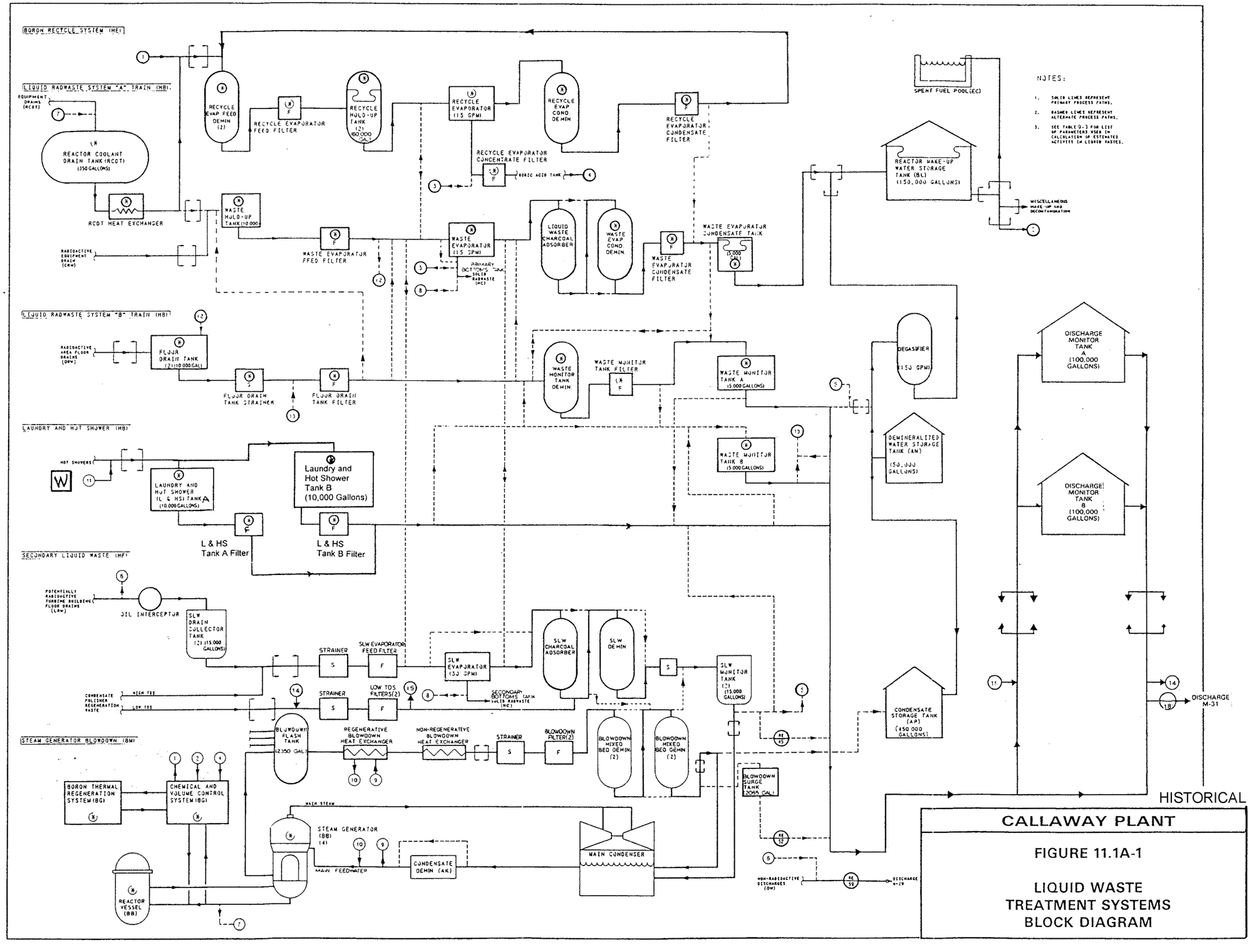
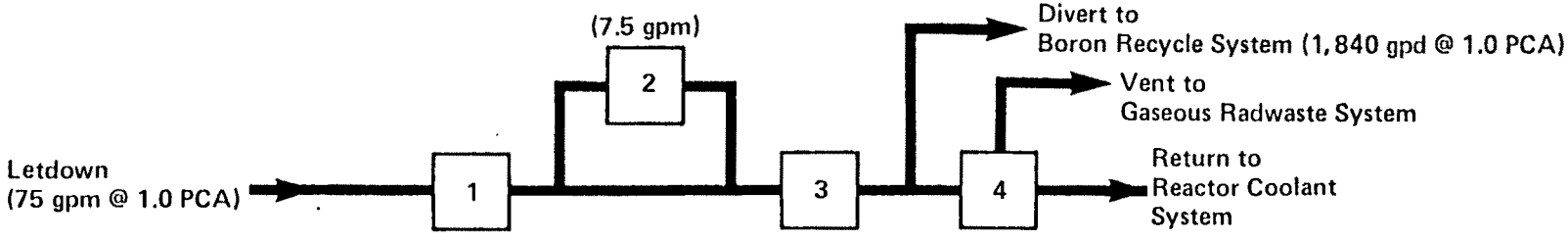


HISTORICAL

CALLAWAY PLANT

FIGURE 11.1A-1

LIQUID WASTE TREATMENT SYSTEMS BLOCK DIAGRAM



DECONTAMINATION FACTORS

		Iodine	Cesium & Rubidium	Other Nuclides
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.

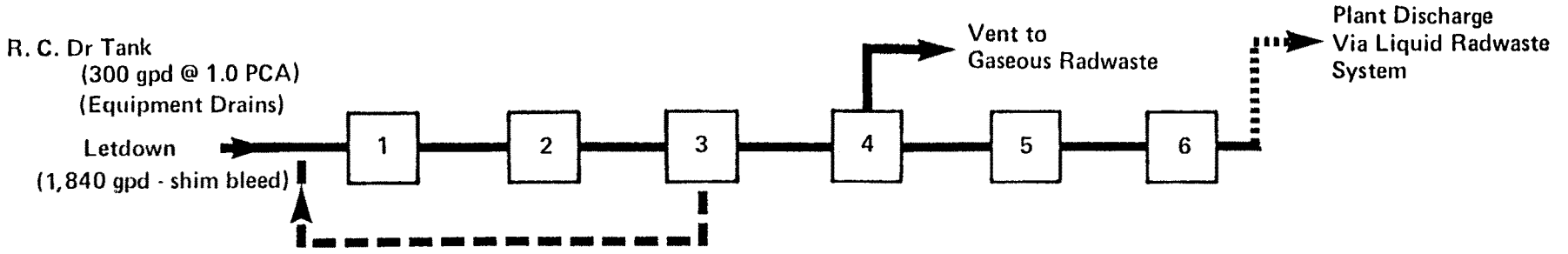
Chemical and Volume Control System

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

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

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

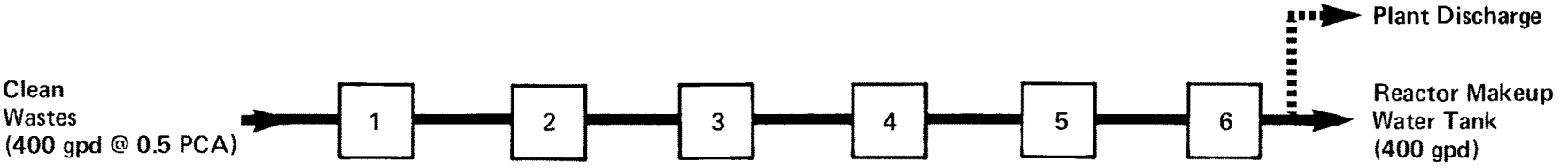
Boron Recycle System

CALLAWAY PLANT

Figure 11.1A-2
(Sheet 2)

System Decontamination Factors

HISTORICAL



		DECONTAMINATION FACTORS		
		Iodine	Cesium & Rubidium	Other Nuclides
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	1	1	1
	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

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

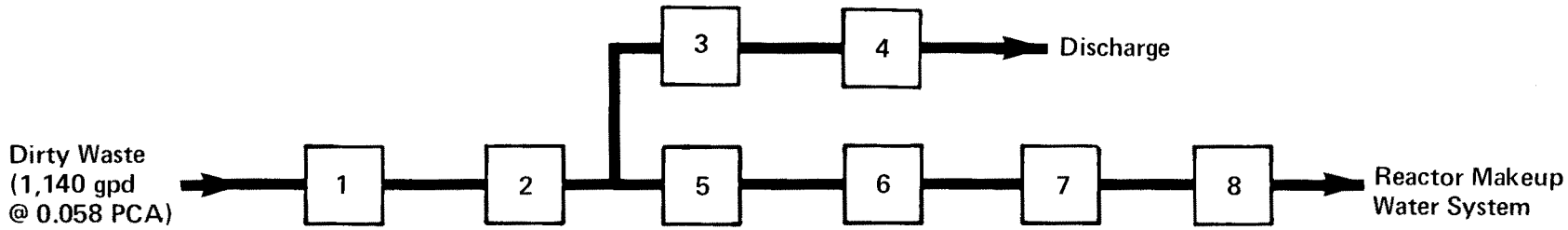
Liquid Radwaste
Train "A" - Clear Waste

CALLAWAY PLANT

Figure 11.1A-2
(Sheet 3)

System Decontamination Factors

HISTORICAL



DECONTAMINATION FACTORS

		Iodine	Cesium & Rubidium	Other Nuclides
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	1	1	1
	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 $< 10^{-5} \mu$Ci/cc
b) Used when influent activity $\geq 10^{-5} \mu$Ci/cc
c) Assumes evaporator path

Liquid Radwaste
Train "B" - Dirty Waste

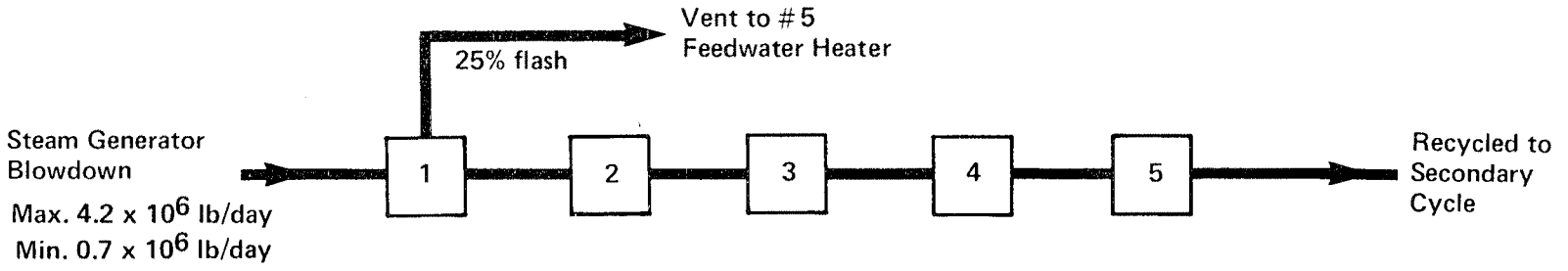
CALLAWAY PLANT

Figure 11.1A-2
(Sheet 4)

System Decontamination Factors

HISTORICAL

Figure 11.1A-2 Sheet 5 is deleted.



DECONTAMINATION FACTORS

		Iodine	Cesium & Rubidium	Other Nuclides
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	$10^2(10)$	10(10)	$10^2(10)$
	System DF	10^3	10^2	10^3

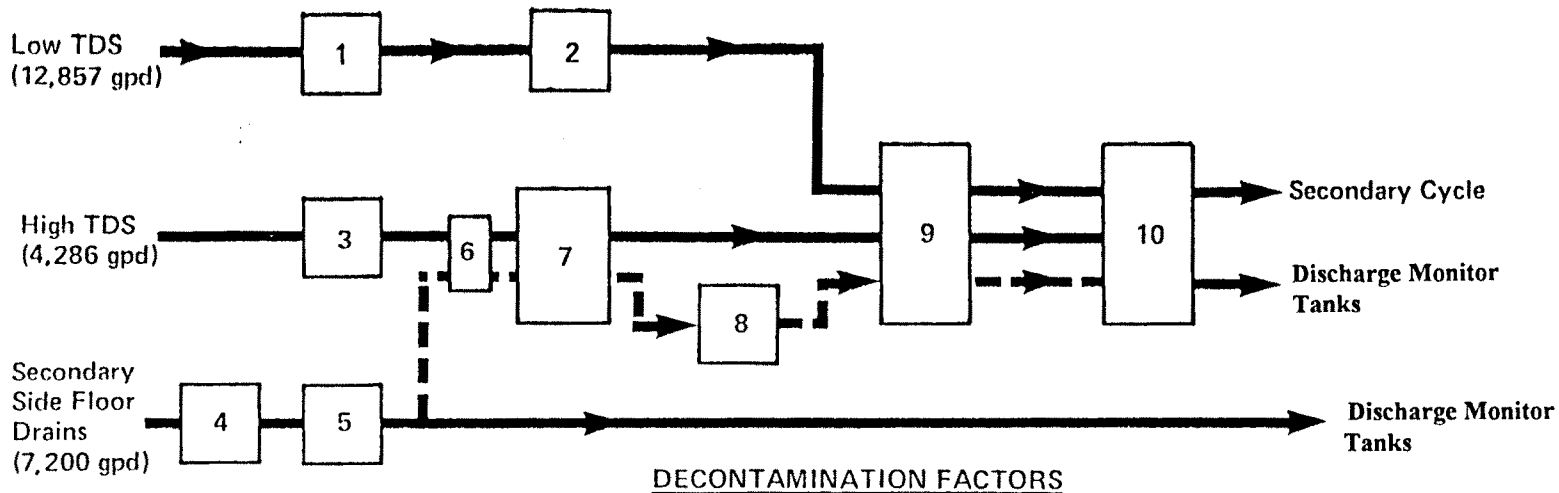
Steam Generator
Blowdown

CALLAWAY PLANT

Figure 11.1A-2
(Sheet 6)

System Decontamination Factors

HISTORICAL



DECONTAMINATION FACTORS

		Iodine	Cesium & Rubidium	Other Nuclides
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

(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.

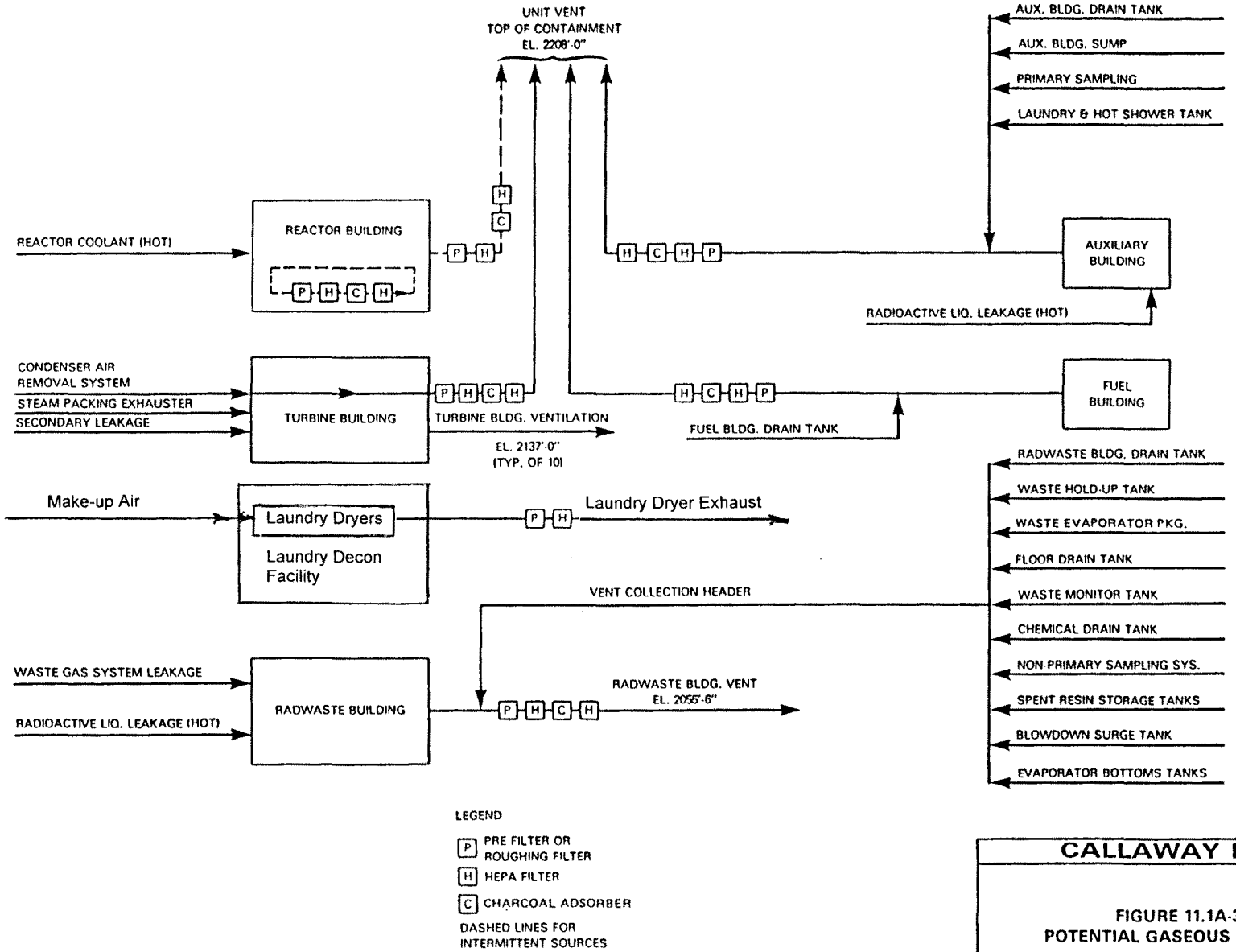
Secondary Liquid Waste System

CALLAWAY PLANT

Figure 11.1A-2
(Sheet 7)

System Decontamination Factors

HISTORICAL

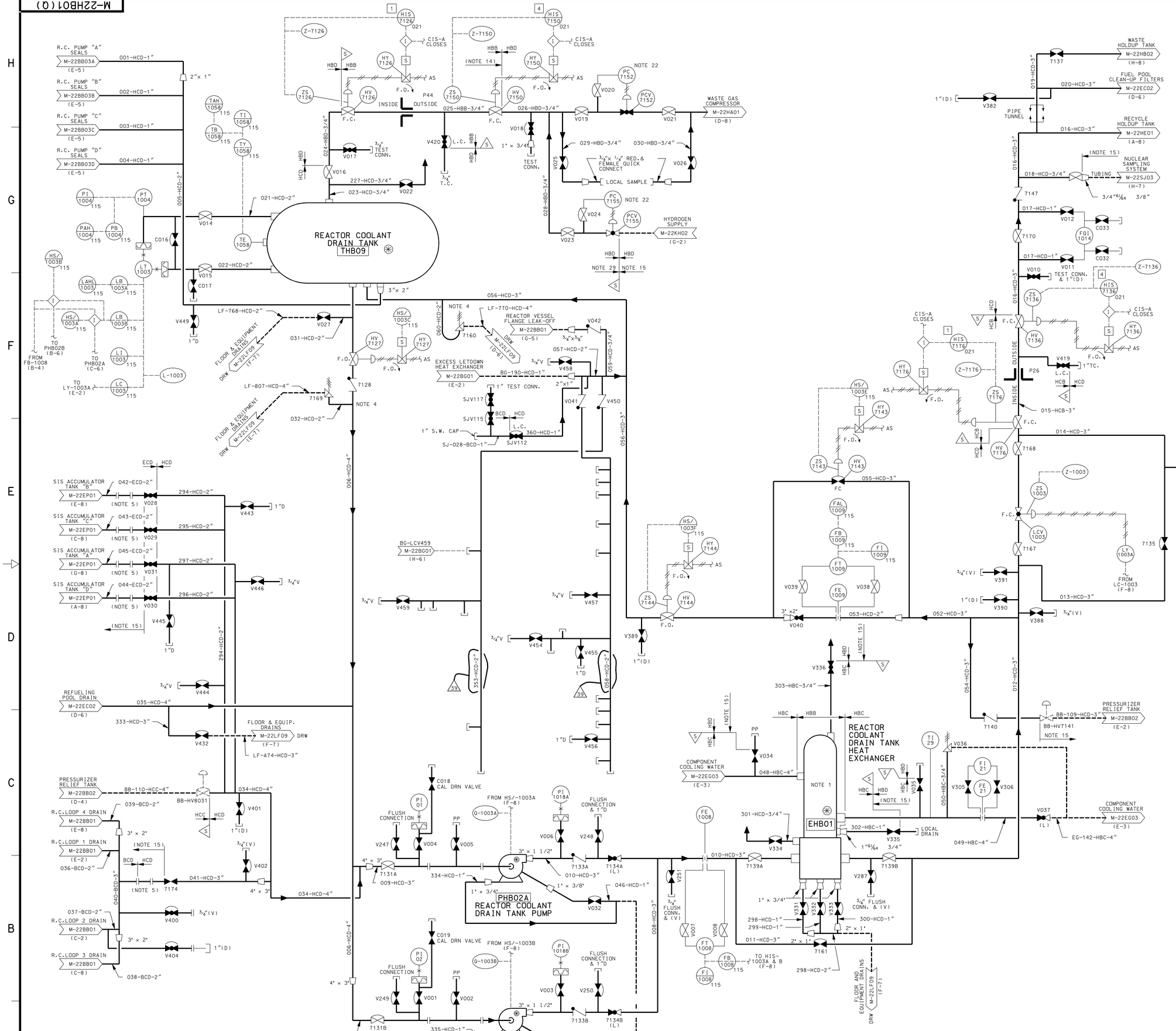


CALLAWAY PLANT

FIGURE 11.1A-3
POTENTIAL GASEOUS RELEASE

HISTORICAL

M-22HB01(Q)



NOTES:

1. THE FOLLOWING WESTINGHOUSE STANDARD EQUIPMENT IS SUPPLIED TO A HIGHER QUALITY GROUP/SEISMIC CLASSIFICATION AND PRINCIPAL CONSTRUCTION CODE THAN IS REQUIRED BASED ON ITS 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. WASTE HOLDUP TANK
   B. WASTE EVAP FEED PUMP
   C. WASTE EVAP FEED FILTER
   D. REACTOR COOLANT DRAIN TANK HEAT EXCHANGER (SHELL SIDE)
   E. FL DRAIN TANK FILTER
   F. WASTE EVAP CONDENSATE DEMINERALIZER
   G. WASTE MONITOR TANK DEMINERALIZER
   H. WASTE MONITOR TANK FILTER
   I. LAUNDRY AND HOT SHOWER TANK FILTER
2. PORTIONS OF THIS SYSTEM THAT CONTAIN RADIOACTIVE FLUIDS AND ARE IDENTIFIED BY QUALITY CLASSIFICATION "D" SHALL MEET THE AUGMENTING REQUIREMENTS.
3. THIS DRAWINGS BASED ON WESTINGHOUSE DRAWINGS 1145E06, 1145E07, SHEETS 1,2 AND 3.
4. MAKE CONNECTIONS TO SIDE OR BOTTOM OF TANK.
5. SPOOL PIECE NORMALLY REMOVED. TO BE INSTALLED ONLY AFTER DEPRESSURIZATION FOR DRAINING.
6. VENT LINES TO EXTEND WITHIN 12 INCHES OF FLOOR.
7. OVERFLOW LOOP SEAL TO EXTEND 12 INCHES BELOW TANK CONNECTION AND TO TOP OF TANK WITH SIPHON BREAK ON TOP OF LOOP SEAL.
8. LOOP SEAL TO EXTEND 12 INCHES BELOW NOZZLE AND TOP OF SEAL TO EXTEND 6 INCHES BELOW DIAPHRAGM FLANGE WITH SIPHON BREAKER LOCATED ON TOP OF LOOP.
9. LOOP SEAL TO EXTEND 12" ABOVE AND BELOW PIPE.
10. THE FOLLOWING EQUIPMENT IS SUPPLIED WITH EVAPORATOR PACKAGE BY VENDOR.
    A. Y-STRAINER-SHB14
    B. PCV-333
    C. TCV-325
    D. PCV-337
    E. FCV-329
    F. WEV-27
    G. WEV-26
11. LOOP SEAL TO EXTEND 12 INCHES BELOW PIPE.
12. THE PORTION OF THIS SYSTEM THAT IS Q-LISTED INCLUDES PIPING AND VALVES ASSOCIATED WITH CONTAINMENT PENETRATIONS AND THE SHELL SIDE OF THE REACTOR COOLANT DRAIN TANK HEAT EXCHANGER AND ITS ASSOCIATED PIPING AND VALVES.
13. MECHANICAL DESIGNATIONS PER M-2G001.
14. THIS POINT DEFINES THE "O" BOUNDARY FOR CONTAINMENT ISOLATION. FROM THIS POINT DOWNSTREAM PIPING IS ANALYZED CONSIDERING A SINGLE DEGREE OF FREEDOM.
15. 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.
16. DELETED
17. CONTROLS FOR WASTE EVAPORATOR ARE ON PANEL HB135 (WASTE EVAPORATOR CONTROL PANEL).
18. LINES 014 & 015 TO BE SCH. 80S WITH SCH. 40S BORE TO MATCH VALVES 7168, 7135, LCV-1003 AND HV-7136.
19. INDICATED PORTIONS OF THIS SYSTEM TO BE 316L SS.
20. INDICATED VALVES TO LOCATED CLOSE TOGETHER.
21. LOCATE INDICATOR WITHIN VIEW PUMP THROTTLING VALVE.
22. PRESSURE CONTROLLER IS VALVE MOUNTED.
23. INSTRUMENTATION IDENTIFIED BY THIS NOTE IS SUPPLIED BY THE SOLID RADWASTE PACKAGE VENDOR UNDER SPECIFICATION M-135.
24. CONNECTIONS TO BE SEAL WELDED.
25. PIPING AND INSTRUMENTATION DIAGRAM FOR THE REVERSE OSMOSIS UNIT IS SHOWN ON BECHTEL DWG. M-136-00025.
26. PIPING AND INSTRUMENTATION DIAGRAM FOR THE WASTE EVAPORATOR IS SHOWN ON WESTINGHOUSE DWG. 4669D04.
27. REMOVABLE SPOOL PROVIDED FOR START-UP.
28. LOCATE WASTE EVAPORATOR REAGENT TANK TO ALLOW GRAVITY DRAIN TO WASTE EVAPORATOR.
29. PIPING DOWNSTREAM OF THIS POINT IS ANALYZED CONSIDERING A SINGLE DEGREE OF FREEDOM.
30. STAINLESS STEEL PT COUPLING HOSE FITTINGS AND ASSOCIATED PLUGS/CAPS MAY BE USED INSTEAD OF VENTS AND DRAINS CAPS PER RFR-13719 REV. A.
31. FAUCET ASSEMBLIES MAY BE INSTALLED FOR SAMPLING AS NECESSARY ON VENTS, DRAINS AND TEST CONNECTIONS. WHEN NOT IN USE, THE FAUCET ASSEMBLIES SHOULD BE IN THE NORMALLY CLOSED POSITION.
32. CONNECTIONS ARE FOR AUXILIARY PROCESSING (i.e.FILTERING AND/OR DEMINERALIZATION).
33. THE PORTIONS OF LINES 500 AND 501 BETWEEN VALVES V816 AND V817 AND THEIR RESPECTIVE IN-LINE MIXING SECTIONS ARE LINED PIPE SUPPLIED BY OTHERS.

REV.	DATE	DRAWN	CHKD.	SUPV.
32	111105	RLW	EWM	SKC
INCORPORATE MP 89-1035A (PARTIAL)				
33	030507	RLW	EWM	SKC
INCORPORATE MP 89-1035A (PARTIAL)				
34	040407	RLW	EWM	TWS
INCORPORATE MP 89-1035A (PARTIAL)				
35	082208	RLW	EWM	TWS
INCORPORATE CR CAR 08-00021B1 CAR 200804353				
36	102808	RLW	TJC	LMR
INCORPORATE MP 89-1035A (PARTIAL)				
37	102908	RLW	EWM	LMR
INCORPORATE MP 89-1035A (PARTIAL)				
38	042610	RLW	EWM	LMP
INCORPORATE MP 89-1035A (PARTIAL)				
39	051110	MAL	TJC	LMP
INCORP. CAR 201004346				

AS-BUILT CLASS 1

DRAWN (DATE) N/A	PIPING AND INSTRUMENTATION DIAGRAM LIQUID RADWASTE SYSTEM		
CHKD. (DATE) N/A	FSAR FIGURE 11.2-1 SHEET 1		
SUPV. (DATE) N/A			
APPD. (DATE) N/A	LOCATION	CLASS	
UNION ELECTRIC COMPANY ST. LOUIS, MO	CALLAWAY PLANT	M-22HB01(Q)	REV. 39

M-22HB02

WASTE HOLDUP TANK
THB02
(NOTE 1)

FLOOR DRAIN TANK
THB01A

FLOOR DRAIN TANK
THB01B

WASTE EVAPORATOR FEED PUMP
PHB03 (NOTE 1)

WASTE EVAPORATOR FEED FILTER
FHB11

FLOOR DRAIN TANK PUMPS
PHB07B
PHB07A

FLOOR DRAIN TANK STRAINER
FHB12

FLOOR DRAIN TANK FILTER
FHB06

FHB15A
FHB15B
FHB16A
FHB16B

WASTE EVAPORATOR PACKAGE
SHB01
(NOTES 17 & 26)

WASTE EVAPORATOR STEAM INLET STRAINER
SHB14

WASTE EVAPORATOR CONCENTRATES PUMP
SHB09

WASTE EVAPORATOR REAGENT TANK
THB08
(NOTE 28)

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

REV.	DATE	DRAWN
5	032392	SBR
CHKD.	SUPV.	APPD.
RAM	TJM	N/A

REDRAWN FOR CLARITY.

REV.	DATE	DRAWN
6	038795	RAM
CHKD.	SUPV.	APPD.
EWM	AMR	N/A

INCORPORATE T.M. 95-M008

REV.	DATE	DRAWN
7	071996	RAM
CHKD.	SUPV.	APPD.
JHK	AMR	N/A

REMOVE T.M. 95-M008 PER W 178617

REV.	DATE	DRAWN
8	112897	RAM
CHKD.	SUPV.	APPD.
HLP	AMR	N/A

INCORPORATES DEC# 1491

REV.	DATE	DRAWN
9	060998	RLW
CHKD.	SUPV.	APPD.
DJB	AMR	N/A

INCORP. MP89-1035 (PARTIAL)

REV.	DATE	DRAWN
10	062598	SKC
CHKD.	SUPV.	APPD.
DLB	AMR	N/A

INCORP. RFR-18922A

REV.	DATE	DRAWN
11	071300	RAM
CHKD.	SUPV.	APPD.
DJB	JHC	N/A

AS-BUILT TEMP. MOD. 00-0006 PER B. ALLEN

REV.	DATE	DRAWN
12	010901	RAM
CHKD.	SUPV.	APPD.
DJB	AMR	N/A

INCORPORATES RFR-20876A

REV.	DATE	DRAWN
13	030701	DJB
CHKD.	SUPV.	APPD.
MAL	AMR	N/A

INCORP. TEMP. MOD. 00-0011

REV.	DATE	DRAWN
14	031902	RAM
CHKD.	SUPV.	APPD.
DJB	AMR	N/A

INCORPORATES TEMP. MOD. 01-0009. REMOVES T.M. 00-0006 & T.M. 00-0011.

REV.	DATE
15	020403
DRAWN	CHKD.	SUPV.
RLW	EWM	TDH

INCORPORATE MP 89-1035A (PARTIAL)

REV.	DATE
16	010904
DRAWN	CHKD.	SUPV.
TJC	JHK	TWS

INCORPORATE MP 01-1001B

REV.	DATE
17	041104
DRAWN	CHKD.	SUPV.
JHK	EWM	TWS

REMOVE TEMP. MOD. 01-0009.

REV.	DATE
18	110904
DRAWN	CHKD.	SUPV.
MAL	RLW	TWS

INCORP. RFR-22941A

REV.	DATE
19	010306
DRAWN	CHKD.	SUPV.
EWM	RLW	TWS

INCORPORATE MP 89-1035A

REV.	DATE
20	113007
DRAWN	CHKD.	SUPV.
EWM	RLW	TWS

INCORPORATE CAR 20070932O

AS-BUILT CLASS 1

DRAWN (DATE) N/A	PIPING AND INSTRUMENTATION DIAGRAM LIQUID RADWASTE SYSTEM		
CHKD. (DATE) N/A	FSAR FIGURE 11.2-1 SHEET 2		
SUPV. (DATE) N/A			
APPD. (DATE) N/A	LOCATION	CALLAWAY PLANT	CLASS
UNION ELECTRIC COMPANY ST. LOUIS, MO	M-22HB02		REV. 20

M-22HB03

REV.	DATE	DRAWN
4	032492	RLW
CHKD.	SUPV.	APPRV.
RBF	TJM	N/A
REDRAWN FOR CLARITY. INCORP. DEC-800 & DEC-812		
REV.	DATE	DRAWN
5	040992	MAL
CHKD.	SUPV.	APPD.
RLW	TJM	N/A
INCORP. DEC-0809 & DEC-0824.		
REV.	DATE	DRAWN
6	051199	RAM
CHKD.	SUPV.	APPD.
JHK	AMR	N/A
INCORP. TEMP MOD 97-M002		
REV.	DATE	DRAWN
7	112897	RAM
CHKD.	SUPV.	APPD.
HLP	AMR	N/A
INCORPORATES DEC# 1491		
REV.	DATE	DRAWN
8	122297	RAM
CHKD.	SUPV.	APPD.
HLP	AMR	N/A
REMOVED TEMP. MOD 97-M002		
REV.	DATE	DRAWN
9	033000	JHK
CHKD.	SUPV.	APPD.
MAL	AMR	N/A
INCORP. MP 97-1006 FCN-10.		
REV.	DATE	DRAWN
10	010901	RAM
CHKD.	SUPV.	APPD.
DJB	AMR	N/A
INCORP. RFR-20876A		
REV.	DATE	
11	072104	
DRAWN	CHKD.	SUPV.
JHK	MAL	TWS
INCORP. RFR-23234A.		
REV.	DATE	
12	110904	
DRAWN	CHKD.	SUPV.
MAL	RLW	TWS
INCORP. RFR-22941A		

AS-BUILT CLASS 1

NOTES:

FOR NOTES SEE DWG. M-22HB01

DRAWN (DATE) N/A	PIPING & INSTRUMENTATION DIAGRAM LIQUID RADWASTE SYSTEM	
CHKD. (DATE) N/A	FSAR FIGURE 11.2-1 SHEET 3	12
SUPV. (DATE) N/A		
APPD. (DATE) N/A	LOCATION: CALLAWAY PLANT	CLASS
UNION ELECTRIC COMPANY ST. LOUIS, MO	M-22HB03	REV. 12

M-22HB04

REV.	DATE	DRAWN
7	940992	RLW
CHKD.	SUPV.	APPD.
RAM	TJM	N/A

REDRAWN FOR CLARITY. INCORP. DEC-0813, DEC-0824, & DEC-0829.

REV.	DATE	DRAWN
8	031497	RAM
CHKD.	SUPV.	APPD.
JHK	AMR	N/A

INCORPORATES DEC # 1406

REV.	DATE	DRAWN
9	032598	MAL
CHKD.	SUPV.	APPD.
EWM	JHK	N/A

INCORP MP 97-1006 FCN-06.

REV.	DATE	DRAWN
10	031302	RAM
CHKD.	SUPV.	APPD.
DJB	AMR	N/A

INCORPORATES TEMP. MOD 01-0009.

REV.	DATE
11	041104
DRAWN	CHKD.	SUPV.
JHK	EWM	TWS

REMOVE TEMP. MOD. 01-0009.

REV.	DATE
12	081804
DRAWN	CHKD.	SUPV.
MAL	RLW	SKC

INCORP. MP 01-1001B.

REV.	DATE
13	110904
DRAWN	CHKD.	SUPV.
MAL	RLW	TWS

INCORP. RFR-22941A

REV.	DATE
14	101706
DRAWN	CHKD.	SUPV.
JHK	MAL	SKC

INCORP. AC 06-000157 (CAR 200408555)

REV.	DATE
15	112106
DRAWN	CHKD.	SUPV.
MAL	TJC	TWS

INCORP. AC 06-000184 (CAR 200600556)

REV.	DATE
16	022708
DRAWN	CHKD.	SUPV.
MAL	TJC	TWS

INCORP. MP 07-0091.

NOTE 15 — LD SYS | HB SYS — TUNNEL — V516 — DETERGENT DRAIN TANK M-22LD01 (E-6) — LD-027-HCD-3" — LAUNDRY DECON FACILITY SUMP M-22LD01 (D-5) — LF-A19-HCD-2" — LAUNDRY & HOT SHOWER TANK A M-22HB04 (F-5) — V326 — 292-HCD-2" — NUCLEAR SAMPLING SYSTEM M-22SJ02 (C-1) — (TUBING) — 3/8" X 3/4" — V346 — 309-HCD-3/4" — 2" X 3/4" — V427 — 1" (D) — 228-HCD-1" — 214-HCD-3" (NOTE 9)

LAUNDRY AND HOT SHOWER TANK B — THB06 — (NOTE 6) (NOTE 15) — LAHL 1010 115 — LIS 1010 115 — LI 1010 — LT 1010 — C011 — V280 — 229-HCD-2" — V240 — 233-HCD-3/4" — 3/4" X 3/8" — V241 — (TUBING) — NUCLEAR SAMPLING SYSTEM M-22SJ02 (H-4)

215-HCD-2" — 230-HCD-1" — V238 — LOCAL DRAIN — HS/ 1010 115 — LS 1010 115 — Q-1010 — PP AND FLUSH CONN. — V216 — V299 — TO REVERSE OSMOSIS UNIT (F-3) — 2" X 1 1/2" — 1" X 2" — 1" X 3/8" — LOCAL DRAIN — V239 — 231-HCD-1" — 1" X 3/4" — 341-HCD-1" — DRW — 232-HCD-1"

LAUNDRY & HOT SHOWER TANK PUMP B — PHB05 — 216-HCD-2" — V217 — V300 — 3/4" FLUSH CONN. — V218 — V370 — PI 1018C — TO DMT'S M-22HF05 (H-3) — V517 — V542 — 725-HCD-2" — HF-989-HCD-2"

V534 — PI 358 — V535 — FHB20A — V536 — V537 — PI 359 — V538 — PI 360 — V539 — FHB20B — V540 — V541 — PI 361 — V409 — 218-HCD-2" — 3/4"(V) — V473 — 2" X 1" — V223 — 726-HCD-2"

ALPS M-22HC01 (G-3) — 3/4" (V) — V474 — LOCAL DRUM COLLECTION — V471 — 354-HCD-1" — 244-HCD-1" — 2"x 1" — V253 — V544 — 3/4" (V) — V475 — 343-HCD-2" — FROM LAUNDRY & HOT SHOWER TANK LEVEL/PUMP CONTROL (F-7)

227-HCD-2" — 219-HCD-1" — M-22HB04 (C-1) — V435

NOTE 24 — 349-HBD-1/2" — ACID METERING PUMP SKID — SHB07 — TO V713 (I-10) — FROM V-712 (I-11) — NOTE 24 — 1/2" (V) — V476 — V481 — 1/2" (D) — 16 — ACID ADDITION TANK LOW-LEVEL

R. O. MODULE SKID — SHB13 — REJECT — FEED — PERMEATE — V728 — PT 708 — TO PI-708 — 703-GCD-1" — 704-GCD-1" — 718-GCD-1"

244-HCD-1" — 715-HBD-1 1/2" NOTE 15 — FROM HV-710 (I-14) — TO RECYCLE TANK (I-12) — TO FCV-706 — FROM HV-705 — FROM HV-711 (I-2) — TO HCV-707

R. O. PROCESS SKID — SHB04 — CONTROL PANEL — HB138 — TO HV-701 (I-1) — FROM HV-707 (I-3) — HEAT EXCHANGER — (I-9) — (I-8) — TO HV-712 (I-13) — TO V731 (I-15) — 2" X 1" — 3/4" (V) — V477 — 717-HBD-1 1/2" NOTE 15 — 2" X 1 1/2" — 716-HBD-1 1/2" NOTE 15 — V478 — 1 1/2" X 1 1/4" — (I-5) — (I-4)

R. O. CHILLER UNIT — SHB08 — (I-6) — (I-7)

V342 — EG-312-HBD-1" — 307-HBD-3/4" — NOTE 15 — V328 — COMPONENT COOLING WATER M-22EG03 (A-8) — EG-311-HBD-2" — 3/4" PP — V344 — TI 30 — 306-HBD-2" — 305-HBD-2" NOTE 15 — COMPONENT COOLING WATER M-22EG03 (A-8) — V343 — 3/4" PP — 2" X 1"

348-JDD-3/4" NOTE 15 — INSTRUMENT AIR M-22KA03 (D-5)

REVERSE OSMOSIS UNIT (SEE NOTE 25)

DETERGENT DRAIN TANK M-22HB04 (H-8) — SECONDARY LIQUID WASTE MONITOR TANK M-22HF02 (C-3) — 245-HCD-2" — WASTE MONITOR TANK M-22HB03 (C-4) — 212-HCD-2" — 292-HCD-2"

WASTE MONITOR TANK DEMINERALIZER M-22HB03 (A-6) — 281-HCD-2" — 1" (D) — V462 — LAUNDRY & HOT SHOWER TANK A & B M-22HB04 (B-1) — 261-HCD-2" — 277-HCD-2" — V309 — WASTE MONITOR TANK DEMINERALIZER M-22HB03 (C-7) — 280-HCD-2" — V318 — 1" (D) — V461 — V224 — V286 — V246 — V225 — 221-HCD-2"

282-HCD-1" — WASTE MONITOR TANK — THB07B — TANK NO. 1 — (NOTES 6 & 15) — 286-HCD-1" — V323 — 283-HCD-2" — V320 — X X — LT 1082 — C013 — 287-HCD-3/4" — V324 — 3/4" X 3/8" — NUCLEAR SAMPLING SYSTEM M-22SJ02 (H-4) — (TUBING)

LOCAL CHARCOAL FILL — 247-HCD-3" — V254 — V226 — 222-HCD-1" — 249-HCD-1" — 248-HCD-2" — V256 — DRW — RETENTION ELEMENT — V255 — HC-195-HCD-2" — SPENT RESIN TANK (SECONDARY) M-22HC02 (D-3)

LAUNDRY & HOT SHOWER CHARCOAL ADSORBER — FHB14 — PDI 28 — V338 — V339 — 223-HCD-3" — 250-HCD-3" — V257 — HC-194-HCD-3" — SPENT RESIN TANK (SECONDARY) M-22HC02 (D-3)

251-HCD-3" — V258 — HC-198-HCD-3" — SPENT RESIN SLUICE PUMP (SECONDARY) M-22HC03 (F-8) — 3" X 1" — 252-HCD-1" — V259 — LOCAL DRAIN — 225-HCD-1"

284-HCD-1" — V321 — DRW — LAHL 1082 115 — LI 1082 — HS/ 1082 115 — LIS 1082 15 — LS 1082 115 — 278-HCD-2" — Q-1082 — PP AND FLUSH CONNECTION — V310 — V311 — FLUSH CONNECTION — V312 — V313 — PI 1084A — 2" X 1 1/2" — 1" X 2" — 279-HCD-2" — V314 — 1" X 3/8" — 1" X 3/4" — WASTE MONITOR TANK PUMP — PHB01B — PUMP NO. 1 — 285-HCD-1" — V322 — 342-HCD-1" — DRW

FI 1085C — NOTE 21 — V315 — FI 1085A 115 — FT 1085A — FE 1085A — V316 — 3/4" (V) — V468 — DISCHARGE LINE M-22HB03 (B-4) — V317 — 279-HCD-2"

PDI 27 — V228 — YS 2 — V229 — V227 — 224-HCD-1" — 1" X 1/2" — V260 — 253-HCD-1" — LOCAL DRAIN — V230

NOTE 9 — 255-HCD-2" (NOTE 15) — 3" CHEMICAL ADDITION — V428 — 1"D. — LAUNDRY & HOT SHOWER TANK A — THB10 — (NOTE 6) — 259-HCD-1" — V262 — 256-HCD-3/4" — X X — LT 7 — C012 — V263 — 257-HCD-1" — LOCAL DRAIN

HIS 7 132 — LAHL 7 132 — LSHL 7 188 — FROM WASHING MACHINES (F-1) — LS 7 188 — LI 7B — Q-7 — PI 8 — LI 7A 132 — PP & FLUSH CONNECTION — V231 — V301 — V232 — 226-HCD-2" — V265 — 3/4" X 3/8" — (TUBING) — NUCLEAR SAMPLING SYSTEM M-22SJ02 (H-4) — V266 — 260-HCD-3/4" — FLUSH CONN. — V302 — V233 NOTE 3 — 227-HCD-2" — 2" X 1 1/2" — 1" X 1/2" — V264 — 258-HCD-1" — LOCAL DRAIN — LAUNDRY & HOT SHOWER TANK A PUMP — PHB10

V518 — PI 350 — V519 — FHB18A — V520 — V521 — PI 351 — V522 — PI 352 — V523 — FHB18B — V524 — V525 — PI 353 — 227-HCD-2" — V236

DISCHARGE LINE M-22HB04 (E-6) — 227-HCD-2" — WASTE MONITOR TANK "B" M-22HB04 (D-8) — 261-HCD-2" — V267

AS-BUILT CLASS 1

NOTES:

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

DRAWN	(DATE) N/A	PIPING AND INSTRUMENTATION DIAGRAM LIQUID RADWASTE SYSTEM	
CHKD.	(DATE) N/A	FSAR FIGURE 11.2-1 SHEET 4	
SUPV.	(DATE) N/A		
APPD.	(DATE) N/A	LOCATION: CALLAWAY PLANT	CLASS
UNION ELECTRIC COMPANY ST. LOUIS, MO		M-22HB04	REV. 16

M-22HB05

NOTES:

SEE DWG M-22HB01 GENERAL NOTES

REV.	DATE	DRAWN
13	031792	DJB
CHKD.	SUPV.	APPD.
DLB	TJM	N/A

REDRAWN FOR CLARITY. INCORP. DEC 809 & RFR-07798A

REV.	DATE	DRAWN
14	030391	RAM
CHKD.	SUPV.	APPD.
JHK	AMR	N/A

INCORPORATES RMP 93-2005

REV.	DATE	DRAWN
15	101491	RAM
CHKD.	SUPV.	APPD.
HLP	JHC	N/A

INCORPORATES CMP 96-1017

REV.	DATE	DRAWN
16	051699	RAM
CHKD.	SUPV.	APPD.
EWM	JHC	N/A

INCORPORATES DEC #1626

REV.	DATE	DRAWN
17	120100	MAL
CHKD.	SUPV.	APPD.
SKC	JHC	N/A

INCORP. MP 96-1017 FCN-04.

REV.	DATE	DRAWN
18	120800	DJB
CHKD.	SUPV.	APPD.
MAL	AMR	N/A

INCORP. RFR-20974A

REV.	DATE	DRAWN
19	012901	RAM
CHKD.	SUPV.	APPD.
DJB	AMR	N/A

INCORPORATES TEMP. MOD. 01-0001

REV.	DATE	DRAWN
20	082301	RAM
CHKD.	SUPV.	APPD.
DJB	AMR	N/A

REMOVE TEMP. MOD. 01-0001

REV.	DATE
21	042005
DRAWN	CHKD.	SUPV.
TJC	MAL	TWS

INCORP. RFR 22941A

AS-BUILT CLASS 1

DRAWN (DATE) N/A	PIPING AND INSTRUMENTATION DIAGRAM LIQUID RADWASTE SYSTEM (21)		
CHKD. (DATE) N/A	FSAR FIGURE 11.2-1 SHEET 5		
SUPV. (DATE) N/A			
APPD. (DATE) N/A	LOCATION	CALLAWAY PLANT	CLASS
UNION ELECTRIC COMPANY ST. LOUIS, MO	M-22HB05		REV. 21

M-22HA01

NOTES:

1. SEE WESTINGHOUSE DRAWING NUMBER 15-0599 SPIN GHAPCP.
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 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

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 VALVE AND ORIFICE UNION 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 INDENTIFIED BY THIS NOTE ARE NOT QUALITY GROUP "D" AUGUMENTED. AUGMENTED REQUIREMENTS DO NOT APPLY TO INSTRUMENTATION AND SAMPLING PIPING DPWNSTREAM OF 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-23B628.

12

REV.	DATE	DRAWN
3	042292	EWM
CHKD.	SUPV.	APPD.
SKC	TJM	N/A

REDRAWN FOR CLARITY. INCORP. DEC-0843.

REV.	DATE	DRAWN
4	071692	MAL
CHKD.	SUPV.	APPD.
RAM	TJM	N/A

INCORP. CMP 88-1025.

REV.	DATE	DRAWN
5	030397	RAM
CHKD.	SUPV.	APPD.
JHK	AMR	N/A

INCORP. DEC #1398

REV.	DATE	DRAWN
6	042891	RAM
CHKD.	SUPV.	APPD.
JHK	AMR	N/A

INCORP. DEC #1427

REV.	DATE	DRAWN
7	062598	MAL
CHKD.	SUPV.	APPD.
JHK	AMR	N/A

INCORP. RFR 18922A.

REV.	DATE
8	100604
DRAWN	CHKD.	SUPV.
JHK	EWM	TWS

INCORP. MP 98-1032 FCN-07.

REV.	DATE
9	042005
DRAWN	CHKD.	SUPV.
TJC	MAL	TWS

INCORP. RFR 22941A

REV.	DATE
10	082208
DRAWN	CHKD.	SUPV.
RLW	EWM	TWS

INCORPORATE CR CAR 08-00021B & CAR 200804353

REV.	DATE
11	110910
DRAWN	CHKD.	SUPV.
MAL	TJC	TWS

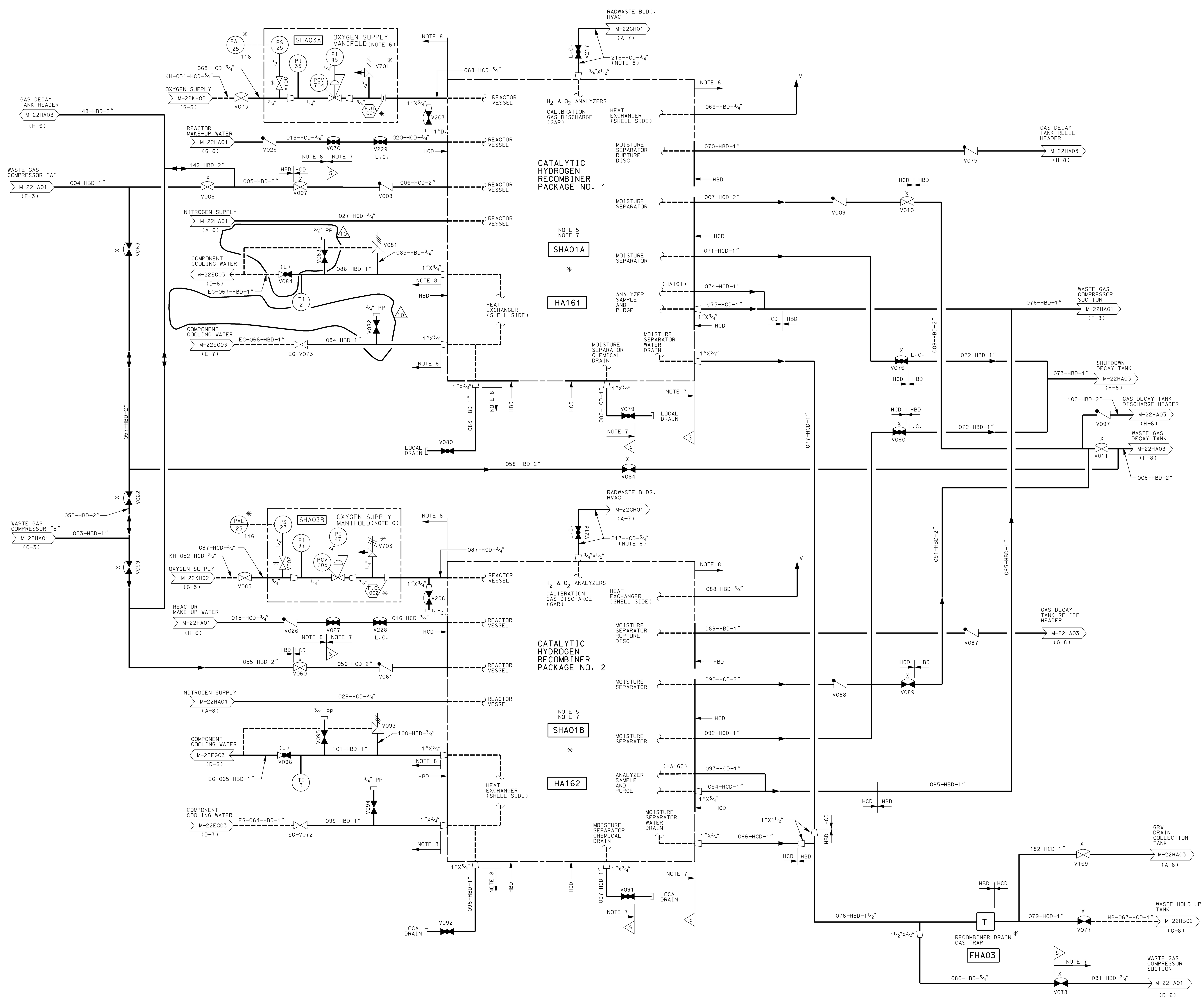
INCORP. TM 10-0012.

REV.	DATE
12	060111
DRAWN	CHKD.	SUPV.
MAL	TJC	LMP

REMOVE TM 10-0012. REV. 1.

AS-BUILT CLASS 1

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



NOTES:

FOR GENERAL NOTES SEE DRAWING M-22HA01.

REV.	DATE	DRAWN	CHKD.	SUPV.	APPD.	DESCRIPTION
5	042192	EWM	SKC	TJM	N/A	REDRAWN FOR CLARITY.
6	062598	MAL	JHK	AMR	N/A	INCORP. RFR 18922A.
7	100603	JHK	MAL	TWS		INCORP. RFR-22739A.
8	110904	MAL	RLW	TWS		INCORP. RFR-22941A
9	110910	MAL	TJC	TWS		INCORP. TM 10-0012.
10	060111	MAL	TJC	LMP		REMOVE TM 10-0012, REV. 1.

AS-BUILT CLASS 1

DRAWN (DATE) N/A	PIPING AND INSTRUMENTATION DIAGRAM GASEOUS RADWASTE SYSTEM
CHKD. (DATE) N/A	
SUPV. (DATE) N/A	FSAR FIGURE 11.3-1 SHEET 2
APPD. (DATE) N/A	LOCATION: CALLAWAY PLANT; CLASS
UNION ELECTRIC COMPANY ST. LOUIS, MO	M-22HA02 REV. 10

M-22HA03

NOTES:

FOR GENERAL NOTES SEE M-22HA01.

REV.	DATE	DRAWN
3	031792	SBR
CHKD. RAM	SUPV. TJM	APPD. N/A

REDRAWN FOR CLARITY. INCORP. CMP 91-1027.

REV.	DATE	DRAWN
4	020295	MAL
CHKD. RAM	SUPV. AMR	APPD. N/A

INCORP. RFR-15458A.

REV.	DATE	DRAWN
5	122298	RAM
CHKD. DLB	SUPV. JHC	APPD. N/A

INCORP. RFR-18977A

REV.	DATE	DRAWN
6	010901	RAM
CHKD. DJB	SUPV. AMR	APPD. N/A

INCORP. RFR-20876A

REV.	DATE
7	042005
DRAWN TJC	CHKD. MAL	SUPV. TWS

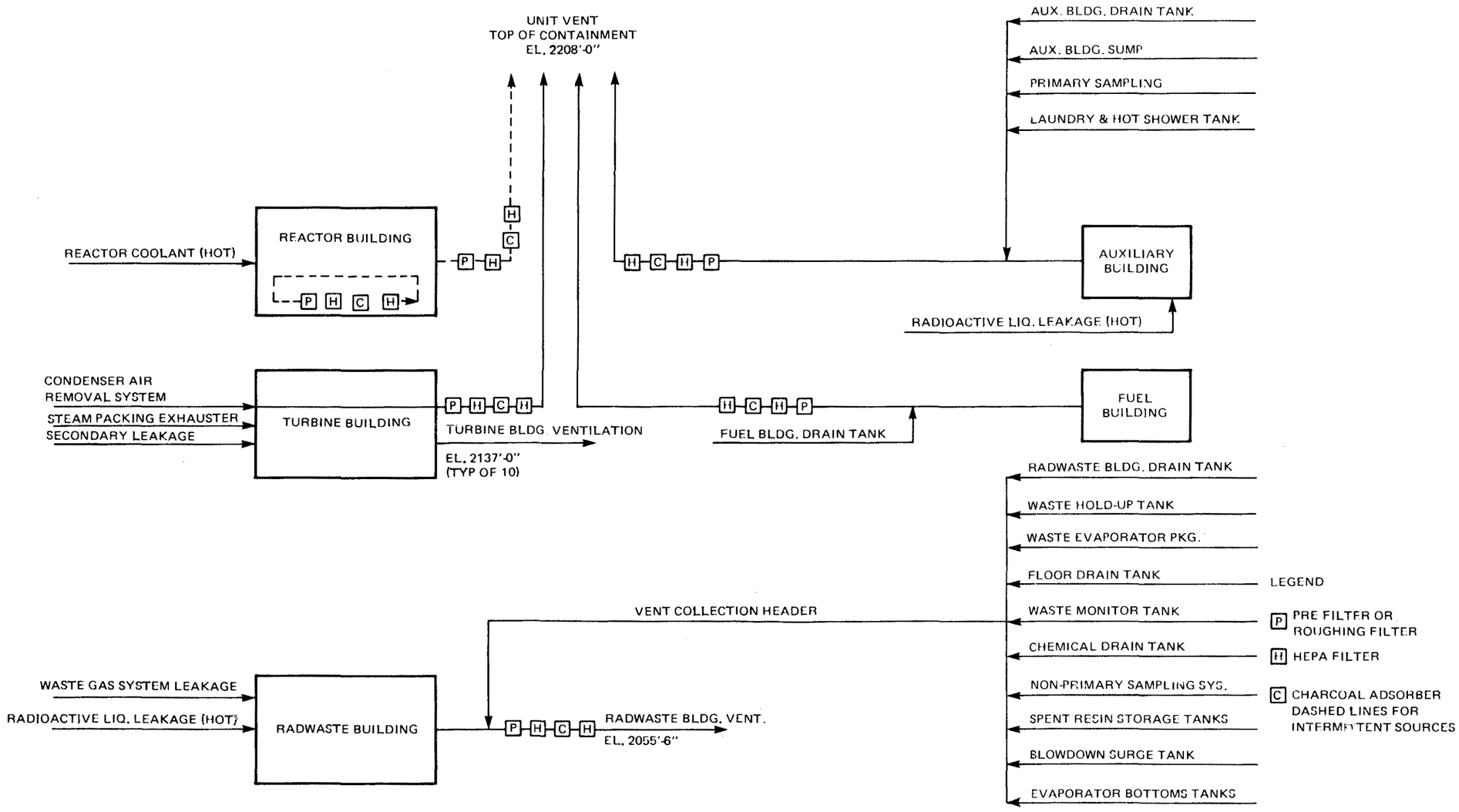
INCORP. RFR 22941A

REV.	DATE
8	011410
DRAWN TJC	CHKD. MAL	SUPV. TWS

INCORP. CAR 200910001.

AS-BUILT CLASS 1

DRAWN (DATE) N/A	PIPING AND INSTRUMENTATION DIAGRAM GASEOUS RADWASTE SYSTEM FSAR FIGURE 11.3-1 SHEET 3		
CHKD. (DATE) N/A			
SUPV. (DATE) N/A			
APPD. (DATE) N/A	LOCATION	CALLAWAY PLANT	CLASS
UNION ELECTRIC COMPANY ST. LOUIS, MO		M-22HA03	REV. 8

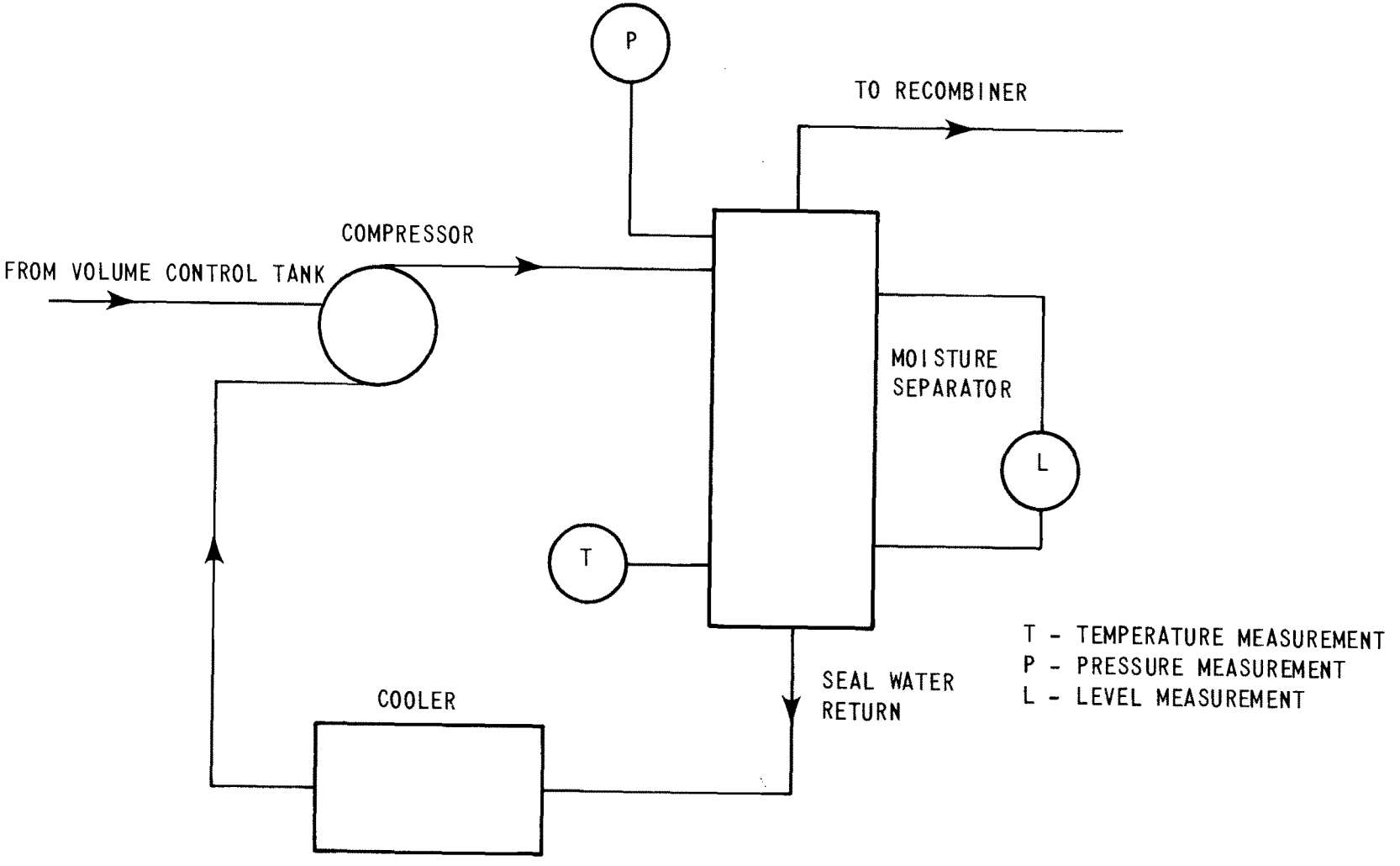


Rev. OL-0
6/86

CALLAWAY PLANT

FIGURE 11.3-2

POTENTIAL GASEOUS RELEASE

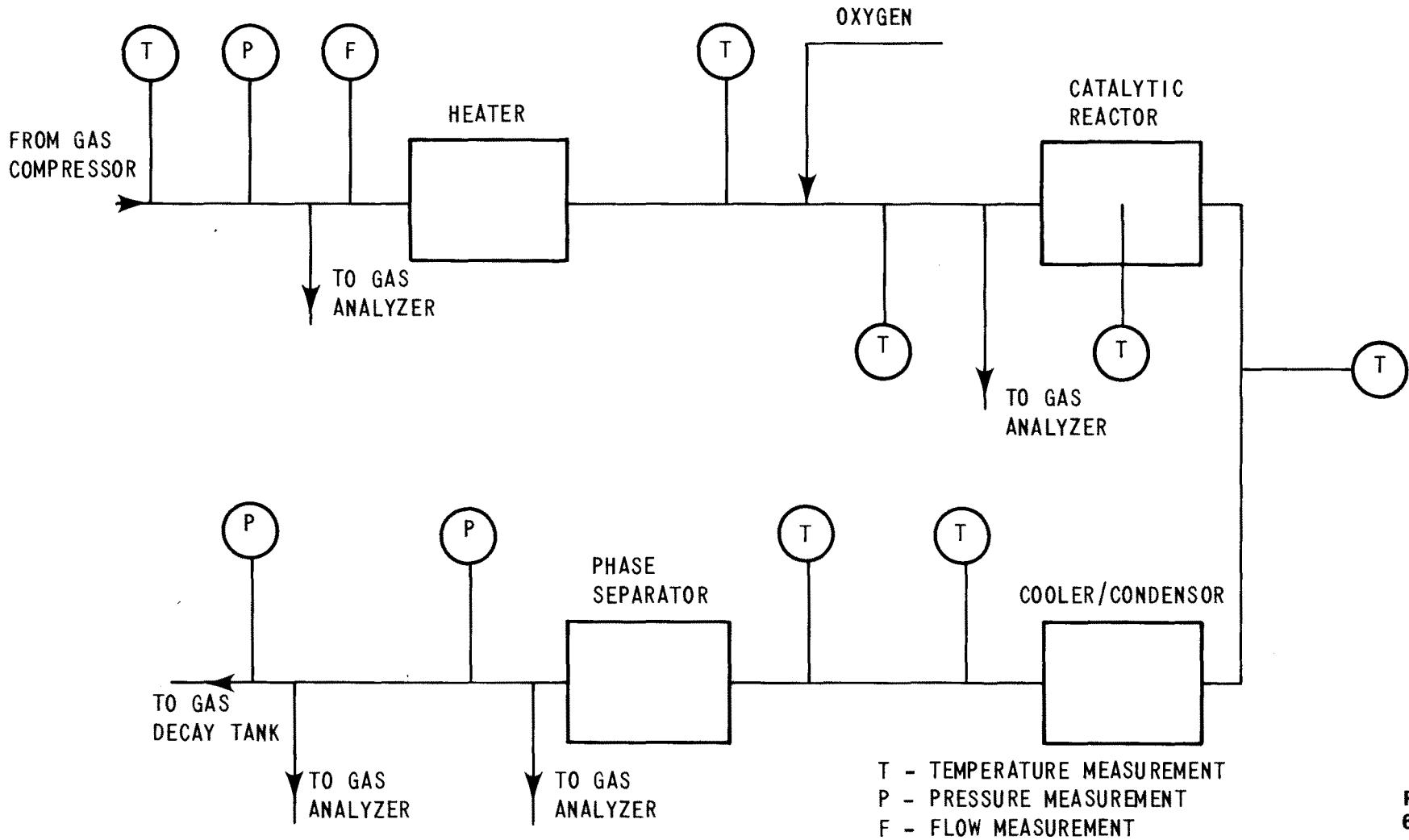


Rev. OL-0
6/86

CALLAWAY PLANT

FIGURE 11.3-3

COMPRESSOR PACKAGE INSTRUMENTS



Rev. OL-0
6/86

CALLAWAY PLANT

FIGURE 11.3-4

HYDROGEN RECOMBINER INSTRUMENTS

M-22HC01

EVAPORATOR BOTTOMS TANK (PRIMARY) THC01

EVAPORATOR BOTTOMS TANK (SECONDARY) THC09

EVAP BOTTOMS TANK PUMP (PRIMARY) PHC01

EVAP BOTTOMS TANK PUMP (SECONDARY) PHC06

SOLID RADWASTE BRIDGE CRANE

SHC07A

SHC07B

NOTE 12 & 20

DRY WASTE COMPACTOR (TYP. OF TWO)

RADWASTE BLDG SHC02

AUXILIARY BLDG SHC03

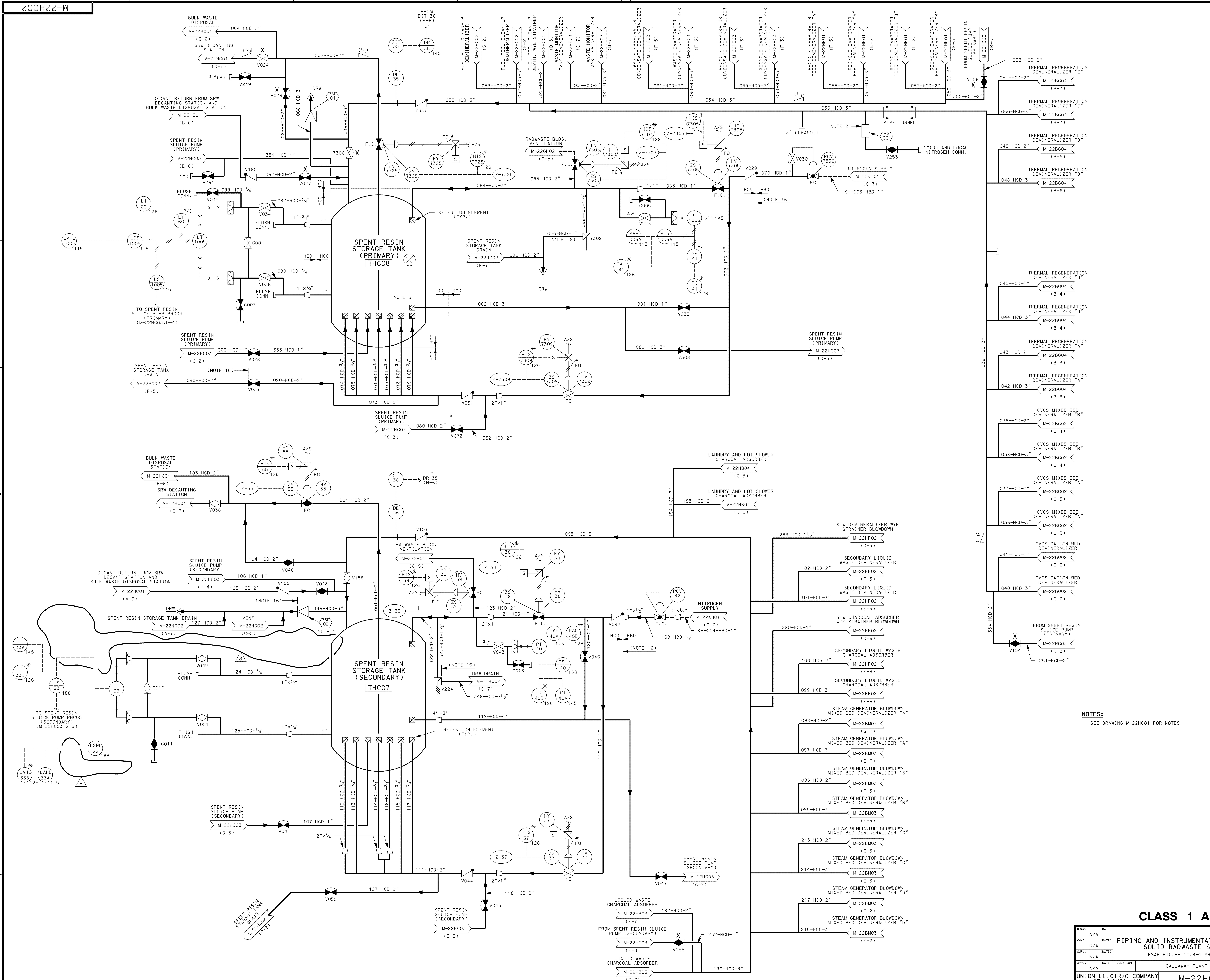
NOTES:

1. RTD LEVEL TRANSMITTER (HIGH ALARM ONLY).
2. ALL ALARMS FOR THIS SYSTEM ARE LOCATED ON THE LOCAL CONTROL PANEL; TOTAL SYSTEM LEVEL ANNUNCIATION IS PROVIDED ON THE MAIN CONTROL BOARD.
3. PORTIONS OF THIS SYSTEM THAT CONTAIN RADIOACTIVE FLUIDS AND ARE IDENTIFIED BY QUALITY GROUP CLASSIFICATION "D" SHALL MEET THE AUGMENTING REQUIREMENTS.
4. REACTOR MAKEUP WATER SUPPLY CONNECTIONS ARE PROVIDED, ONE FOR EVERY TWO DEMINERALIZERS. TO MINIMIZE THE FLEXIBLE HOSE LENGTH REQUIRED WHEN FLUSHING THE RESIN FILL LINE.
5. THE FOLLOWING STANDARD WESTINGHOUSE EQUIPMENT IS SUPPLIED TO A HIGHER QUALITY GROUP/SEISMIC CLASSIFICATION AND PRINCIPAL CONSTRUCTION CODE THAN IS REQUIRED BASED ON ITS 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 EQUIPMENT IS THE LOWER CLASSIFICATION AS INDICATED FOR THE ASSOCIATED PIPING.
   A. SPENT RESIN SLUICE PUMP (PRIMARY)
   B. SPENT RESIN SLUICE FILTER (PRIMARY)
   C. SPENT RESIN STORAGE TANK (PRIMARY)
6. HOSE AND HOSE CONNECTIONS SUPPLIED BY OWNER.
7. NOZZLE TO TANGENTIALLY PENETRATE TANK.
8. OPEN TOP TANK
9. REFER TO VENDOR P & ID'S M-135-00046 00047.00096.00182 & 00183.
10. DELETED.
11. CONTROL PANEL 126 IS BEING SUPPLIED WITH THE SOLID RADWASTE PACKAGE.
12. CRANE RAILS AND SUPPORT BEAMS FOR THE SOLID RADWASTE BRIDGE CRANE WILL BE SUPPLIED WITH THE SOLID RADWASTE PACKAGE.
13. EXTERNAL STRAP-ON HEATERS SUPPLIED BY THE TANK MANUFACTURER.
14. ACID ADDITION VALVES HV-45A,HV-45B,AND HV-45C SHALL BE LOCATED IN THE VALVE COMPARTMENTS OF THE RESPECTIVE RECEIVING EQUIPMENT.
15. CAUSTIC ADDITION VALVES HV-43A,HV-43B,HV-43C, HV-43D,HV-43E,AND HV-43F SHALL BE LOCATED IN THE VALVE COMPARTMENTS OF THE RESPECTIVE RECEIVING EQUIPMENT.
16. 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.
17. INDICATED PIPING SHALL BE SELF DRAINING FROM THE EVAPORATORS TO THE RESPECTIVE EVAPORATOR BOTTOMS TANKS.
18. OWNER PROCURED.
19. LOCAL 55 GALLON FILTRATION UNIT TO BE LOCATED AS CLOSE AS POSSIBLE TO SUMP PUMP.
20. CRANE SERVICES THE FILTER DROP STATION, SHC11A, AND THE DRUM INSPECTION AND LABELING STATION, SHC12A, SUPPLIED AS PART OF THE SOLID RADWASTE PACKAGE.
21. RETENTION SCREEN REQUIRED AS CLOSE TO RESIN SLUICE HEADER (LINE#036-HCD-3") AS POSSIBLE.
22. INSTRUMENTS MARKED BY ASTERISKS ARE SUPPLIED BY THE SOLID RADWASTE PACKAGE VENDOR.
23. PIPES AND DUCTS INDICATED BY THIS NOTE ARE SUPPLIED LOOSE BY THE SOLID RADWASTE PACKAGE VENDOR TO BE INSTALLED BY THE CONSTRUCTOR IN THE FIELD.
24. LOOP SEAL TO HAVE A SHORT LEG OF 12 INCHES AND A LONG LEG OF 24 INCHES.
25. DRAIN LINE FROM 4" HUB IN CEMENT STORAGE SILO COMPRESSOR ROOM CONCRETE PAD TO SITE.
26. INSTRUMENT TUBING TO THE STAND AND THE TWO VALVE MANIFOLD LEFT IN PLACE.
27. STAINLESS STEEL PT COUPLING HOSE FITTINGS AND ASSOCIATED PLUGS/CAPS MAY BE USED INSTEAD OF VENTS AND DRAINS CAPS PER RFR-13719 REV. A.
28. LINE HAS BEEN BLANKED OFF FROM PERMANENTLY REMOVED FROM SERVICE EQUIPMENT. REMOVED EQUIPMENT MAY BE FOUND ON NON-FUNCTIONAL DRAWINGS M-23HC10 & M-23HC14.
29. SOCKET WELDED STAINLESS STEEL PIPE CAP IS USED ON THE HXD PIPING.
30. BLIND FLANGE INSTALLED WHEN SYSTEM NOT-IN-USE.
31. (35) THE STEM IS BROKEN AND THE HANDWHEEL REMOVED FROM HCV0213. (REF. M-22HC03 (F-21).

REV.	DATE	REV.	DATE	DRAWN
29	010904	22	382799	MAL
DRAWN	CHKD.	SUPV.	CHKD.	SUPV.	APPD.
JHK	MAL	TWS	SKC	AMR	N/A
INCORP. MP 01-1001 FCN-06.			INCORP. TEMP MOD. 99-0002.		
REV.	DATE	REV.	DATE	DRAWN
30	081904	23	391555	EWM
DRAWN	CHKD.	SUPV.	CHKD.	SUPV.	APPD.
MAL	RLW	TWS	MAL	AMR	N/A
INCORP. MP 01-1001B & FCN-09.			REMOVE TEMP MOD. 99-0002.		
REV.	DATE	REV.	DATE	DRAWN
31	110904	24	312402	RAM
DRAWN	CHKD.	SUPV.	CHKD.	SUPV.	APPD.
MAL	RLW	TWS	DJB	AMR	N/A
INCORP. RFR-22941A			INCORPORATES DEC# 1801		
REV.	DATE	REV.	DATE	
32	113007	25	110603	
DRAWN	CHKD.	SUPV.	DRAWN	CHKD.	SUPV.
EWM	RLW	TWS	JHK	MAL	TWS
INCORPORATE CAR 200709320			INCORP. MP 01-1001A.		
REV.	DATE	REV.	DATE	
33	082208	26	121903	
DRAWN	CHKD.	SUPV.	DRAWN	CHKD.	SUPV.
RLW	EWM	TWS	JHK	RLW	TWS
INCORPORATE CR CAR 08-000218; CAR 200804353			INCORP. MP 01-1001 FCN-05 (PARTIAL).		
REV.	DATE	REV.	DATE	
34	081710	27	010604	
DRAWN	CHKD.	SUPV.	DRAWN	CHKD.	SUPV.
RLW	TJC	TWS	JHK	RLW	TWS
INCORPORATE CR AC 10-000044; RFR 201007756			INCORP. MP 01-1001B (PARTIAL) AND FCN-05 (PARTIAL).		
REV.	DATE	REV.	DATE	
35	121712	28	010704	
DRAWN	CHKD.	SUPV.	DRAWN	CHKD.	SUPV.
MAL	TJC	DME	JHK	MAL	TWS
INCORP. MP 12-0011, REV. 0.			INCORP. MP 01-1001 FCN-05.		

AS-BUILT CLASS 1

DRAWN N/A [DATE]	PIPING AND INSTRUMENTATION DIAGRAM SOLID RADWASTE SYSTEM		
CHKD. N/A [DATE]			
SUPV. N/A [DATE]	FSAR FIGURE 11.4-1 SHEET 1		
APPD. N/A [DATE]	LOCATION: CALLAWAY ENERGY CENTER	CLASS	
UNION ELECTRIC COMPANY ST. LOUIS, MO	M-22HC01	REV. 35	



REV.	DATE	DRAWN
4	022692	HLP
CHKD. RBF	SUPV. TJM	APPD. N/A
REDRAWN FOR CLARITY.		
5	072193	JHK
CHKD. RLW	SUPV. TJM	APPD. N/A
INCORP. CMP 90-1044.		
6	012600	RAM
CHKD. EWM	SUPV. AMR	APPD. N/A
INCORP. DEC. #1678		
7	042005	
DRAWN TJC	CHKD. MAL	SUPV. TWS
INCORP. RFR 22941A		
8	120810	
DRAWN MAL	CHKD. TJC	SUPV. TWS
INCORP. MP 08-0003. REV. 0.		

PIPING AND INSTRUMENTATION DIAGRAM SOLID RADWASTE SYSTEM

FSAR FIGURE 11.4-1 SHEET 2

DRAWN N/A · CHKD. N/A · SUPV. N/A · APPD. N/A

CALLAWAY PLANT

UNION ELECTRIC COMPANY ST. LOUIS, MO

M-22HC02 REV. 8

M-22HC03

REV.	DATE	REV.	DATE	REV.	DATE	REV.	DATE	DRAWN
16	121712	14	082307	12	010405	10	101497	RAM
DRAWN: MAL / CHKD.: TJC / SUPV.: DME		DRAWN: RLW / CHKD.: EWM / SUPV.: TWS		DRAWN: RLW / CHKD.: MAL / SUPV.: TWS		CHKD.: HLP / SUPV.: JHC / APPD.: N/A		
INCORP. MP 12-0011, REV. 0.		INCORPORATE MP 89-1035A		INCORPORATE MP 89-1035A (PARTIAL)		INCORPORATES CMP 96-1017		
REV.	DATE	REV.	DATE	REV.	DATE	DRAWN		
15	022208	13	042005	11	010901	RAM		
DRAWN: MAL / CHKD.: TJC / SUPV.: TWS		DRAWN: TJC / CHKD.: MAL / SUPV.: TWS		CHKD.: DJB / SUPV.: AMR / APPD.: N/A				
INCORP. MP 07-0091.		INCORP. RFR 22941A		INCORP. RFR-20876A				

SPENT RESIN HEADER FLUSH LINE M-22HC02 (A-4)

252-HCD-3"

LIQUID WASTE CHARCOAL ADSORBER M-22HB03 (E-7)

199-HCD-3"

STEAM GEN. BLOWDOWN MIXED BED DEMINERALIZER "D" M-22BM03 (E-2)

132-HCD-3"

STEAM GEN. BLOWDOWN MIXED BED DEMINERALIZER "C" M-22BM03 (E-3)

133-HCD-3"

STEAM GEN. BLOWDOWN MIXED BED DEMINERALIZER "B" M-22BM03 (E-5)

212-HCD-3"

STEAM GEN. BLOWDOWN MIXED BED DEMINERALIZER "A" M-22BM03 (E-7)

213-HCD-3"

SECONDARY LIQUID WASTE CHARCOAL ADSORBER M-22HF02 (E-6)

131-HCD-3"

SECONDARY LIQUID WASTE DEMINERALIZER M-22HF02 (E-5)

130-HCD-3"

LAUNDRY AND HOT SHOWER CHARCOAL ADSORBER M-22HB04 (C-5)

198-HCD-3"

199-HCD-3"

V270 1" D

129-HCD-3"

V152

V055 V056 V076 V068 LOCAL SAMPLE CONNECTIONS

¾"x¼" RED. AND FEMALE QUICK CONNECT

V153

137-HCD-1"

REACTOR MAKE UP WATER SUPPLY M-22HC01 (A-7)

118-HCD-2"

SPENT RESIN STORAGE TANK (SECONDARY) M-22HC02 (A-5)

107-HCD-1"

SPENT RESIN STORAGE TANK (SECONDARY) M-22HC02 (B-7)

FAL 33 145

HIS 33 145

FSL 33 188

FS 33 188

FI 33 145

FY 33 188

FROM LS-33 (M-22HC02, C-8)

FT 33

FE 33

C008 V063 V062 C009

SPENT RESIN SLUICE FILTER (PRIMARY) VENT

M-22HC03 (E-7)

158-HCD-¾"

HVAC M-22GH01 (H-2)

DRW

PDI 31

V058 V061 C007

SPENT RESIN SLUICE FILTER (SECONDARY) FHC02

138-HCD-¾"

V057 C006

F

128-HCD-3"

V151

V241

139-HCD-1"

V059

DRW

SPENT RESIN STORAGE TANK (SECONDARY) M-22HC02 (D-7)

V054 V053

V260 1" D

106-HCD-1"

PP AND FLUSH CONN.

V222

3"x2"

4"x3"

PHC05 SPENT RESIN SLUICE PUMP (SECONDARY)

119-HCD-4"

SPENT RESIN STORAGE TANK (SECONDARY) M-22HC02 (A-4)

1"x½"

326-HCD-1"

LOCAL DRAIN

V220

PP AND FLUSH CONN.

V221

¾"x¾"

TO REVERSE OSMOSIS UNIT & ACID METERING PUMP M-22HB04 (H-3)

CLOSES VALVES HV-45A, HV-45B, AND HV-45C

LT 48 LI 48 145

LS 48 188

FQIK 48 145

KY 48 145

HIS 48 145

PHC07 ACID ADDITION METERING PUMP

1"x¾"

HV 45A S I A/S FQ FROM KY-48

ZS 45A HIS 45A 145

SLW EVAPORATOR M-22HF04 (C-8) 336-HCD-1"

FC 1"x¾"

V212 312-HBD-¾"

HBD HXD NOTE 16

V256 ¾"D

HV 45B ZS 45B HIS 45B 145

CHEMICAL DRAIN TANK M-22HB03 (H-1) HB-325-HXD-¾"

V213 V216 313-HBD-¾" V233 315-HXD-¾"

SEE NOTE 31 16

HV 45C ZS 45C HIS 45C 145

FLOOR DRAIN TANK M-22HB02 (F-6) HB-315-HXD-¾"

V214 V215 V232 314-HXD-¾"

HS 44 145

V284

219-HBD-¾"

V867

V915 1" D

HV 43A ZS 43A HIS 43A 145

SLW EVAPORATOR M-22HF04 (C-8) 336-HCD-1"

304-HCD-¾"

V202 V257 V203

HV 43B ZS 43B HIS 43B 145

CHEMICAL DRAIN TANK M-22HB03 (H-1) HB-326-HCD-¾"

305-HCD-¾"

V211 V231

HV 43D ZS 43D HIS 43D 145

WASTE HOLDUP TANK M-22HB02 (H-5) HB-316-HCD-¾"

307-HCD-¾"

V205 V230

HV 43C ZS 43C HIS 43C 145

FLOOR DRAIN TANK M-22HB02 (F-5) HB-323-HCD-¾"

306-HCD-¾"

V204 V210 V229

HV 43E ZS 43E HIS 43E 145

EVAP. BOTTOMS TANK (PRIMARY) M-22HC01 (H-7)

250-HCD-¾"

V206 V208 V258

HV 43F ZS 43F HIS 43F 145

EVAP. BOTTOMS TANK (SECONDARY) M-22HC01 (H-2)

249-HCD-¾"

V207 V161 V254

NOTE 16

CAUSTIC ADDITION TANK THC11

FILL NOZZLE

299-HCD-3"

298-HCD-2"

VENT

297-HCD-1"

300-HCD-1"

V188 V186

302-HCD-¾"

LC 49

LT 47 LI 47 145

LS 47 188

V189 V187

301-HCD-1"

303-HCD-¾"

293-HCD-1"

FQIK 51 145

V234 1"D

V180

PCV 201

296-HCD-¾"

V183

PHC08 CAUSTIC ADDITION METERING PUMP

V181

294-HCD-1"

MISC. CHEMICAL REAGENTS CONN.

V184 V185

V274 ¾"PP

DISCHARGE MON. TANKS M-22HB05 (B-3)

HV 43G ZS 43G HIS 43G 145 KY 51 HIS 51 145

V841 V916 V283 1"D

HS 0138 TMR 0138 V289 V290 M-22HB05 (F-6)

CHEMICAL DRUM CABINET

PHC13 CAUSTIC METERING PUMP

HS 0137 TMR 0137 FLUSH CONNECTION V288 V285 V286 V287 M-22HB05 (E-5)

CHEMICAL DRUM CABINET

PHC12 ACID METERING PUMP

HVAC M-22HC03 (G-5)

V071

SPENT RESIN STORAGE TANK (PRIMARY) M-22HC02 (G-7)

351-HCD-1"

V065 V064

PP AND FLUSH CONN.

V219

66-HCD-1"

140-HCD-3"

7314

PP AND FLUSH CONN.

V218

HCD GCD GCD HCD HCC HCD HCD HCC

3"x 2"

NOTE 5

82-HCD-3"

SPENT RESIN STORAGE TANK (PRIMARY) M-22HC02 (F-3)

1"x¾"

V217

LOCAL DRAIN

325-HCD-1"

PHC04 SPENT RESIN SLUICE PUMP (PRIMARY)

FHC01 SPENT RESIN SLUICE FILTER (PRIMARY)

158-HCD-¾"

GCD HCD

V242

V072

159-HCD-1"

V070

C015

LF-A08-HCD-1"

FLOOR AND EQUIP. DRAIN SYSTEM M-22LF06 (G-5) CRW

¾"

V074

C017

PDI 1086

141-HCD-3"

REACTOR MAKE UP WATER SUPPLY M-22HC01 (C-7)

156-HCD-1"

V066

¾"x½" RED. AND FEMALE QUICK CONNECT

LOCAL SAMPLE CONNECTIONS

V073 V069

V061

7363

FAL 1011 115

FS 1011 115

FROM LS-1005 (M-22HC02, F-7)

HS/ 1005 115

FI 1011 115

FT 1011

V075 V076

FE 1011

7335

SPENT RESIN STORAGE TANK (PRIMARY) M-22HC02 (E-6)

080-HCD-2"

069-HCD-1"

SPENT RESIN STORAGE TANK (PRIMARY) M-22HC02 (E-7)

CVCS CATION BED DEMINERALIZER M-22BG02 (B-6) 144-HCD-2"

SPENT RESIN HEADER FLUSH LINE M-22HC02 (C-2) 251-HCD-2"

CVCS MIXED BED DEMINERALIZER "A" M-22BG02 (B-5) 142-HCD-2"

CVCS MIXED BED DEMINERALIZER "B" M-22BG02 (B-4) 143-HCD-2"

THERMAL REGENERATION DEMINERALIZER "A" M-22BG04 (B-7) 145-HCD-2"

THERMAL REGENERATION DEMINERALIZER "B" M-22BG04 (B-6) 146-HCD-2"

THERMAL REGENERATION DEMINERALIZER "C" M-22BG04 (B-4) 148-HCD-2"

THERMAL REGENERATION DEMINERALIZER "D" M-22BG04 (B-3) 149-HCD-2"

SPENT RESIN HEADER FLUSH LINE M-22HC02 (H-2) 253-HCD-2"

RECYCLE EVAPORATOR FEED DEMINERALIZER "B" M-22HE01 (E-4) 151-HCD-2"

RECYCLE EVAPORATOR FEED DEMINERALIZER "A" M-22HE01 (E-5) 152-HCD-2"

RECYCLE EVAPORATOR CONDENSATE DEMINERALIZER M-22HE03 (F-3) 153-HCD-2"

WASTE EVAPORATOR CONDENSATE DEMINERALIZER M-22HB03 (F-5) 154-HCD-2"

WASTE MONITOR TANK DEMINERALIZER M-22HB03 (B-7) 155-HCD-2"

FUEL POOL CLEANUP DEMINERALIZER M-22EC02 (D-5) 150-HCD-2"

¾"(V) V271

147-HCD-2"

3"x2"

141-HCD-3"

PIPE TUNNEL

V243 1" D

7356

NOTES:

FOR NOTES SEE DRAWING M-22HC01.

AS-BUILT CLASS 1

DRAWN: N/A (DATE:)	PIPING AND INSTRUMENTATION DIAGRAM SOLID RADWASTE SYSTEM		
CHKD.: N/A (DATE:)			
SUPV.: N/A (DATE:)	FSAR FIGURE 11.4-1 SHEET 3		
APPD.: N/A (DATE:)	LOCATION: CALLAWAY ENERGY CENTER		CLASS
UNION ELECTRIC COMPANY ST. LOUIS, MO	M-22HC03		REV. 16

REACTOR MAKEUP WATER SUPPLY
M-22BL01
(F-2)
V149
$3/4$"V
V275
19-HCD-$1\frac{1}{2}$"
206-HCD-$1\frac{1}{2}$"
207-HCD-$1\frac{1}{2}$"
208-HCD-$1\frac{1}{2}$"
209-HCD-$1\frac{1}{2}$"
210-HCD-$1\frac{1}{2}$"
211-HCD-$1\frac{1}{2}$"
V118
V119
V120
V121
V122
V123
V124
NOTE 6
NOTE 7
NOTE 8
V093
177-HCD-1"
V094
178-HCD-1"
LC 5
RESIN CHARGING TANK (RADWASTE)
THC06
PORTABLE TANK ON WHEELS
V097
NOTE 16
167-HCD-3"
200-HCD-3"
163-HCD-3"
274-GCD-$3/4$"
276-GCD-$3/4$"
278-GCD-$3/4$"
280-GCD-$3/4$"
164-HCD-3"
170-HCD-3"
162-HCD-3"
171-HCD-3"
172-HCD-3"
173-HCD-3"
V134
V135
V136
V137
V138
V139
V140
V141
V142
V143
V144
V145
V146
GCD
HCD
FUEL POOL CLEAN-UP DEMINERALIZER
M-22ECO2
(G-4)
271-HCD-$3/4$"
SECONDARY LIQUID WASTE DEMINERALIZER
M-22HF02
(G-6)
272-HCD-$3/4$"
SECONDARY LIQUID WASTE CHARCOAL ADSORBER
M-22HF02
(G-8)
273-HCD-$3/4$"
STEAM GENERATOR BLOWDOWN MIXED BED DEMINERALIZER "A"
M-22BM03
(G-8)
165-GCD-3"
275-HCD-$3/4$"
12
STEAM GENERATOR BLOWDOWN MIXED BED DEMINERALIZER "B"
M-22BM03
(G-6)
222-GCD-3"
277-HCD-$3/4$"
12
STEAM GENERATOR BLOWDOWN MIXED BED DEMINERALIZER "C"
M-22BM03
(G-4)
166-GCD-3"
279-HCD-$3/4$"
12
STEAM GENERATOR BLOWDOWN MIXED BED DEMINERALIZER "D"
M-22BM03
(G-3)
223-GCD-3"
281-HCD-$3/4$"
12
WASTE MONITOR TANK DEMINERALIZER
M-22HB03
(C-8)
282-HCD-$3/4$"
WASTE EVAPORATOR CONDENSATE DEMINERALIZER
M-22HB03
(G-6)
283-HCD-$3/4$"
LIQUID WASTE CHARCOAL ADSORBER
M-22HB03
(G-8)
284-HCD-$3/4$"
RECYCLE EVAPORATOR CONDENSATE DEMINERALIZER
M-22HE03
(H-4)
285-HCD-$3/4$"
RECYCLE EVAPORATOR FEED DEMINERALIZER "A"
M-22HE01
(G-7)
286-HCD-$3/4$"
RECYCLE EVAPORATOR FEED DEMINERALIZER "B"
M-22HE01
(G-4)
287-HCD-$3/4$"
288-HCD-$3/4$"
V147
(NOTE 16)
DRW

REACTOR MAKEUP WATER SUPPLY
M-22BL01
(D-2)
V148
188-HCD-$1\frac{1}{2}$"
NOTE 8
NOTE 7
V104
192-HCD-1"
LC 9
V105
193-HCD-1"
RESIN CHARGING TANK (CVCS)
THC05
PORTABLE TANK ON WHEELS
V097
189-HCD-$1\frac{1}{2}$"
190-HCD-$1\frac{1}{2}$"
191-HCD-$1\frac{1}{2}$"
188-HCD-$1\frac{1}{2}$"
V100
V101
V102
V103
NOTE 6
NOTE 16
255-HCD-$3/4$"
257-HCD-$3/4$"
259-HCD-$3/4$"
261-HCD-$3/4$"
263-HCD-$3/4$"
265-HCD-$3/4$"
267-HCD-$3/4$"
270-HCD-$3/4$"
V125
V126
V128
V129
V130
V131
V132
V133
GCD
HCD
L.C.
254-GCD-$3/4$"
256-GCD-$3/4$"
260-GCD-$3/4$"
262-GCD-$3/4$"
264-GCD-$3/4$"
266-GCD-$3/4$"
268-GCD-$3/4$"
269-HCD-$3/4$"
EQUIPMENT DRAINS
M-22LF05
(F-8)
CRW
LF-445-HCD-$3/4$"
180-GCD-3"
181-GCD-3"
183-GCD-3"
184-GCD-3"
186-GCD-3"
187-GCD-3"
185-GCD-3"
THERMAL REGENERATION DEMINERALIZER "E"
M-22BG04
(C-8)
THERMAL REGENERATION DEMINERALIZER "D"
M-22BG04
(C-7)
THERMAL REGENERATION DEMINERALIZER "B"
M-22BG04
(C-5)
THERMAL REGENERATION DEMINERALIZER "A"
M-22BG04
(C-4)
CVCS MIXED BED DEMINERALIZER "B"
M-22BG02
(E-5)
CVCS MIXED BED DEMINERALIZER "A"
M-22BG02
(E-6)
CVCS CATION BED DEMINERALIZER
M-22BG02
(E-8)

NOTES:

FOR NOTES SEE DRAWING M-22HC01.

REV.	DATE	DRAWN
3	022592	RAM
CHKD.	SUPV.	APPD.
DLBr	TJM	N/A

REDRAWN FOR CLARITY.

REV.	DATE	DRAWN
4	072193	JHK
CHKD.	SUPV.	APPD.
RLW	TJM	N/A

INCORP. CMP 90-1044.

REV.	DATE	DRAWN
5	061200	RAM
CHKD.	SUPV.	APPD.
JHK	AMR	N/A

INCORPORATES TEMP MOD. 00-0006

REV.	DATE	DRAWN
6	030701	DJB
CHKD.	SUPV.	APPD.
MAL	AMR	N/A

INCORP. TEMP MOD. 00-0011

REV.	DATE	DRAWN
7	031902	RAM
CHKD.	SUPV.	APPD.
DJB	AMR	N/A

INCORPORATES TEMP MOD. 01-0009. REMOVES TEMP. MODS 00-0006 & 00-0011.

REV.	DATE	DRAWN
8	092702	JHK
CHKD.	SUPV.	APPD.
MAL	AMR	N/A

INCORP. RFR-21388A.

REV.	DATE
9	041104
DRAWN	CHKD.	SUPV.
JHK	EWM	TWS

REMOVE TEMP. MOD 01-0009.

REV.	DATE
10	110904
DRAWN	CHKD.	SUPV.
MAL	RLW	TWS

INCORP. RFR-22941A

REV.	DATE
11	112106
DRAWN	CHKD.	SUPV.
JHK	MAL	TWS

INCORP. AC 06-000181 (RFR-200503134)

REV.	DATE
12	020717
DRAWN	CHKD.	SUPV.
MAL	RLW	DME

INCORP. CR 201608554.

AS-BUILT CLASS 1

DRAWN (DATE) N/A	PIPING AND INSTRUMENTATION DIAGRAM SOLID RADWASTE SYSTEM		
CHKD. (DATE) N/A			
SUPV. (DATE) N/A	FSAR FIGURE 11.4-1 SHEET 4		
APPD. (DATE) N/A	LOCATION	CALLAWAY ENERGY CENTER	CLASS
UNION ELECTRIC COMPANY ST. LOUIS, MO	M-22HC04		REV. 12

M-22HC05

NOTES:
1. DELETED.
2. DELETED.

REV.	DATE	DRAWN
1	012192	MAL
CHKD.	SUPV.	APPD.
GDC	TJM	N/A

INCORP. CMP 90-1051 FCN-04

REV.	DATE	DRAWN
2	092593	JHK
CHKD.	SUPV.	APPD.
RAM	TJM	N/A

INCORP. CMP 92-1043 PARTIAL

REV.	DATE	DRAWN
3	121093	JHK
CHKD.	SUPV.	APPD.
RAM	DME	N/A

INCORP. CMP 90-1051 (PARTIAL).

REV.	DATE	DRAWN
4	033194	JHK
CHKD.	SUPV.	APPD.
RAM	GDC	N/A

INCORP. CMP 92-1043 (PARTIAL).

REV.	DATE	DRAWN
5	061094	JHK
CHKD.	SUPV.	APPD.
RAM	AMR	N/A

INCORP. CMP 90-1051.

REV.	DATE	DRAWN
6	102595	RAM
CHKD.	SUPV.	APPD.
JHK	AMR	N/A

INCORP. CMP 92-1043

REV.	DATE
7	110603
DRAWN	CHKD.	SUPV.
JHK	MAL	TWS

INCORP. MP 01-1001A.

REV.	DATE
8	010604
DRAWN	CHKD.	SUPV.
JHK	RLW	TWS

INCORP. MP 01-1001B (PARTIAL) AND FCN-05 (PARTIAL).

REV.	DATE
9	010904
DRAWN	CHKD.	SUPV.
JHK	MAL	TWS

INCORP. MP 01-1001 FCN-06.

REV.	DATE
10	081904
DRAWN	CHKD.	SUPV.
MAL	RLW	TWS

INCORP. MP 01-1001B, FCN-05, & FCN-09.

REV.	DATE
11	110904
DRAWN	CHKD.	SUPV.
MAL	RLW	TWS

INCORP. RFR-22941A

ALPS (WATER SUPPLY) M-22HC01 (G-5) — 379-HCD-1" — V919 — CAMLOK

ALPS (BULK) M-22HC01 (F-4) — 2x1 1/2" RED. — 378-HCD-1 1/2" — V921 — CAMLOK

SERVICE AIR M-22KA02 (F-7) — KA SYS. | HC SYS. — 382-HCD-3/4" — 1x3/4" RED. — V421 — V420 QUICK DISCONNECT — V925 QUICK DISCONNECT

ADVANCED WASTE PROCESSING SYSTEM (ALPS) SHB15

CAMLOK — V920 — ALPS DISCHARGE TO SLW MONITOR TANKS M-22HC01 (A-4) — 231-HCD-1 1/2"

CAMLOK — ALPS OVERPRESSURE RELIEF DRAIN M-22LF10 (F-7) — LF-B91-HCD-1 1/2"

CAMLOK — ALPS SENSOR DRAIN M-22LF10 (E-8) — LF-B90-HCD-1"

CAMLOK — V419 — ALPS SAMPLE SINK M-22LF10 (F-7) — LF-B89-HCD-3/4"

AS-BUILT CLASS 1

DRAWN (DATE) N/A	PIPING & INSTRUMENTATION DIAGRAM LIQUID WASTE PROCESSING SYSTEM		
CHKD. (DATE) N/A			
SUPV. (DATE) N/A	FSAR FIGURE 11.4-1 SHEET 5 (11)		
APPD. (DATE) N/A	LOCATION CALLAWAY PLANT		CLASS
UNION ELECTRIC COMPANY ST. LOUIS, MO	M-22HC05		REV. 11

Figure 11.4-2 has been deleted.