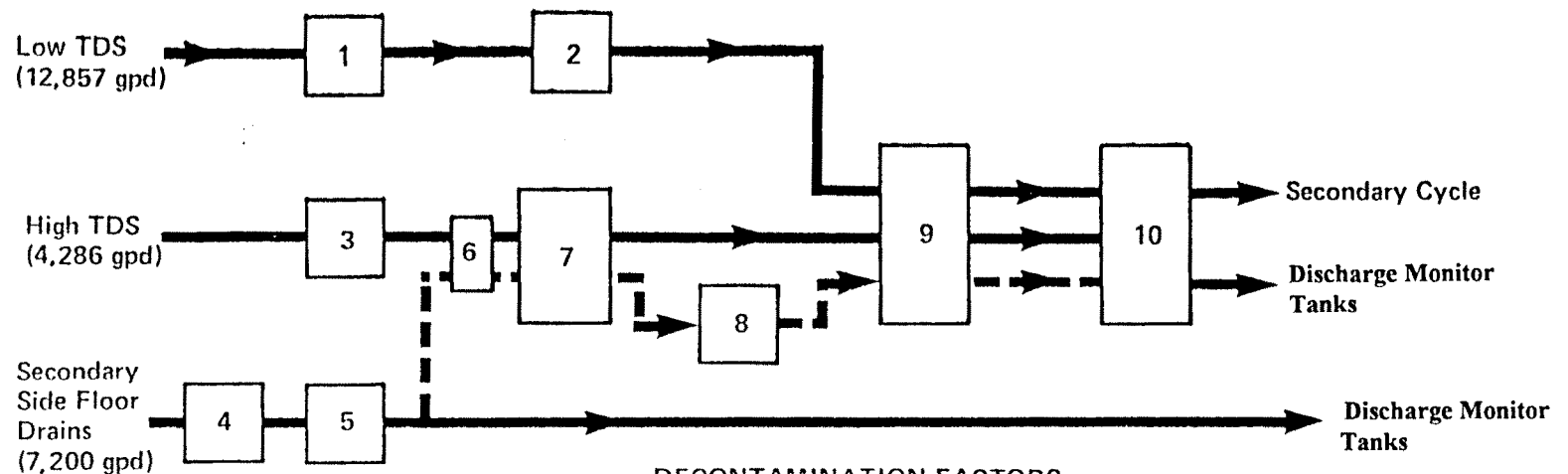
Steam Generator
Blowdown

CALLAWAY PLANT

Figure 11.1A-2
(Sheet 6)

System Decontamination Factors

HISTORICAL



DECONTAMINATION FACTORS

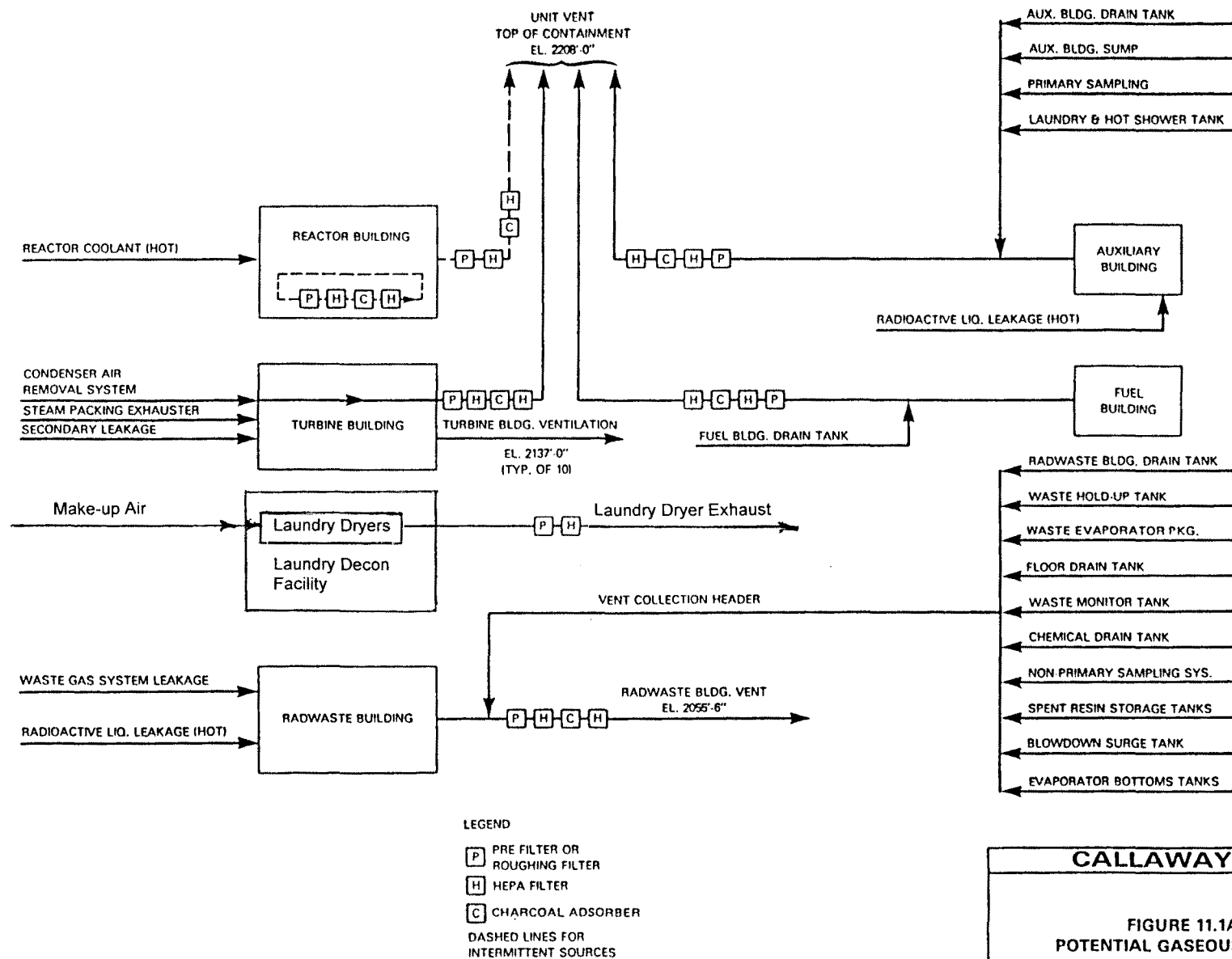
	<u>Iodine</u>	<u>Cesium & Rubidium</u>	<u>Other Nuclides</u>
1. Low TDS Collector Tank	—	—	—
2. Low TDS Filter	1	1	1
3. High TDS Collector Tank	—	—	—
4. Oil Interceptor	—	—	—
5. SLW Drain Collector Tank	—	—	—
6. SLW Filter	1	1	1
7. SLW Evaporator (available only for high TDS)	10^3	10^4	10^4
8. SLW Charcoal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

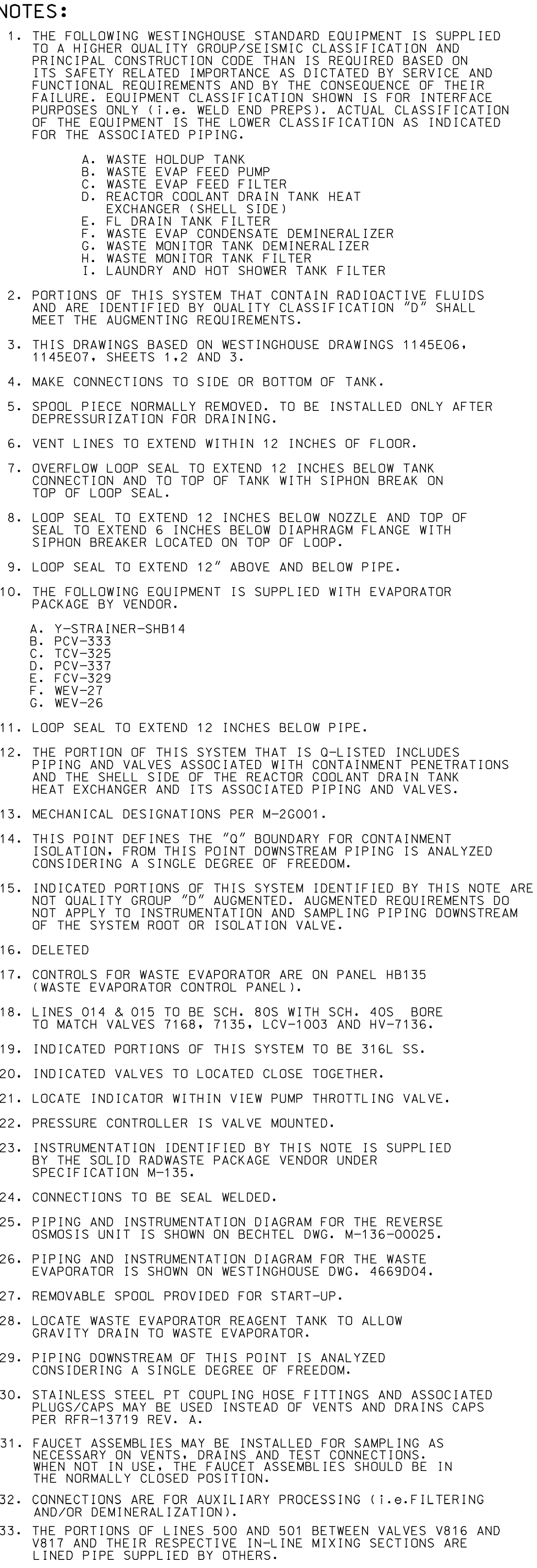
HISTORICAL



CALLAWAY PLANT

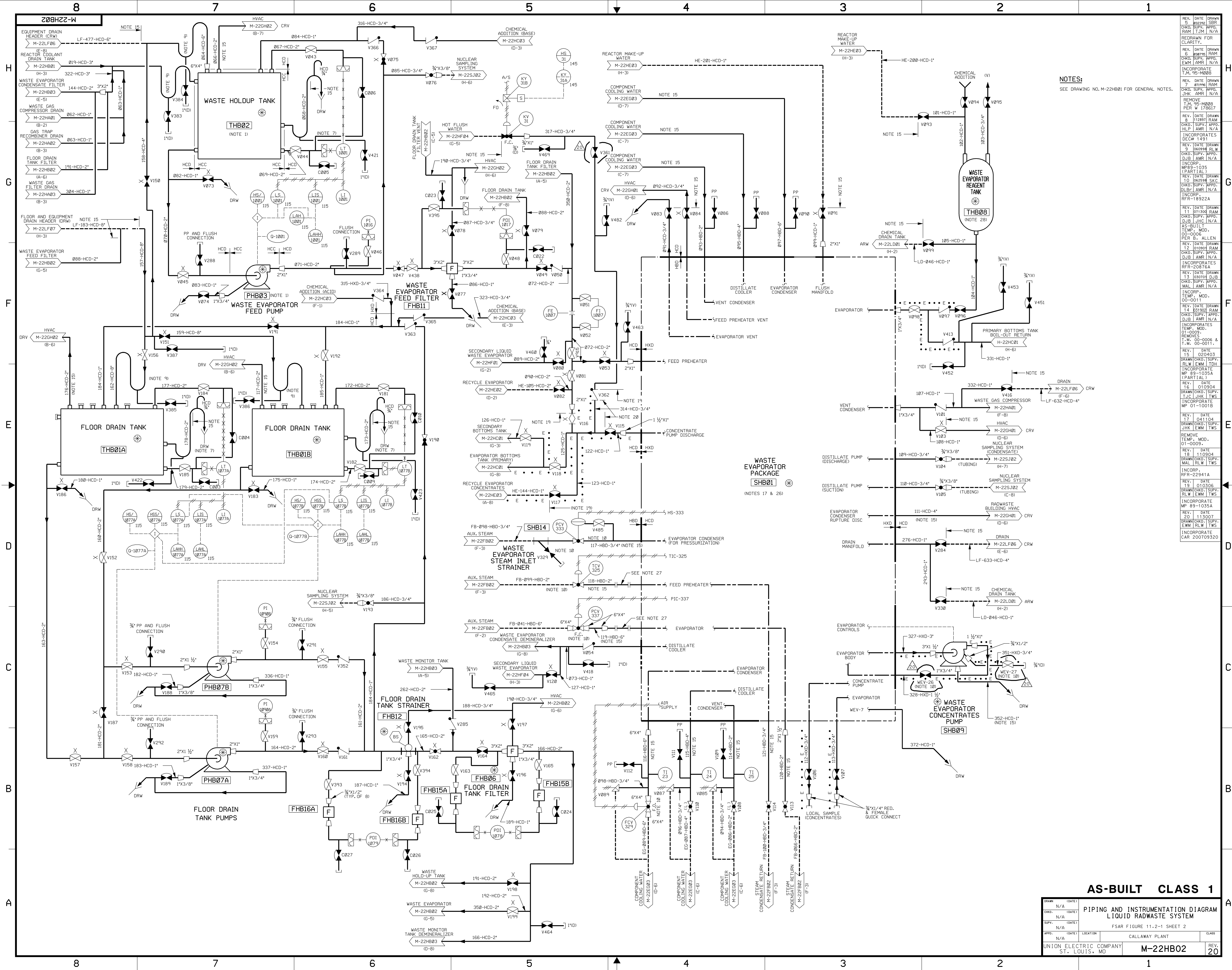
FIGURE 11.1A-3
POTENTIAL GASEOUS RELEASE

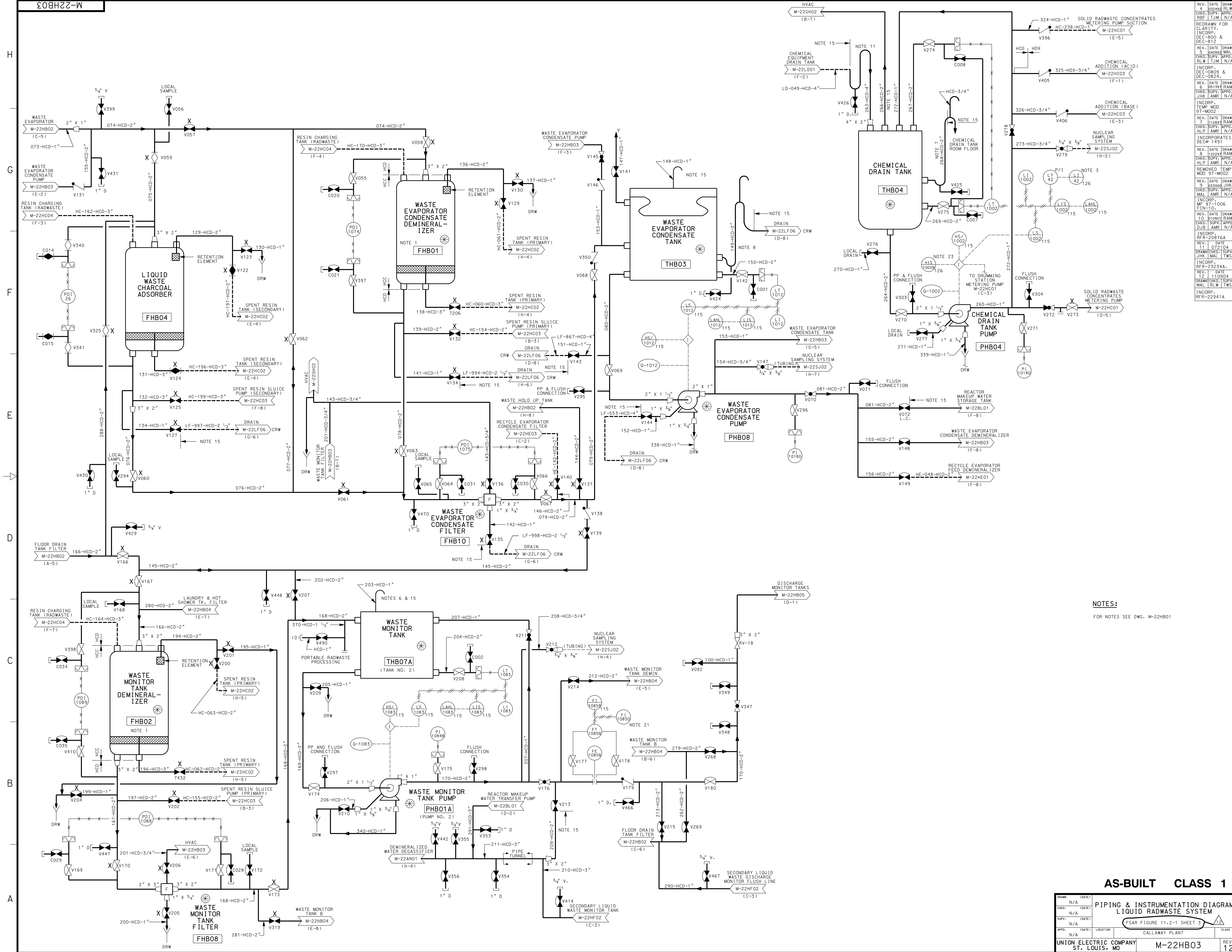
HISTORICAL



REV. DATE
32 111105
DRAIN CHKD, SUPV.
RLW EWM SKC
INCORPORATE
MP 89-1035A
(PARTIAL)
REV. DATE
35 005070
DRAIN CHKD, SUPV.
RLW EWM SKC
INCORPORATE
MP 89-1035A
(PARTIAL)
REV. DATE
34 040407
DRAIN CHKD, SUPV.
RLW EWM SKC
INCORPORATE
MP 89-1035A
(PARTIAL)
REV. DATE
35 005070
DRAIN CHKD, SUPV.
RLW EWM SKC
INCORPORATE
MP 89-1035A
(PARTIAL)
REV. DATE
36 102808
DRAIN CHKD, SUPV.
RLW EWM LMR
INCORPORATE
MP 89-1035A
(PARTIAL)
REV. DATE
32 292908
DRAIN CHKD, SUPV.
RLW EWM LMR
INCORPORATE
MP 89-1035A
(PARTIAL)
REV. DATE
38 042610
DRAIN CHKD, SUPV.
RLW EWM LMR
INCORPORATE
MP 89-1035A
(PARTIAL)
REV. DATE
39 005070
DRAIN CHKD, SUPV.
MAL TJC LMP
INCORP.
CAR 201004346

<table border="1"> <tr> <td>OWNER</td> <td>(DATE)</td> </tr> <tr> <td>N/A</td> <td></td> </tr> <tr> <td>CHD.</td> <td>(DATE)</td> </tr> <tr> <td>N/A</td> <td></td> </tr> <tr> <td>SUPV.</td> <td>(DATE)</td> </tr> <tr> <td>N/A</td> <td></td> </tr> <tr> <td>APPD.</td> <td>(DATE)</td> </tr> <tr> <td>N/A</td> <td></td> </tr> </table>	OWNER	(DATE)	N/A		CHD.	(DATE)	N/A		SUPV.	(DATE)	N/A		APPD.	(DATE)	N/A		PIPING AND INSTRUMENTATION DIAGRAM LIQUID WASTEWATER SYSTEM FSAR FIGURE 11.2-1 SHEET 1		CLASS
OWNER	(DATE)																		
N/A																			
CHD.	(DATE)																		
N/A																			
SUPV.	(DATE)																		
N/A																			
APPD.	(DATE)																		
N/A																			
UNION ELECTRIC COMPANY ST. LOUIS, MO	M-22HB01 (Q)		REV 39																





NOTES:
FOR NOTES SEE DWG. M-22HB01

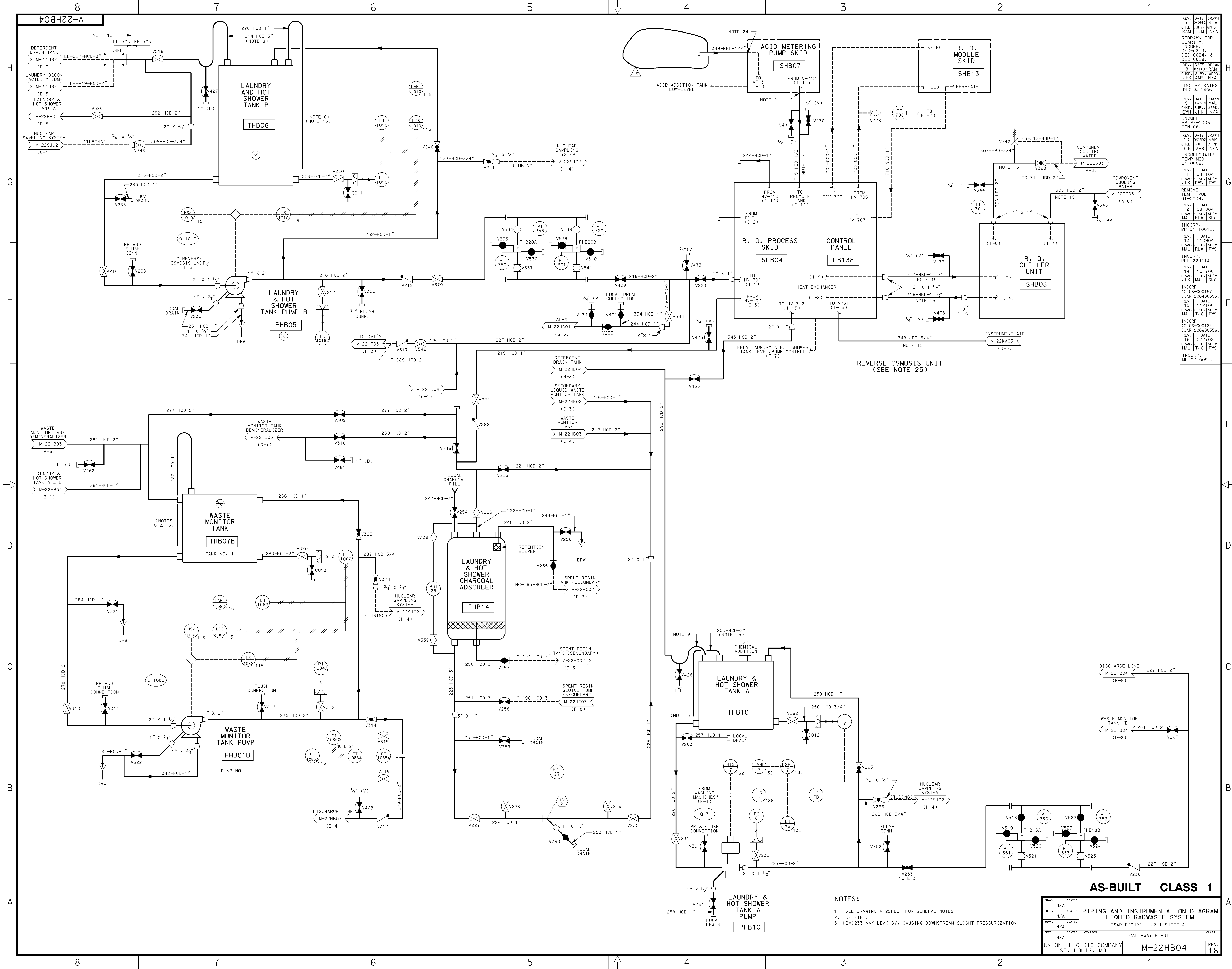
AS-BUILT CLASS 1

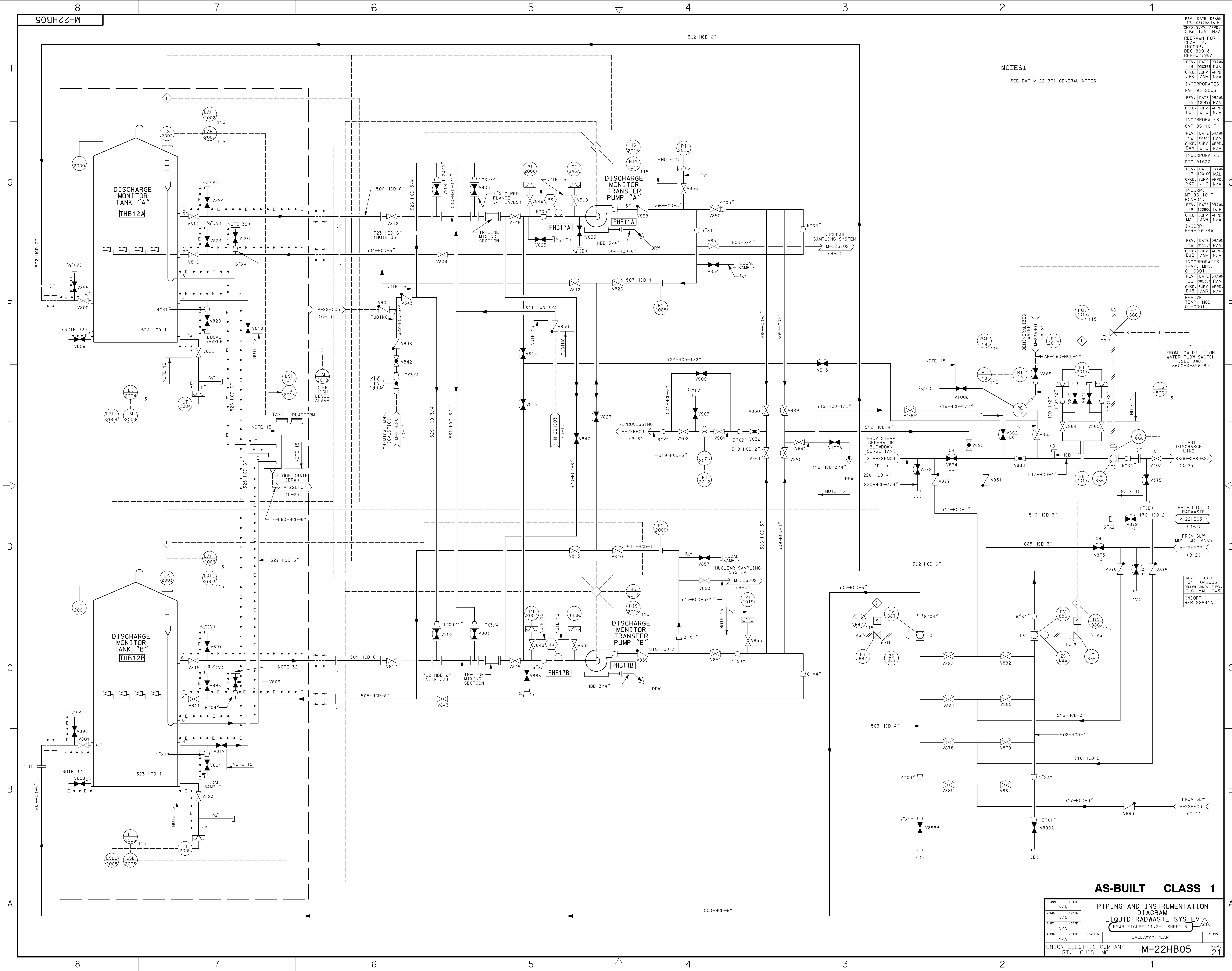
UNION ELECTRIC COMPANY
ST. LOUIS, MO

REVISIONS
REV. 12
DATE 11/21/04
BY JHK
CHECKED JHK
APPROVED JHK
LOCATION CALLAWAY PLANT
CLASS

FSAR FIGURE 11.2-1 SHEET 3

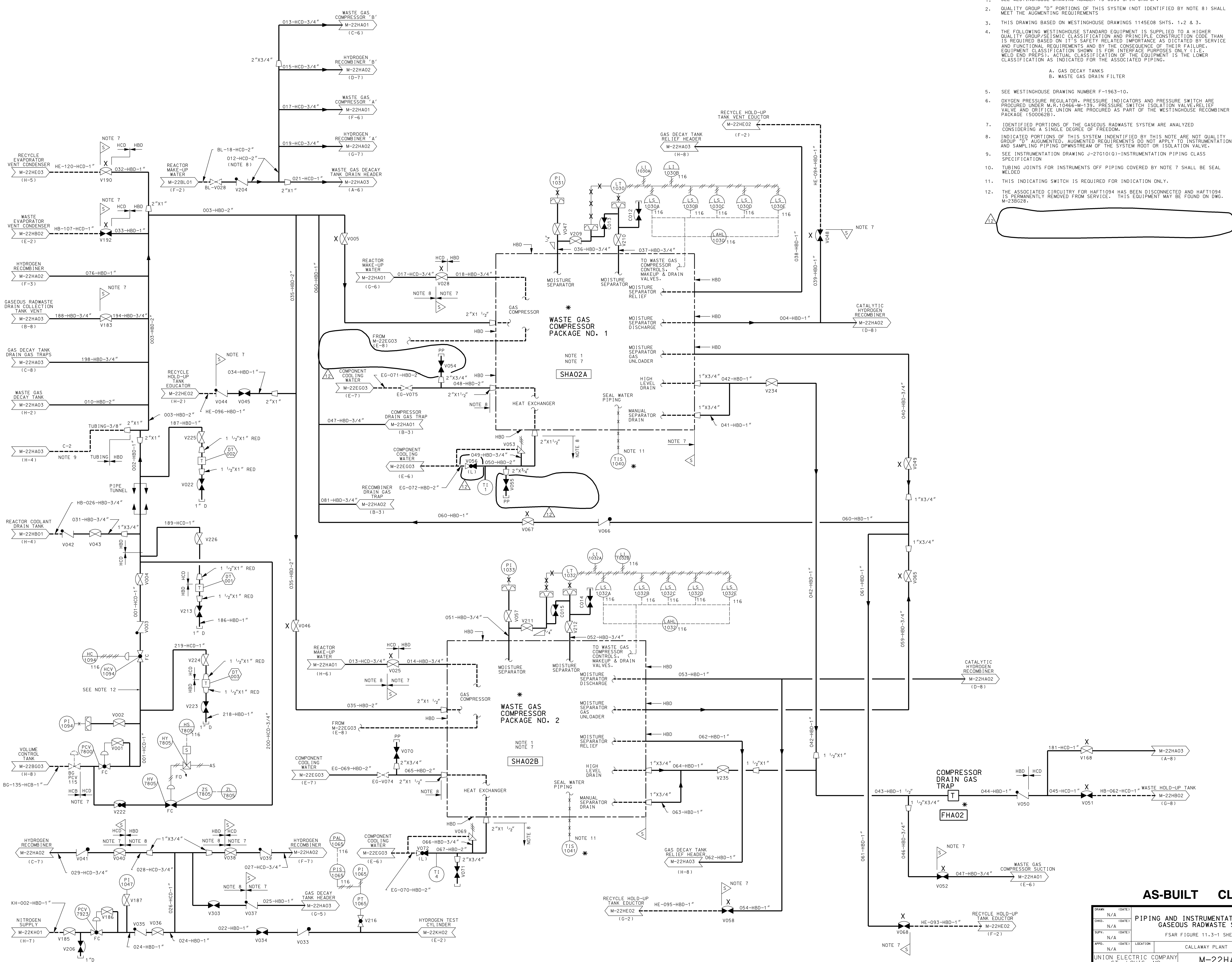
12





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			
DRWN	N/A	DATE	
CHKD	N/A	DATE	
SUPV	N/A	DATE	
APPD	N/A	LOCATION	
UNION ELECTRIC COMPANY ST. LOUIS, MO			REV. 21
M-22HB05			CLASS
CALLAWAY PLANT			

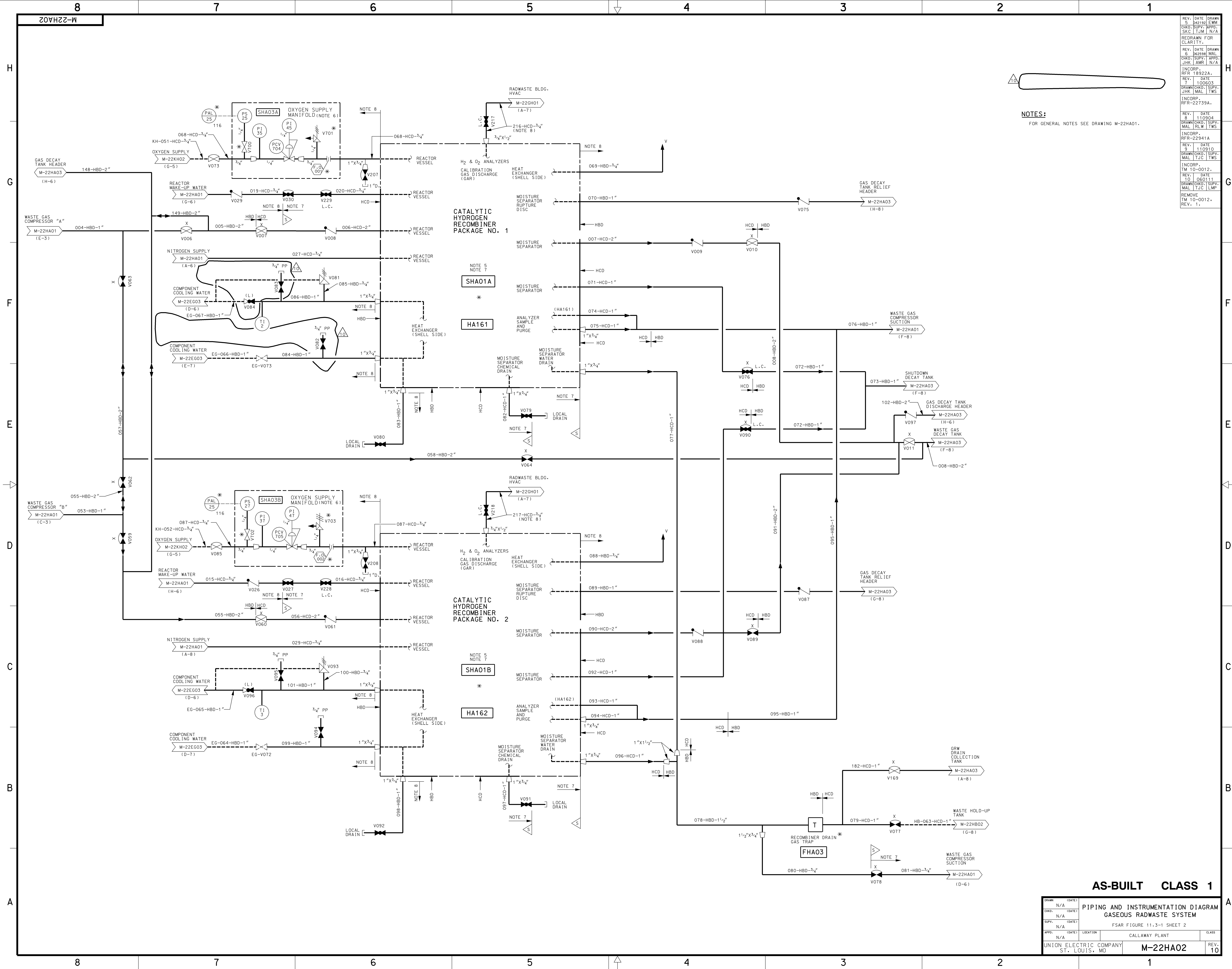


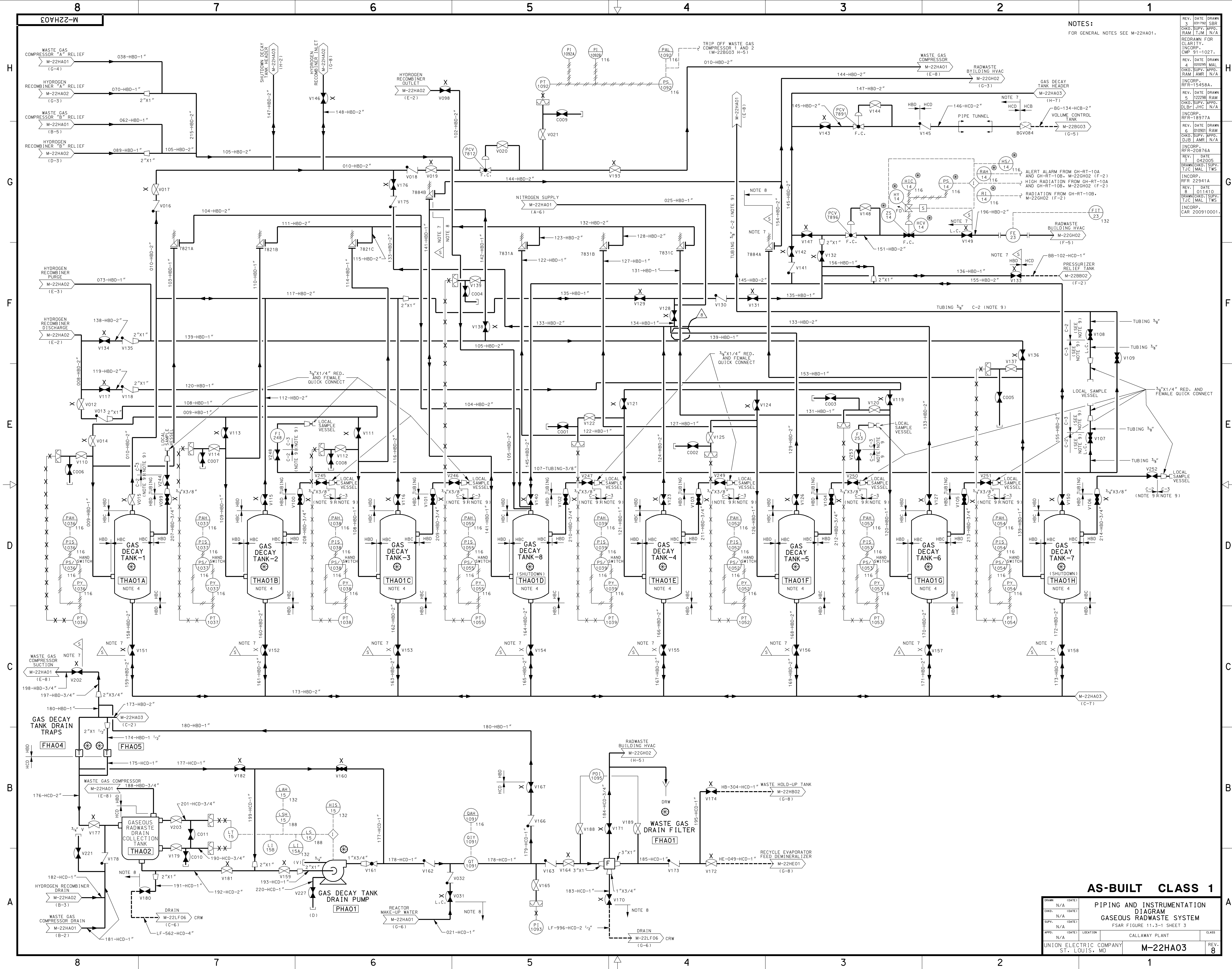
NOTES:

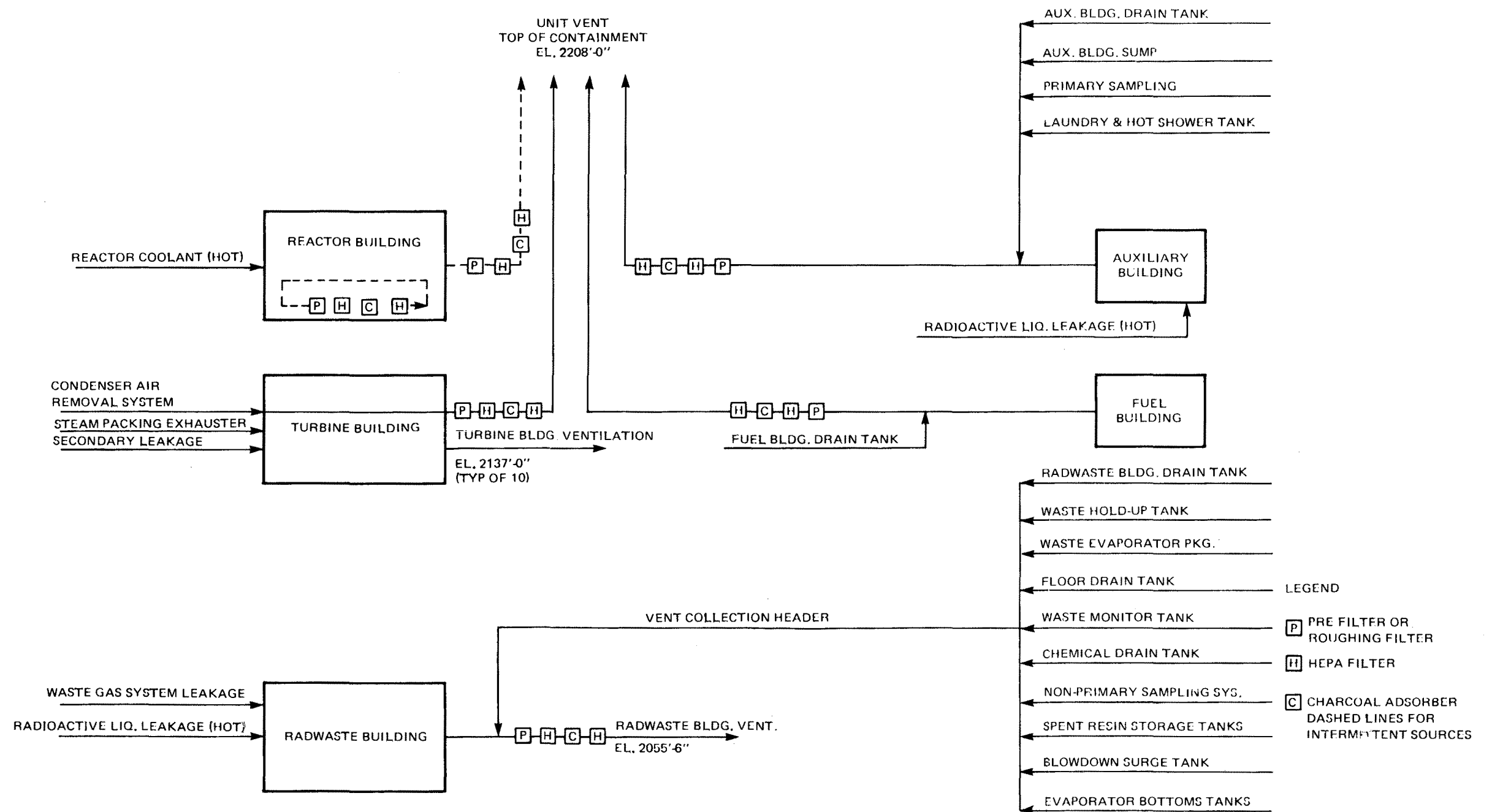
1. SEE WESTINGHOUSE DRAWING NUMBER 15-0599 SPIN GHAPPC.
2. QUALITY GROUP "D" PORTIONS OF THIS SYSTEM (NOT IDENTIFIED BY NOTE 8) SHALL MEET THE AUGMENTING REQUIREMENTS
3. THIS DRAWING BASED ON WESTINGHOUSE DRAWINGS 1145E08 SHTS. 1,2 & 3.
4. THE FOLLOWING WESTINGHOUSE STANDARD EQUIPMENT IS SUPPLIED TO 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 IN THE PURCHASES 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
5. SEE WESTINGHOUSE DRAWING NUMBER F-1963-10.
6. OXYGEN PRESSURE REGULATOR, PRESSURE INDICATORS AND PRESSURE SWITCH ARE PROCURED UNDER M.R.10466-M-139. PRESSURE SWITCH ISOLATION VALVE RELIEF PACKAGE AND DRIFTE UNIT ARE PROCURED AS PART OF THE WESTINGHOUSE RECOMBINER PACKAGE (500062B).
7. IDENTIFIED PORTIONS OF THE GASEOUS RADWASTE SYSTEM ARE ANALYZED CONSIDERING A SINGLE DEGREE OF FREEDOM.
8. INDICATED PORTIONS OF THIS SYSTEM IDENTIFIED BY THIS NOTE ARE NOT QUALITY GROUP "D" AUGMENTED. AUGMENTED IDENTIFICATIONS DO NOT APPLY TO INSTRUMENTATION AND SAMPLING PIPING DRINKSWHEM IS THE SYSTEM ROOT OR ISOLATION VALVE.
9. SEE INSTRUMENTATION DRAWING J-27G10(Q)-INSTRUMENTATION PIPING CLASS SPECIFICATION
10. TUBING JOINTS FOR INSTRUMENTS OFF PIPING COVERED BY NOTE 7 SHALL BE SEAL WELDED
11. THIS INDICATING SWITCH IS REQUIRED FOR INDICATION ONLY.
12. THE ASSOCIATED CIRCUITRY FOR HAFT1094 HAS BEEN DISCONNECTED AND HAFT1094 IS PERMANENTLY REMOVED FROM SERVICE. THIS EQUIPMENT MAY BE FOUND ON DWG. M-238C68.

REV. DATE DRAWN
DATE 04238E TWM
CHKD. SUPV. APPR.
SKC TJM N/A
REDRAWN FOR
CLERICAL ERROR
DEC 1983
REV. DATE DRAWN
DATE 07169E LAM
CHKD. SUPV. APPR.
TJM N/A
INCORP.
CMP 88-1025.
REV. DATE DRAWN
DATE 04238E TWM
CHKD. SUPV. APPR.
JHK AMR N/A
INCORP.
DEC 1983
REV. DATE DRAWN
DATE 04289E RAM
CHKD. SUPV. APPR.
TJM N/A
INCORP.
DEC #1427
REV. DATE DRAWN
DATE 04289E RAM
CHKD. SUPV. APPR.
JHK AMR N/A
INCORP.
DEC 1982A
REV. DATE
DATE 000604
DRAWN(CORP. SUPV.
JHK EWM TWS
INCORP. NO. 132
FCN-07.
REV. DATE
DATE 010305
DRAWN(CORP. SUPV.
TJM LAM TWS
INCORP.
REF 22941A
REV. DATE
DATE 10 082208
DRAWN(CORP. SUPV.
TJM LAM TWS
INCORPORATE CR
CAR 08-0002181
CAR 200804353
REV. DATE
DATE 11 10910
DRAWN(CORP. SUPV.
TJM LAM TWS
INCORP.
TM 10-0012.
REV. DATE
DATE 12 000111
DRAWN(CORP. SUPV.
TJM LAM TWS
REMOVE
TM 10-0012.
REV. DATE
DATE 12 000111

AS-BUILT CLASS 1															
<table border="1"> <tr> <td>DRWN</td> <td>DATE:</td> <td>N/A</td> </tr> <tr> <td>CHKD</td> <td>DATE:</td> <td>N/A</td> </tr> <tr> <td>SUPV</td> <td>DATE:</td> <td>N/A</td> </tr> <tr> <td>APPR</td> <td>DATE:</td> <td>N/A</td> </tr> </table>	DRWN	DATE:	N/A	CHKD	DATE:	N/A	SUPV	DATE:	N/A	APPR	DATE:	N/A	PIPING AND INSTRUMENTATION DIAGRAM GASEOUS RADWASTE SYSTEM FSAR FIGURE 11.3-1 SHEET 1		
DRWN	DATE:	N/A													
CHKD	DATE:	N/A													
SUPV	DATE:	N/A													
APPR	DATE:	N/A													
LOCATION CALLAWAY PLANT		CLASS 1													
UNION ELECTRIC COMPANY ST. LOUIS, MO		M-22HA01 REV. 12													





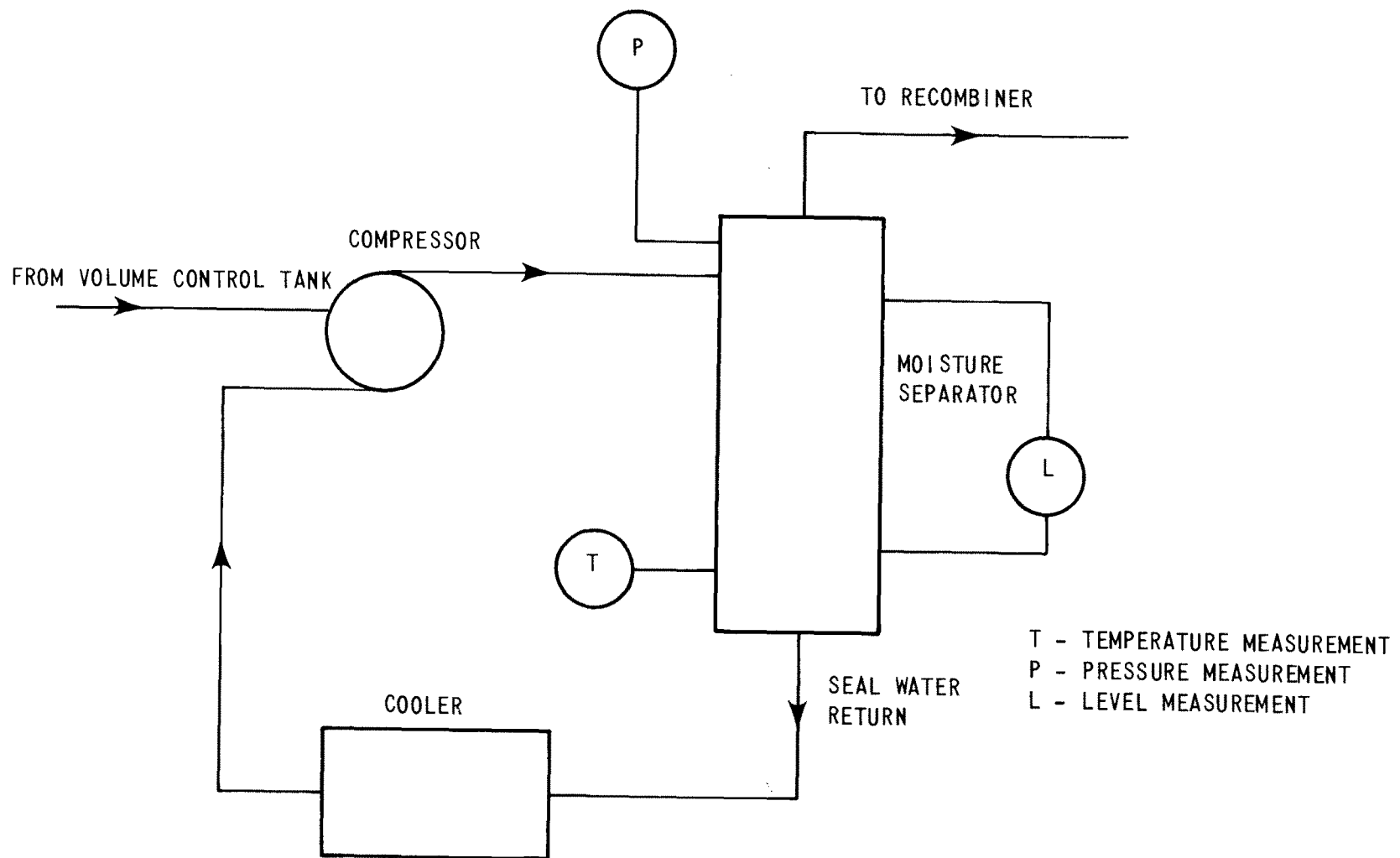


Rev. OL-0
6/86

CALLAWAY PLANT

FIGURE 11.3-2

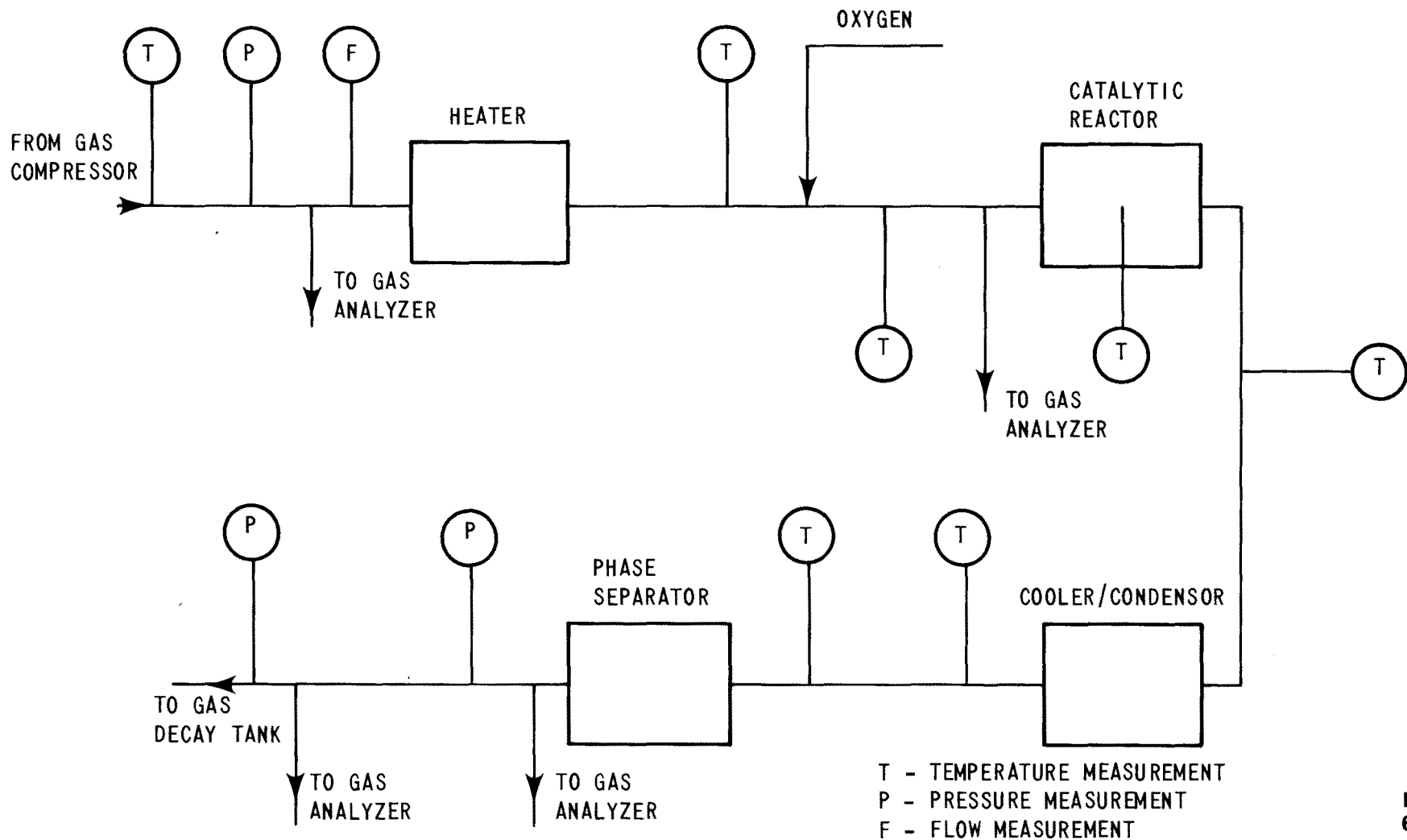
POTENTIAL GASEOUS RELEASE



Rev. OL-0
6/86

CALLAWAY PLANT

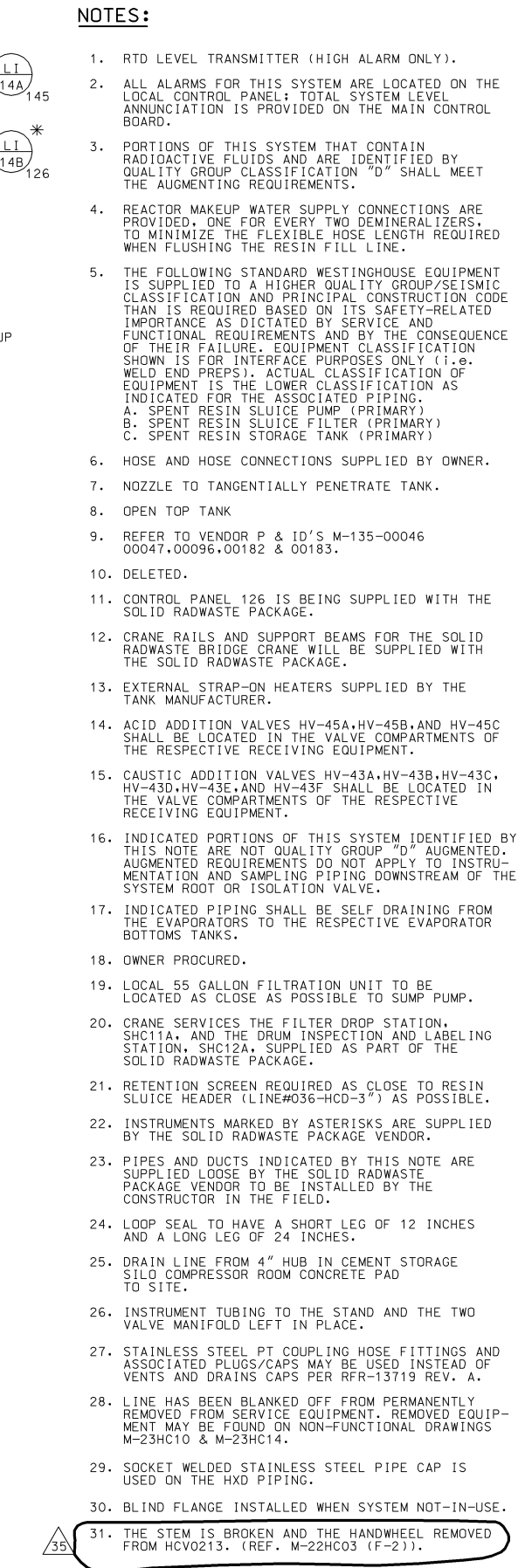
FIGURE 11.3-3
COMPRESSOR PACKAGE INSTRUMENTS



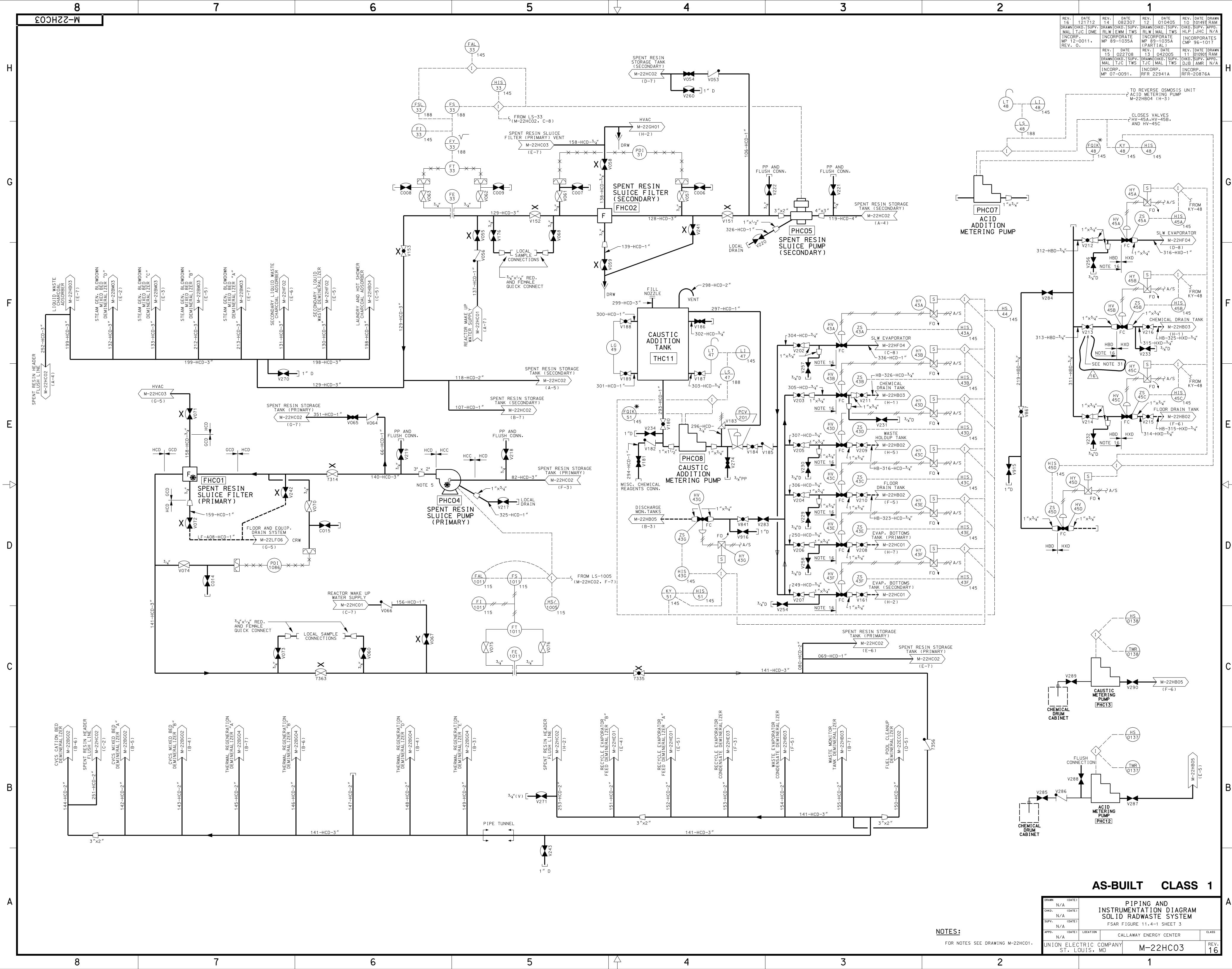
Rev. OL-0
6/86

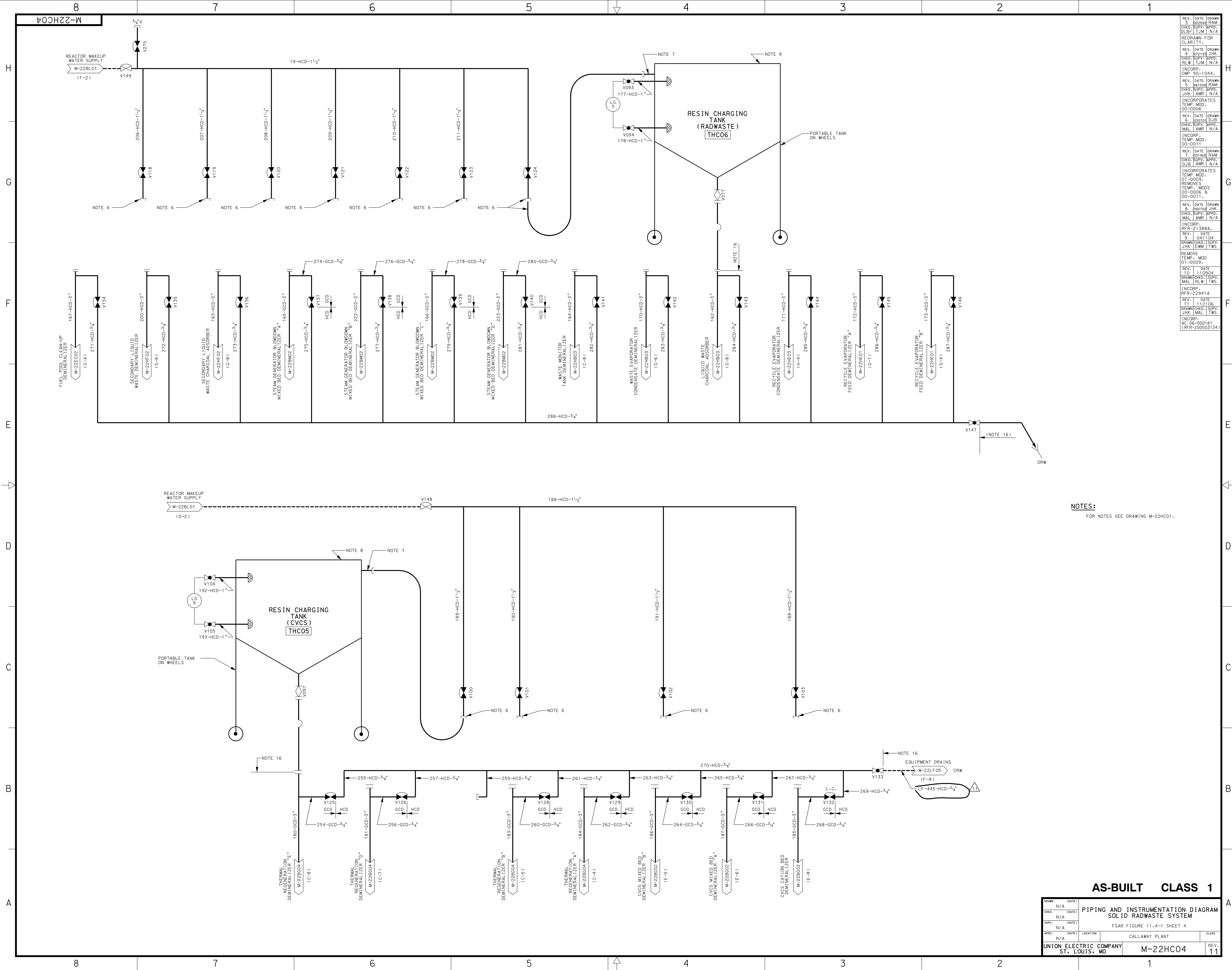
CALLAWAY PLANT

FIGURE 11.3-4
HYDROGEN RECOMBINER INSTRUMENTS



AS-BUILT CLASS 1					
DRAWN N/A CHG. N/A SUPV. N/A APPR. N/A	(DATE) (DATE) (DATE) (DATE)	PIPING AND INSTRUMENTATION DIAGRAM SOLID RADWASTE SYSTEM			
		FSAR FIGURE 11.4-1 SHEET 1			
		LOCATION CALLAWAY ENERGY CENTER			CLASS 1
UNION ELECTRIC COMPANY ST. LOUIS, MO			M-22HC01		REV 35





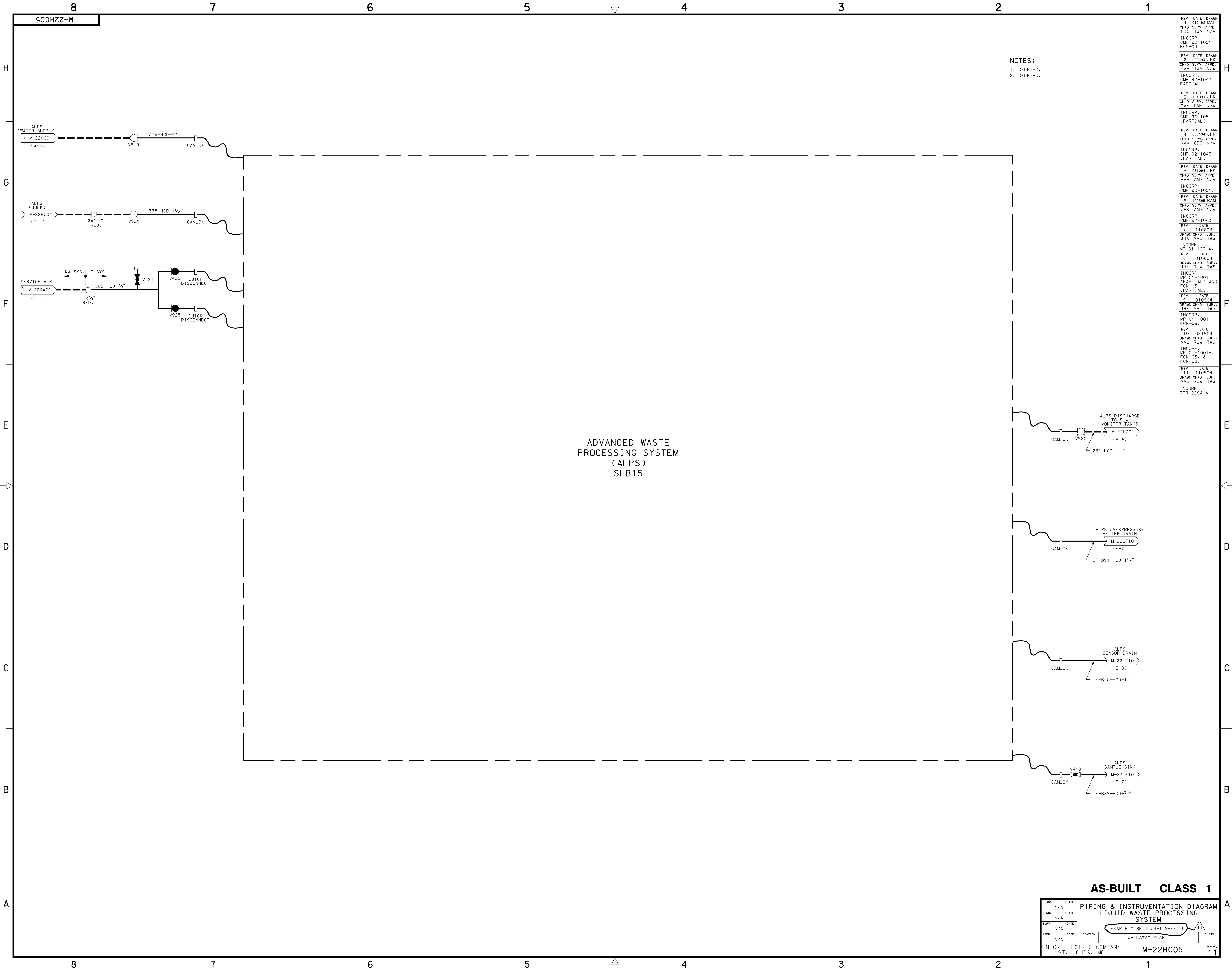


Figure 11.4-2 has been deleted.