905-D-049	Sht:001	Rev:003	Title: P&ID vitrification facility fire protection systems
905-D-050	Sht:001	Rev:007	Title: P&ID vitrification drainage system low level
905-D-051	Sht:001	Rev:009	Title: P&ID vitrification facility potable water system
905-D-052	Sht:001	Rev:010	Title: Vitrification facility closed loop cooling water system P&ID
905-D-052	Sht:002	Rev:013	Title: Vitrification facility closed loop cooling water system P&ID
905-D-053	Sht:001	Rev:005	Title: P&ID vitrification facility non rack cold chem. decon & slurry system
905-D-053	Sht:002	Rev:008	Title: P&ID vitrification facility non rack cold chem decon & slurry system
905-D-054	Sht:001	Rev:010	Title: P&ID vtirification facility cooling tower water system
905-D-055	Sht:001	Rev:001	Title: VOID PER ECN P&ID vitrification facility off gas condensate system
905-D-056	Sht:001	Rev:006	Title: P&ID vitrification facility vent header system
905-D-057	Sht:001	Rev:004	Title: Vitrification Rest Rooms P&ID
905-D-058	Sht:001	Rev:003	Title: PNEUMATIC SAMPLE TRANSFER SYSTEM P&ID
905-D-058	Sht:002	Rev:000	Title: PNEUMATIC SAMPLE TRANSFER SYSTEM P&ID
905-D-450	Sht:001	Rev:006	Title: HVAC air flow diagram vitrification facility
905-D-451	Sht:001	Rev:006	Title: HVAC air flow diagram & P&ID control room
905-D-452	Sht:001	Rev:014	Title: HVAC P&ID vitrification facility
905-D-452	Sht:002	Rev:009	Title: HVAC P&ID vitrification facility

905-D-452 Sht:003 Rev:004 Title: VS HVAC P&ID VITRIFICATION FACILITY

905-D-453 Sht:001 Rev:008 Title: Vitrification facility HVAC chilled water system P&ID sh 1

905-D-453 Sht:002 Rev:001 Title: Vitrification facility HVAC chilled water system P&ID sh 3

905-D-454 Sht:001 Rev:006 Title: Vitrification facility HVAC chilled water P&ID sh 2

905-E-045 Sht:021 Rev:003 Title: P&ID VITRIFICATION FACILITY INSTRUMENT RACK 3W8

906-D-009 Sht:001 Rev:001 Title: VF EX-CELL OFF-GAS MISCELLANEOUS UTILITIES P&ID

906-D-014 Sht:001 Rev:005 Title: VF MELTER OFF-GAS P&ID MELTER EX CELL OFF GAS SYSTEM

906-D-015 Sht:001 Rev:005 Title: VF MELTER OFF-GAS P&ID MELTER EX CELL OFF GAS SYSTEM

906-D-018 Sht:001 Rev:005 Title: VF MELTER OFF-GAS HVAC AIR FLOW DIAGRAM & P&ID

906-D-019 Sht:001 Rev:001 Title: VOID PER ECN VF MELTER OFF-GAS HVAC AIR FLOW DIAGRAM & P&ID

906-D-025 Sht:001 Rev:007 Title: VF MELTER OFF-GAS P&ID INSTRUMENT RACK 01

906-D-026 Sht:001 Rev:006 Title: VF MELTER OFF-GAS P&ID INSTRUMENT RACK 02

906-D-027 Sht:001 Rev:006 Title: VF MELTER OFF-GAS P&ID INSTRUMENT RACK 02

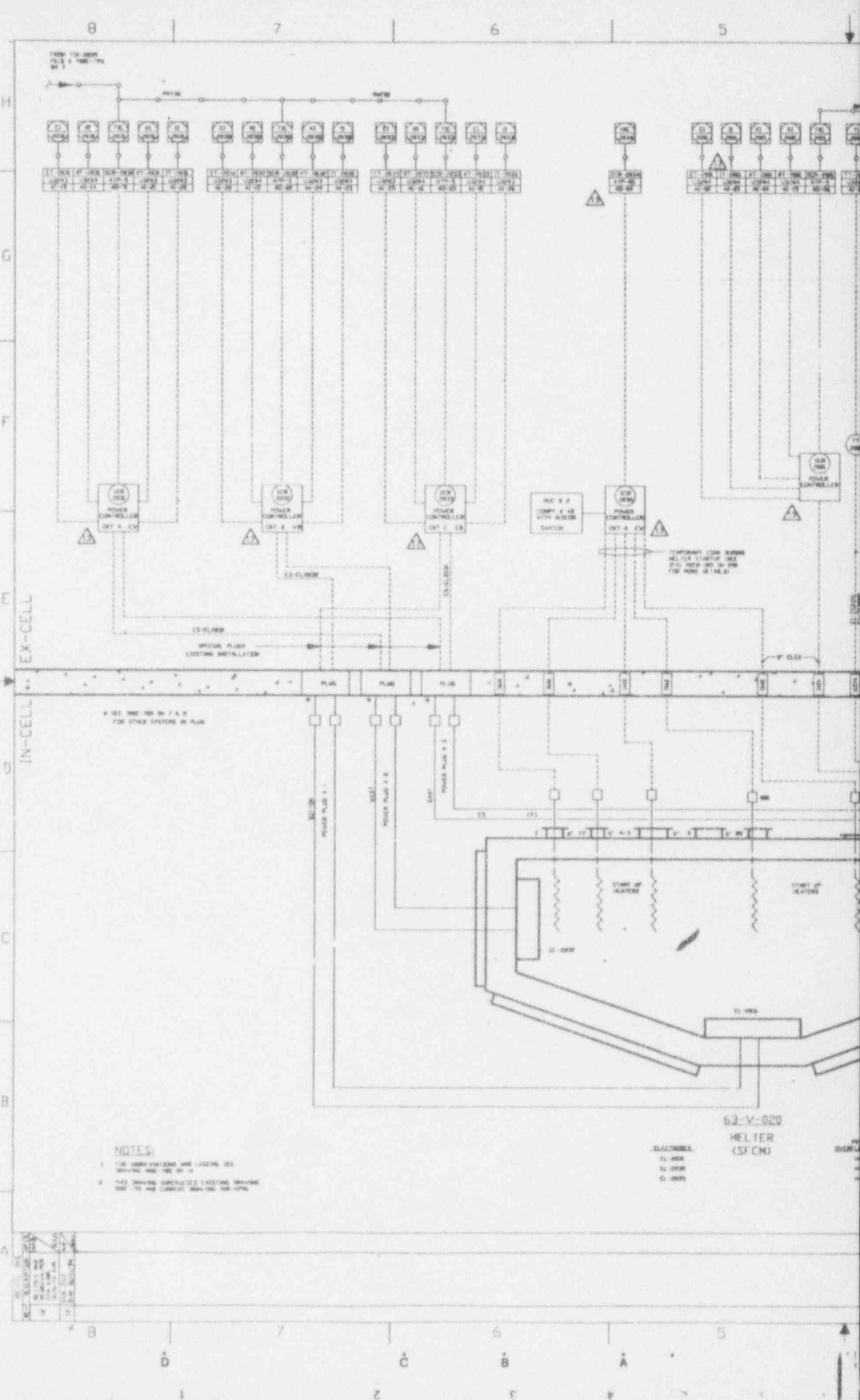
906-D-028 Sht:001 Rev:006 Title: VF MELTER OFF-GAS P&ID INSTRUMENT RACK 02

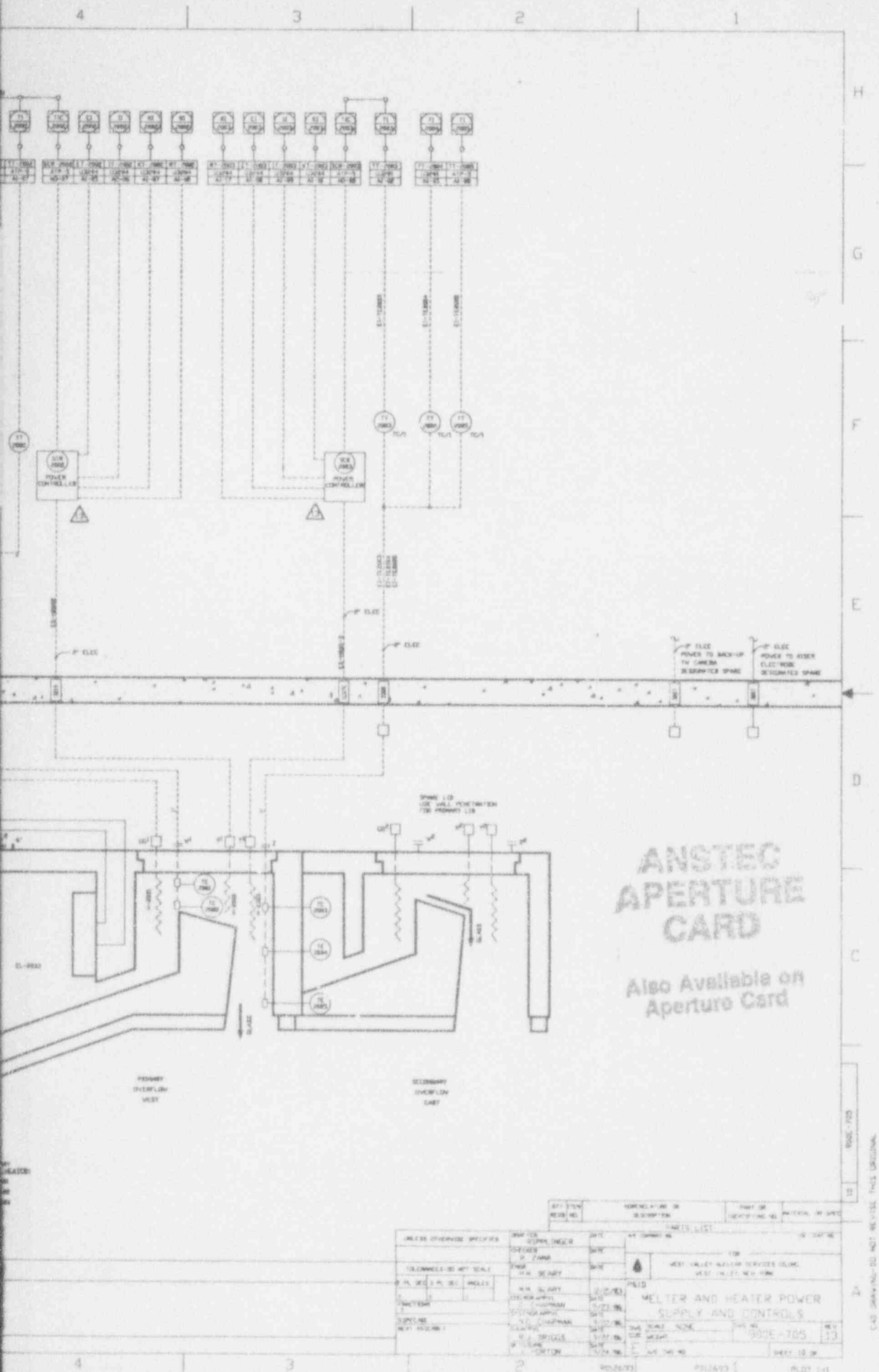
906-E-011 Sht:001 Rev:007 Title: VF MEITER OFF-GAS P&ID MELTER EX CELL OFF GAS SYSTEM

906-E-012 Sht:001 Rev:008 Title: VF MELTER OFF-GAS P&ID MELTER EX CELL OFF GAS SYSTEM

906-E-012 Sht:002 Rev:001 Title: VF P&ID MELTER EX-CELL OFF-GAS SYS

906-E-013	Sht:001	Rev:008	Title: VF MELTER OFF-GAS P&ID MELTER EX CELL OFF GAS SYSTEM
906-E-016	Sht:001	Rev:006	Title: VF MELTER OFF-GAS P&ID INSTRUMENT AIR
906-E-017	Sht:001	Rev:001	Title: VF P&ID OFF-GAS TRENCH


EX-CELL
IN-CELL
POWER CONTROLLER
SPECIAL PLUG
EXISTING INSTALLATION
POWER PLUG # 1
POWER PLUG # 2
POWER PLUG # 3
START UP HEATER
63-V-020
HELTER
(SFDM)
NOTES:

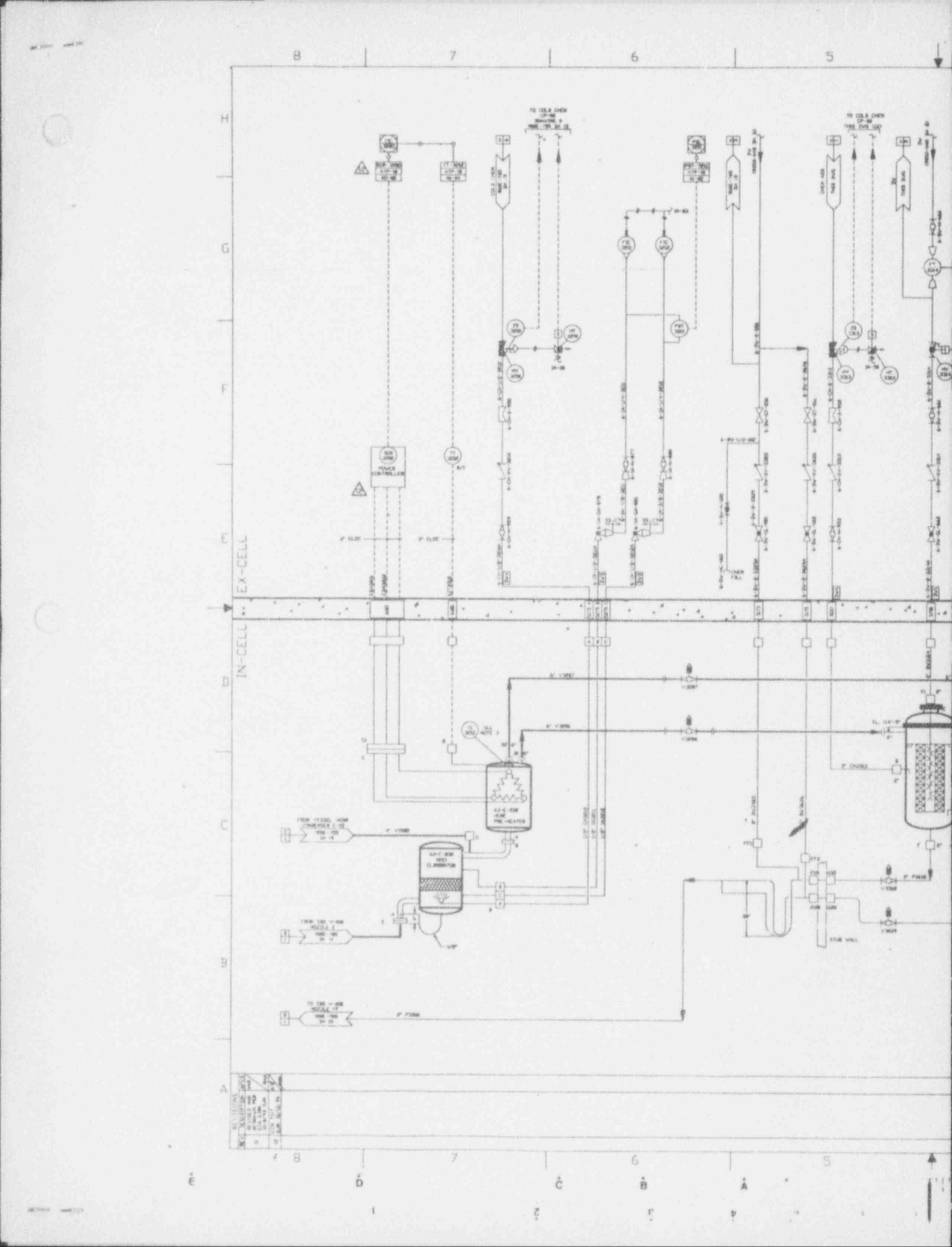


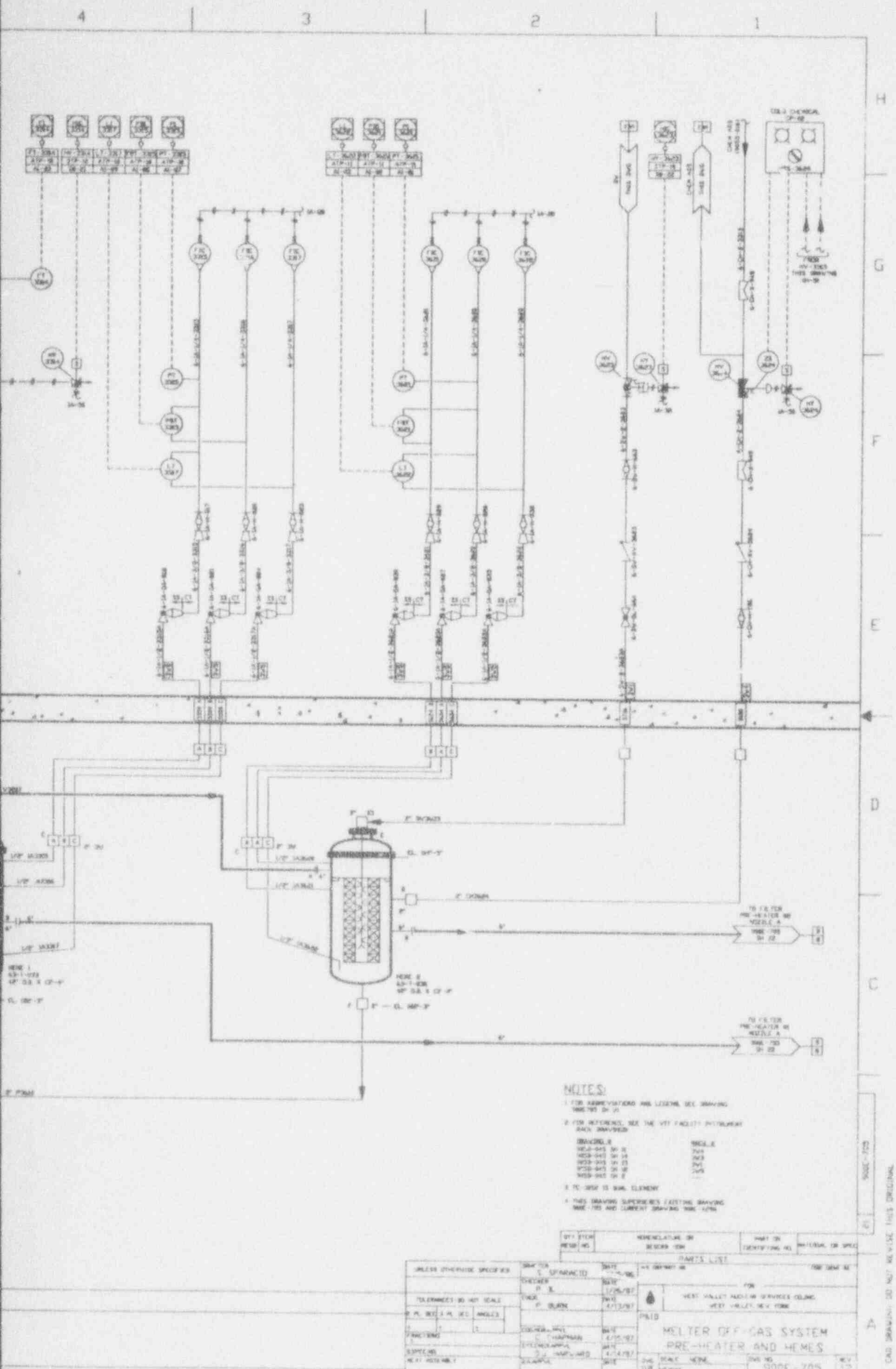
MELTER AND HEATER POWER
SUPPLY AND CONTROLS

9805-705

13

9404080208-01


EX-CELL
IN-CELL



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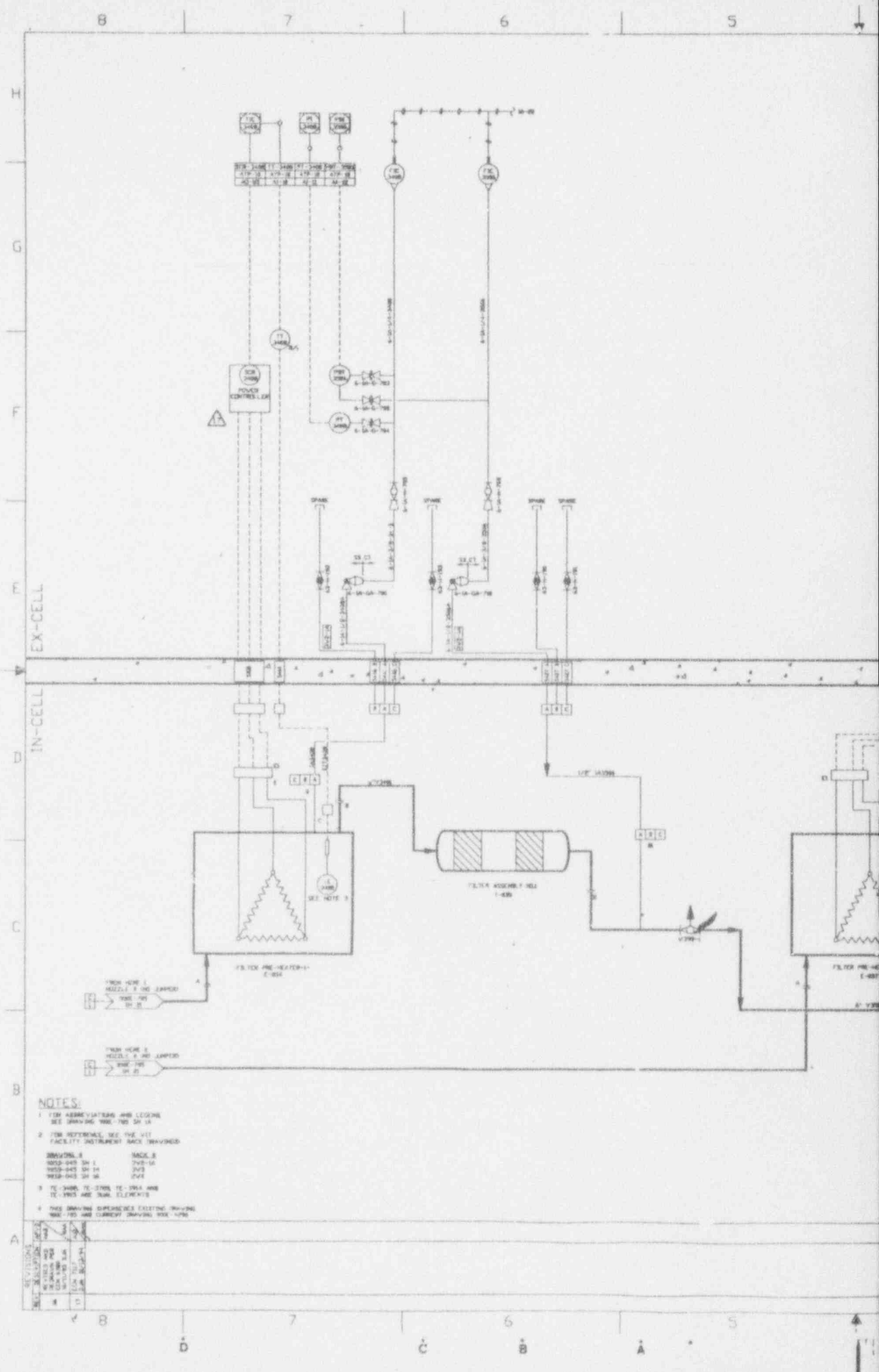
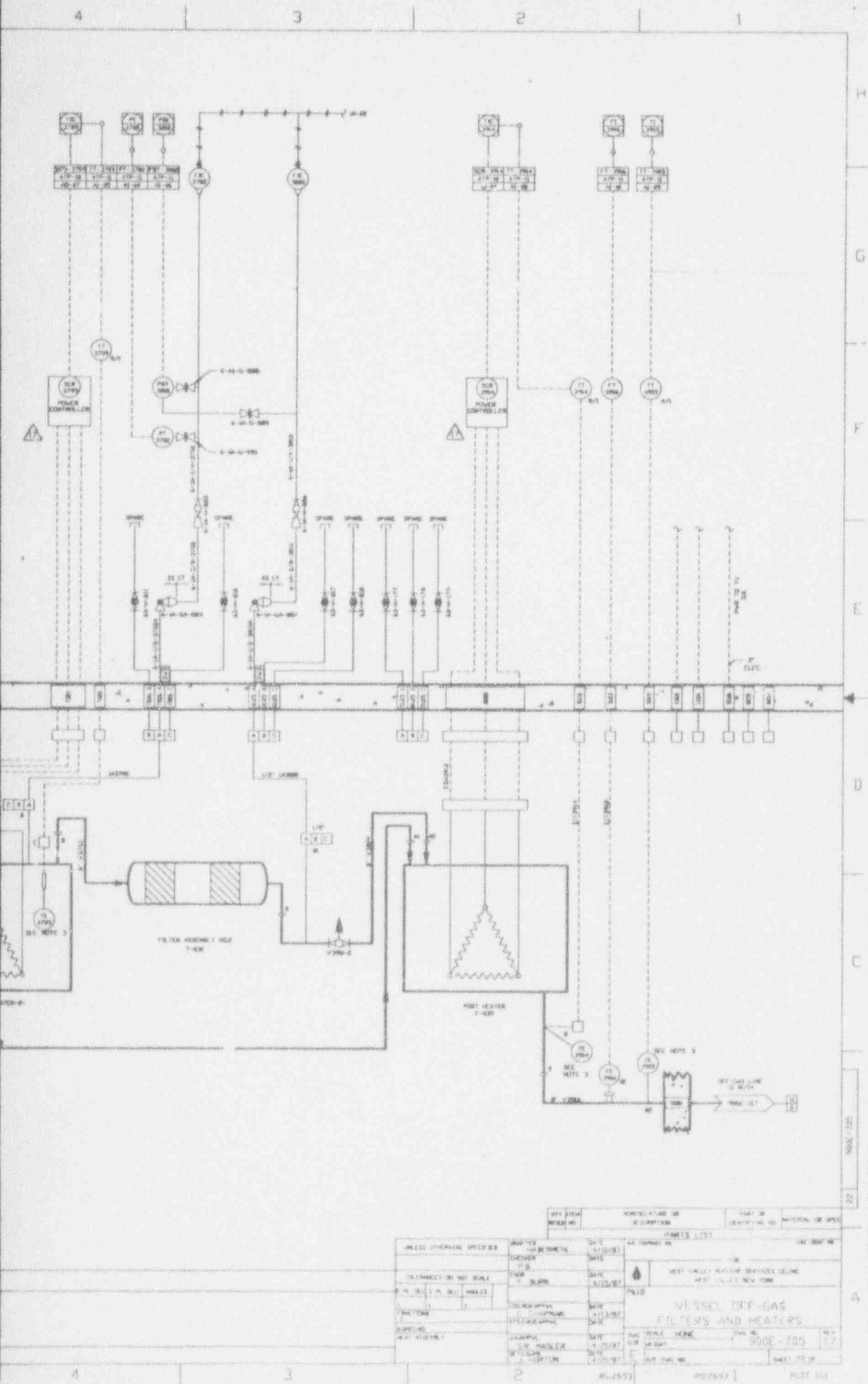

EX-CELL
IN-CELL
POWER CONTROLLER
FILTER ASSEMBLY
FILTER PRE-HEATER
NOTES:



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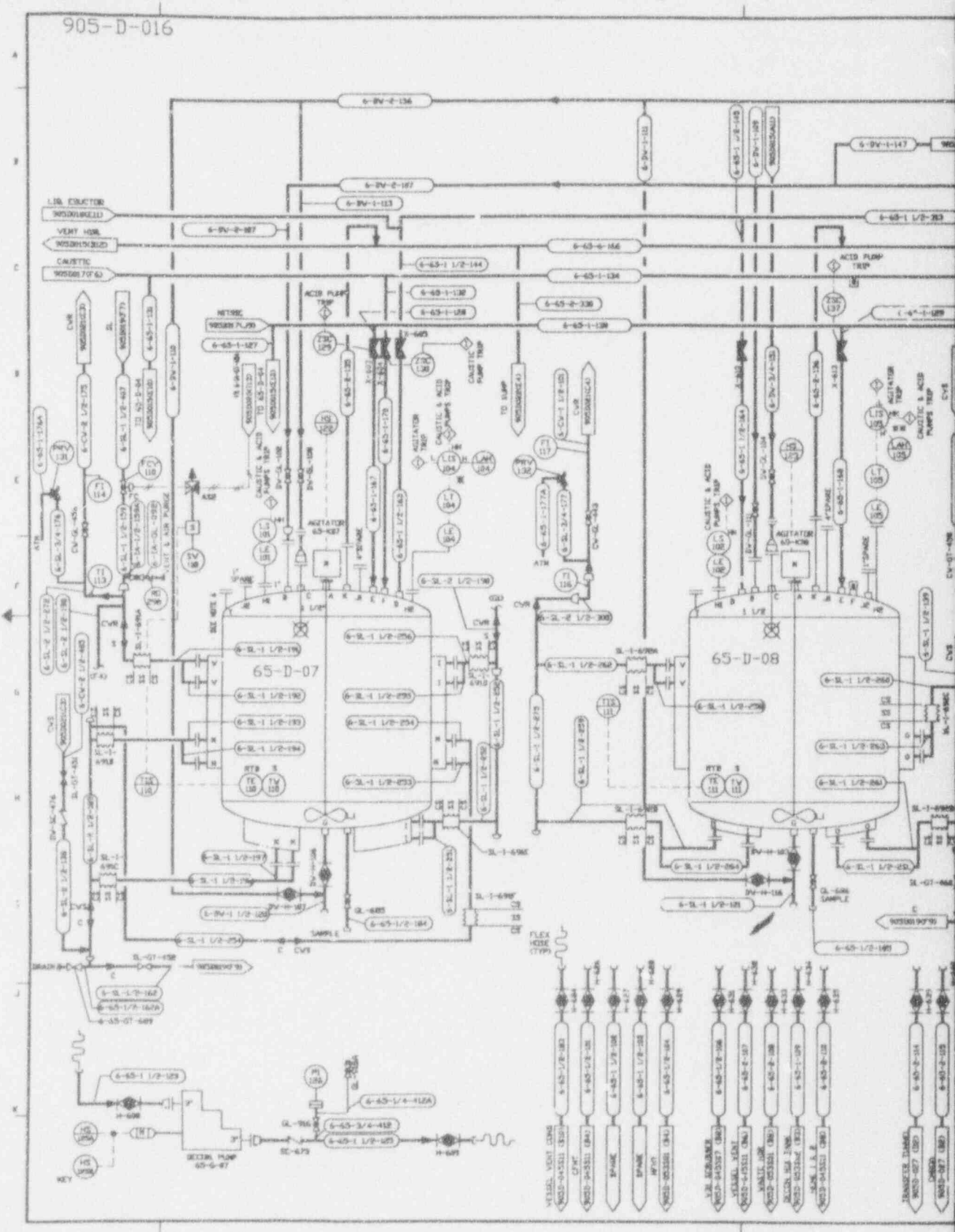
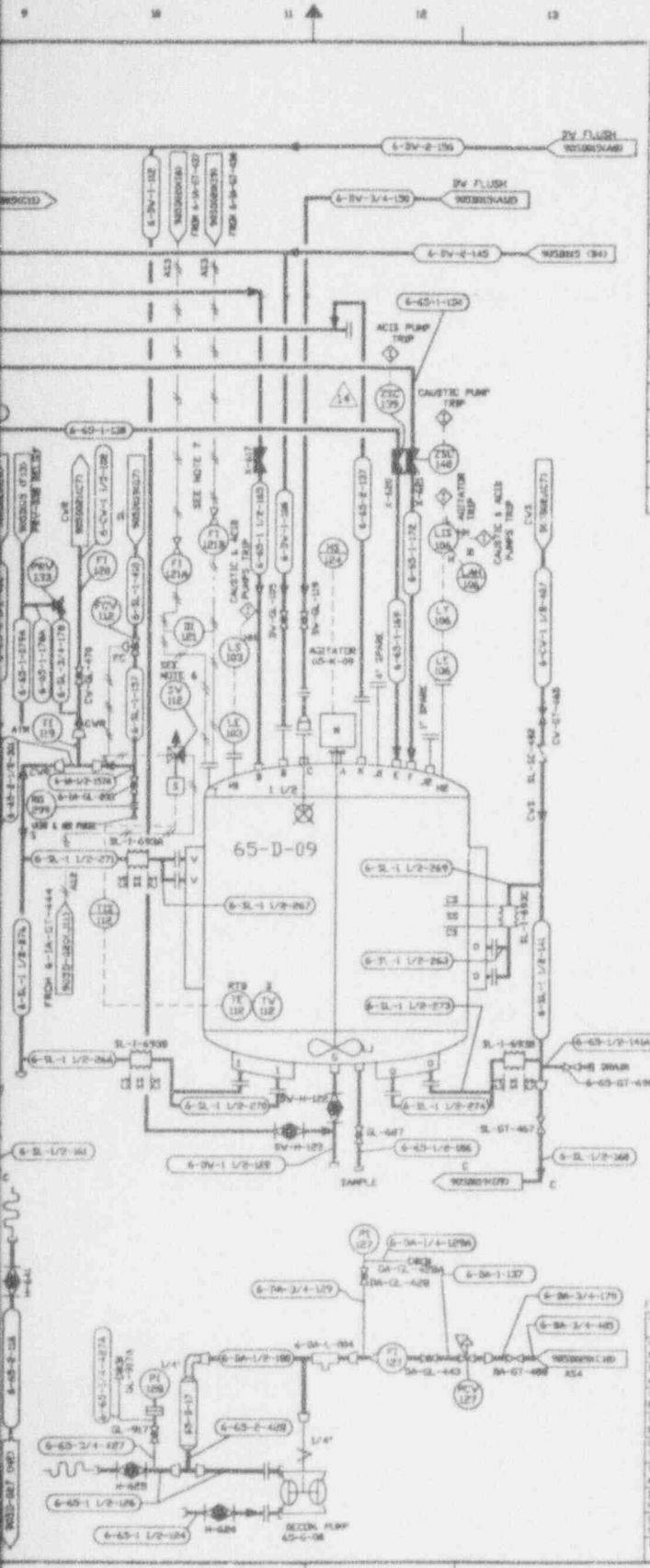

905-D-016
65-D-07
65-D-08
ACID PUMP TRIP
CAUSTIC PUMP TRIP
CAUSTIC & ACID PUMPS TRIP
AGITATOR TRIP
AGITATOR 65-K07
AGITATOR 65-K08
TO SUMP
SAMPLE
FLEX HOSE (TYP)
DECON PUMP 65-G-07
KEY



NO	DATE	REVISION	DR	CH	APPROVED		
8	05-14-97		TJK	AJD	R.L.	AJD FSK	MDV
		GENERAL REVISION					
9	08-14-97		TJK	AJD	EGS R.A.	AJD FSK	MDV
		REVISION PER CBAR 9408					
10	10-23-97		TJK	JV	R.A.	AJD	MDV
		REVISION PER CBAR 9908					
0	10-03-88	CR 1468			JRH		
11	10/20/93	GENERAL REVISION/ECN 6179	MJL	HAB	DJR		
12	10/27/93	REV'D PER ECN 6950	SRD	KMB	KB		
13	11/5/93	REV'D PER ECN 6944	SRD	SRS	DJR		
14	1/14/94	REV'D PER ECN 7344	MJL	KMB	DJR		
5	3/25/98	REV'D PER ECN 9840	CGR	HAB	TEC		
6	3/1/93	REV'D PER ECN 5974	SRS	DRS	DDS		
7	3/23/93	REV'D PER ECN 6008	VRC	HAB	GGT		
8	4/13/93	REV'D PER ECN 6085	BMC	HAB	ZB		
9	6/22/93	REV'D PER ECN 6455	JLH	HAB	GGT		
10	9/3/93	REV'D PER ECN 6656	VCK	HAB	DDS		

NOTES

1. FOR GENERAL NOTES SEE DWG. 905-D-015.
2. ACID, CAUSTIC, AND EDUCTED LIQUIDS LINES SHALL BE OF ALL WELDED CONSTRUCTION. WHEN THESE TRANSFER LINES ENTER A VESSEL THEY SHALL EXTEND 4" INTO TANK.
3. 65-D-07 TANK MANWAY TO BE UTILIZED AS PRIVIDER INLET IF PNEUMATIC CONVEYING SYSTEM IS ADDED IN FUTURE
4. ALL VALVE/SPECIALTY ITEM NUMBERS PRECEEDED BY 6-65- UNLESS OTHERWISE NOTED.
5. ALL INSTRUMENT ITEM NUMBERS ARE PRECEEDED BY 65-,
6. FOR OTHER COMPONENTS ASSOCIATED WITH SOLENOID VALVES SV-110, AND SV-112, REFER TO COLD CHEM SYSTEM, INSTR. INSTALL. DETAILS DWG NO 905D-355, SH16
7. FOR OTHER COMPONENTS ASSOCIATED WITH ROTAMETERS FI-121A & B, REFER TO COLD CHEMICAL SYSTEM INSTR. INSTALL. DETAILS DWG NO 905-0355 SH 22

* LEVEL CONTROL STATION #1
** LEVEL CONTROL STATION #2

EQUIPT. NO.	EQUIPT. NAME	REF. DWG.	DESCRIPTION
65-D-07	DECON. TK.	9900-1990	1000 GAL. V. VTL. 4'-6 IN. 9'-0 TYPE 304L S.S. WITH BOLT-ON JACKETS
65-D-08	DECON. TK.	E-1490	750 GAL. V. VTL. 3'-0 IN. 5'-6 TYPE 304L S.S. WITH BOLT-ON JACKETS
65-D-09	DECON. TK.	E-1496	750 GAL. V. VTL. 3'-0 IN. 5'-6 TYPE 304L S.S. WITH BOLT-ON JACKETS
65-G-01	DECON. METERING PUMP	———	1500 GPH @ 60 PSI, VARIABLE DISPLACEMENT PUMP, TYPE 316 SS & PTFE WETTED PARTS, MILROYAL C(MD)-160-6031-E, 5 HP.
65-G-08	DECON. TRANSFER PUMP	———	AIR OP DOUBLE DIAPHRAGH VR MODEL ST 1 1/2A TYPE S, 316 SS & TEFLON, 30 GPH @ 65PSI
65-D-17	PULSATION DAMPER	———	WARREN RUPP TRANSAFLEX
65-E-07	AGITATOR	———	1.0 HP, 54 RPM, 1-12" DIA PROP, 304L SS
65-E-08	AGITATOR	———	0.5 HP, 430 RPM, 1-11" DIA PROP, 304L SS
65-E-09	AGITATOR	———	0.5 HP, 430 RPM, 1-11" DIA PROP, 304L SS

FOR DRAWING INDEX SEE DRAWING NO.

APPROVED VWNS CO.

PROJECT MGR. N.G. WEINGART 03-30-97

ENGINEER SUPV. A.J. DIFILIPPO 03-30-97

LEAD DISC ENGR. F. TULIPANO 03-30-97

DESIGN R.J. LEWKO 03-30-97

CHECKED T.J. PIAZZA 03-30-97

DRAWN K. KOLODZIEJSKI 03-30-97

DE-AC07-81NE44139
PROJECT NO.
19-CWV-002375
SUBCONTRACT NO.
ISSUED FOR CONSTRUCTION

EBASCO SERVICES INCORPORATED
A/E O.F.S. NO. 22868 TASK ORDER 025

FOR
WEST VALLEY NUCLEAR SERVICES COMPANY, INC.
WEST VALLEY, NEW YORK

WEST VALLEY DEMONSTRATION PROJECT

P & ID
COLD CHEMICAL PREPARATION AND FEED SYSTEM

SIZE: D | INDEX CODE NUMBER: AREA 05 TYP GL SEQ | DRAWING NO. 905D-016 | REV 14

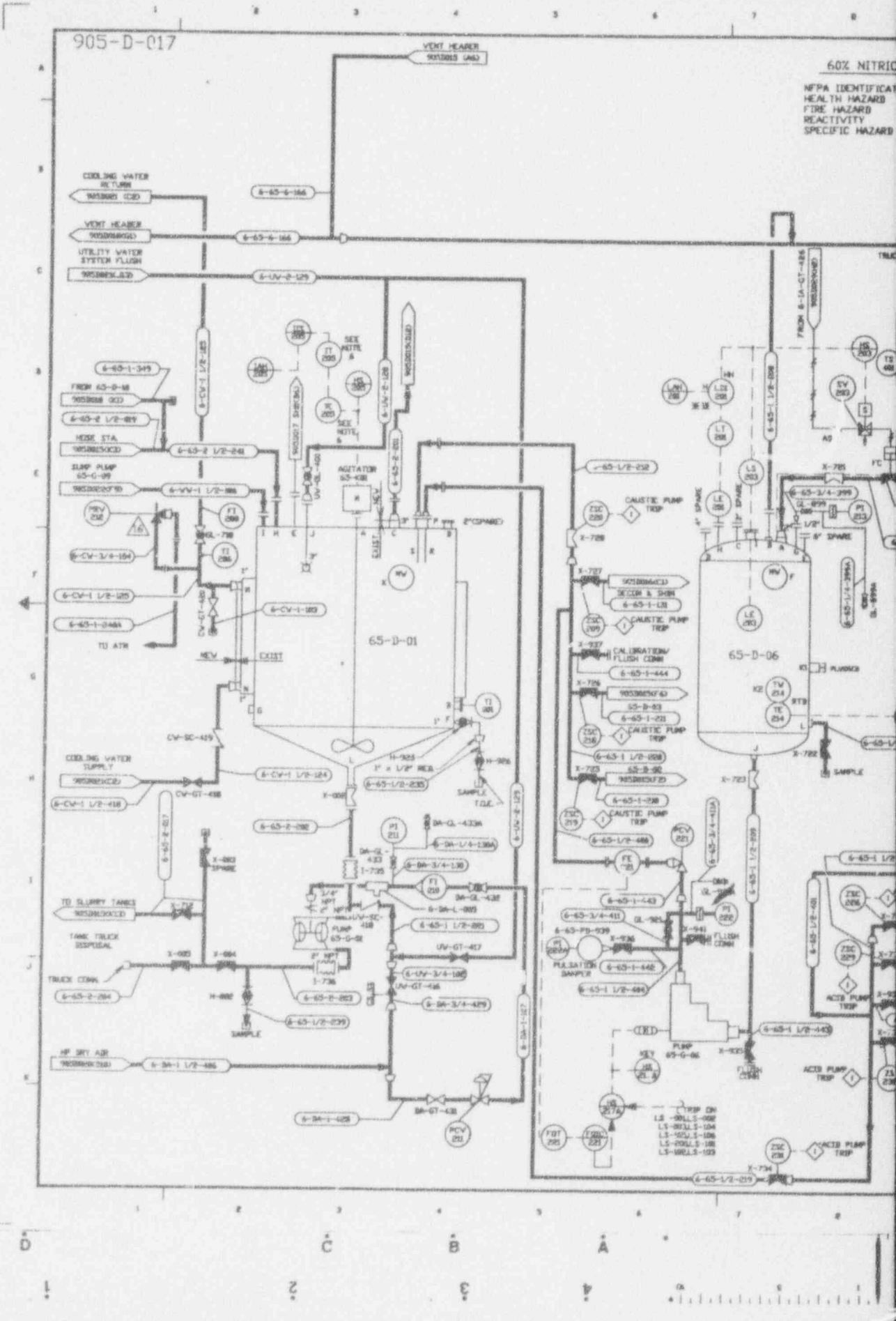
SCALE: NONE | SPEC. CODES | A/E SHEET NO. 905-D-016 D

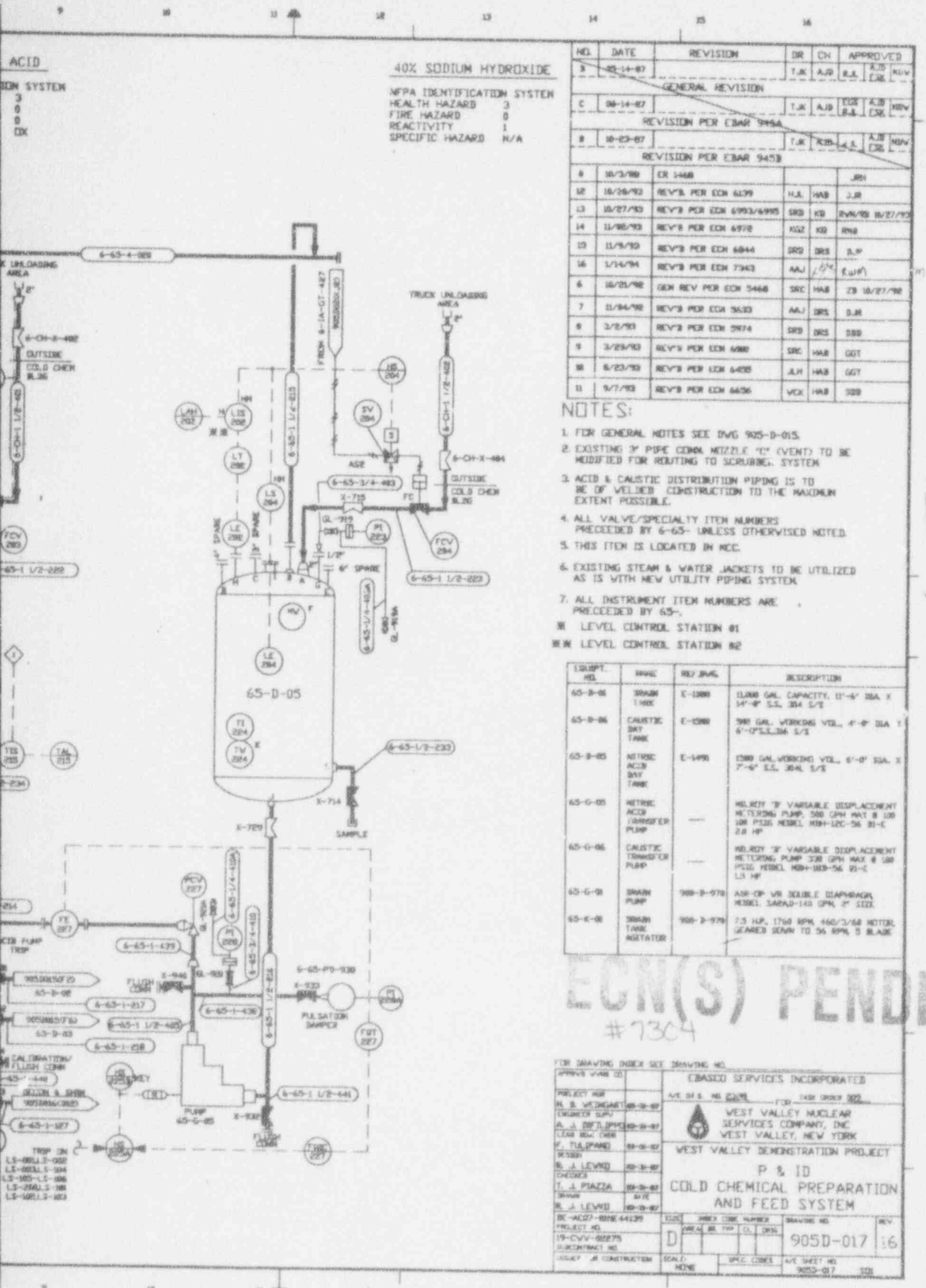
ANSTEC APERTURE CARD
Also Available on Aperture Card

ECN(S) PENDING
#6413 #7514
#7096 #7578
#7304

CAD DRAWING - Do not revise this original

9404080208-03

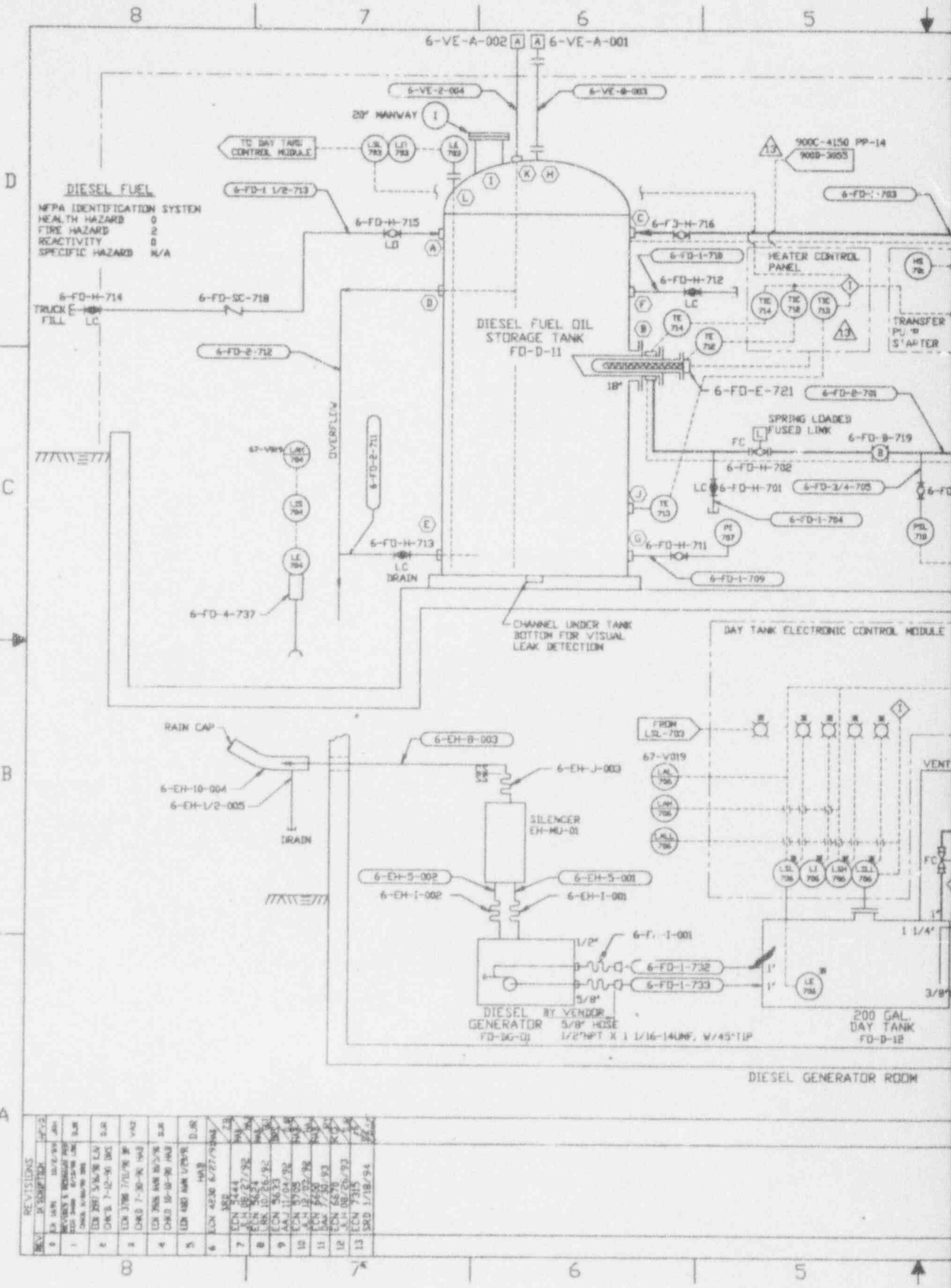

905-D-017
60% NITRIC
NFPA IDENTIFICA
HEALTH HAZARD
FIRE HAZARD
REACTIVITY
SPECIFIC HAZARD
VENT HEADER
COOLING WATER RETURN
VENT HEADER
UTILITY WATER SYSTEM FLUSH
FROM 65-D-68
HOSE STA.
SUMP PUMP 65-G-09
TO ATM
EXIST
65-D-01
65-D-06
AGITATOR 65-K01
CAUSTIC PUMP TRIP
CALIBRATION/ FLUSH CONN
COOLING WATER SUPPLY
TO SLURRY TANKS
TANK TRUCK DISPOSAL
TRUCK CONN.
SAMPLE
HP DRY AIR
PUMP 65-G-06
ACID PUMP TRIP
FLUSH CONN
PULSATION DAMPER
SEE NOTE 5
SEE NOTE 6
2" SPARE
4" SPARE
6" SPARE



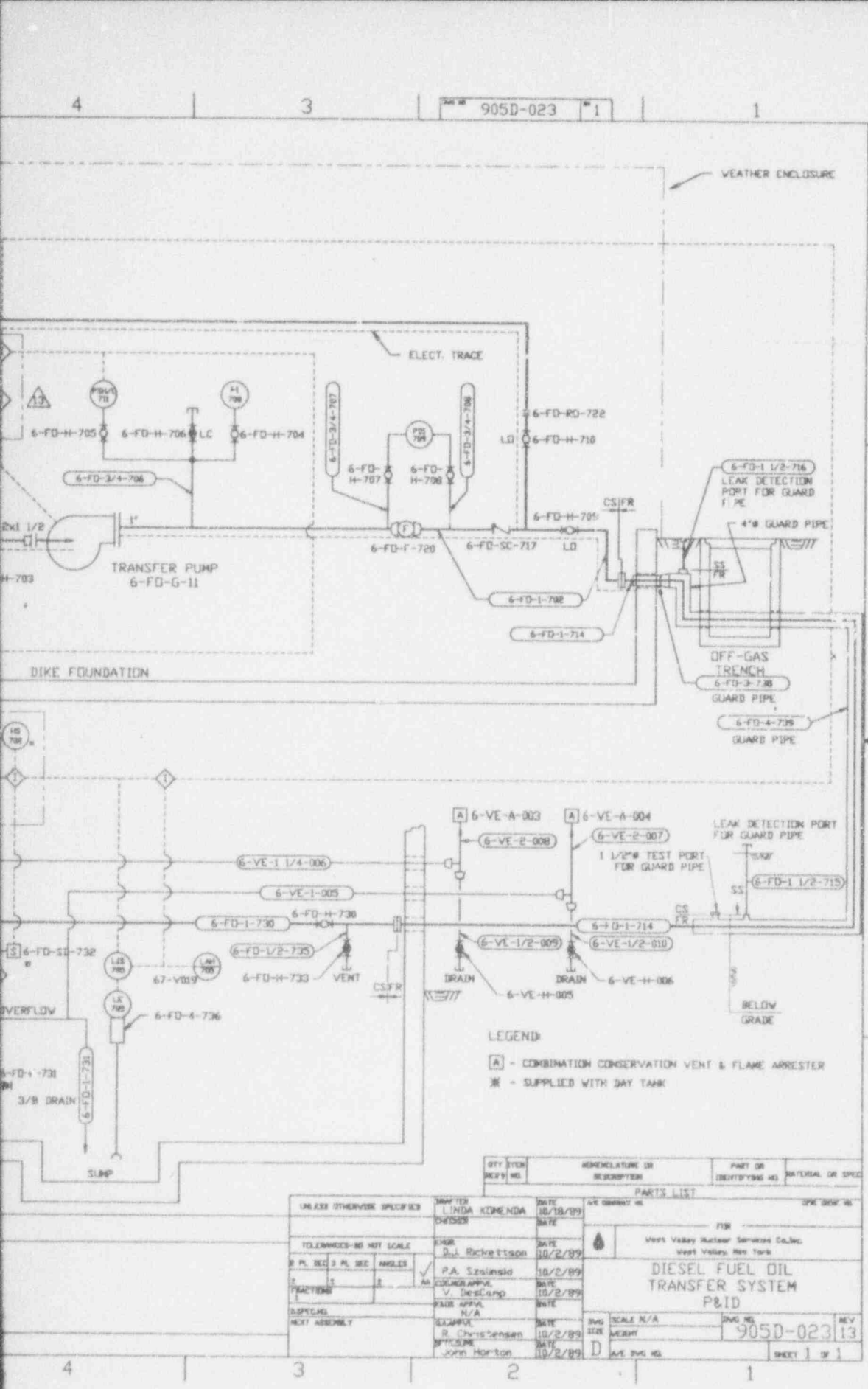
NO.	DATE	REVISION	DR	CH	APPROVED
9	02-14-97	GENERAL REVISION	TJK	AJD	R.K. A.JD CSR KUV
C	08-14-97	REVISION PER EBAR 9454	TJK	AJD	ECS R.K. A.JD CSR KBV
B	10-03-97	REVISION PER EBAR 9453	TJK	RCB	L.S. A.JD CSR NJV
A	10/3/89	ER 5468			JRH
12	10/28/92	REV'D PER ECN 6139	H.A.	HAB	J.JR
13	10/27/93	REV'D PER ECN 6993/6995	SRD	KB	RVN/RB 10/27/93
14	11/08/93	REV'D PER ECN 6978	KGZ	KB	RNB
15	11/5/93	REV'D PER ECN 6844	SRD	DRS	D.JP
16	1/14/94	REV'D PER ECN 7343	AAJ		E.WP
6	10/21/92	GEN REV PER ECN 5468	SRC	HAB	ZB 10/27/92
7	11/04/92	REV'D PER ECN 5633	AAJ	DRS	D.JR
8	2/2/93	REV'D PER ECN 5974	SRD	DRS	SBD
9	3/29/93	REV'D PER ECN 6080	SRC	HAB	GGT
10	8/23/93	REV'D PER ECN 6455	JLH	HAB	GGT
11	9/7/93	REV'D PER ECN 6636	VCK	HAB	SBD

EQUIPT. NO.	NAME	REQ'D/AVG.	DESCRIPTION
65-D-04	DRAIN TANK	E-1288	11,000 GAL. CAPACITY, 11'-6" DIA. X 14'-8" S.S., 304 S/S
65-D-06	CAUSTIC DAY TANK	E-1289	500 GAL. WORKING VOL., 4'-0" DIA. X 6'-0"S.S.,304 S/S
65-D-05	NITRIC ACID DAY TANK	E-1495	1500 GAL.WORKING VOL., 6'-0" DIA. X 7'-6" S.S., 304L S/S
65-G-05	NITRIC ACID TRANSFER PUMP	—	MILROY "B" VARIABLE DISPLACEMENT METERING PUMP, 500 GPH MAX @ 100 PSIG MODEL M3H-12C-S6 91-C 2.0 HP
65-G-06	CAUSTIC TRANSFER PUMP	—	MILROY "B" VARIABLE DISPLACEMENT METERING PUMP 320 GPH MAX @ 100 PSIG MODEL M3H-103-S6 91-C 1.5 HP
65-G-01	DRAIN PUMP	9000-P-979	AIR-OP VR DOUBLE DIAPHRAGM MODEL SANDPIPER 140 GPM, 2" SIZE
65-K-01	DRAIN TANK AGITATOR	9000-P-979	7.5 H.P., 1760 RPM, 460/3/60 MOTOR, GEARED DOWN TO 56 RPM, 3 BLADE

9404080208 04



DIESEL FUEL
NFPA IDENTIFICATION SYSTEM
HEALTH HAZARD 0
FIRE HAZARD 2
REACTIVITY 0
SPECIFIC HAZARD N/A
6-VE-A-002
6-VE-A-001
20" MANWAY
TO DAY TANK CONTROL MODULE
900C-4150 PP-14
6-FD-H-715
LO
6-FD-H-714
TRUCK FILL
LC
6-FD-SC-718
6-FD-2-712
OVERFLOW
DIESEL FUEL OIL STORAGE TANK FD-D-11
6-FD-H-716
6-FD-H-712
HEATER CONTROL PANEL
TRANSFER
6-FD-E-721
SPRING LOADED FUSED LINK
6-FD-H-702
6-FD-H-701
6-FD-H-713
LC DRAIN
6-FD-H-711
6-FD-4-737
CHANNEL UNDER TANK BOTTOM FOR VISUAL LEAK DETECTION
DAY TANK ELECTRONIC CONTROL MODULE
RAIN CAP
6-EH-10-004
6-EH-1/2-005
DRAIN
6-EH-J-003
SILENCER EH-MU-01
6-EH-5-002
6-EH-5-001
6-EH-I-002
6-EH-I-001
67-V019
VENT
DIESEL GENERATOR FD-DG-01
BY VENDOR
5/8" HOSE
1/2"NPT X 1 1/16-14UNF, W/45°TIP
200 GAL. DAY TANK FD-D-12
DIESEL GENERATOR ROOM
REVISIONS



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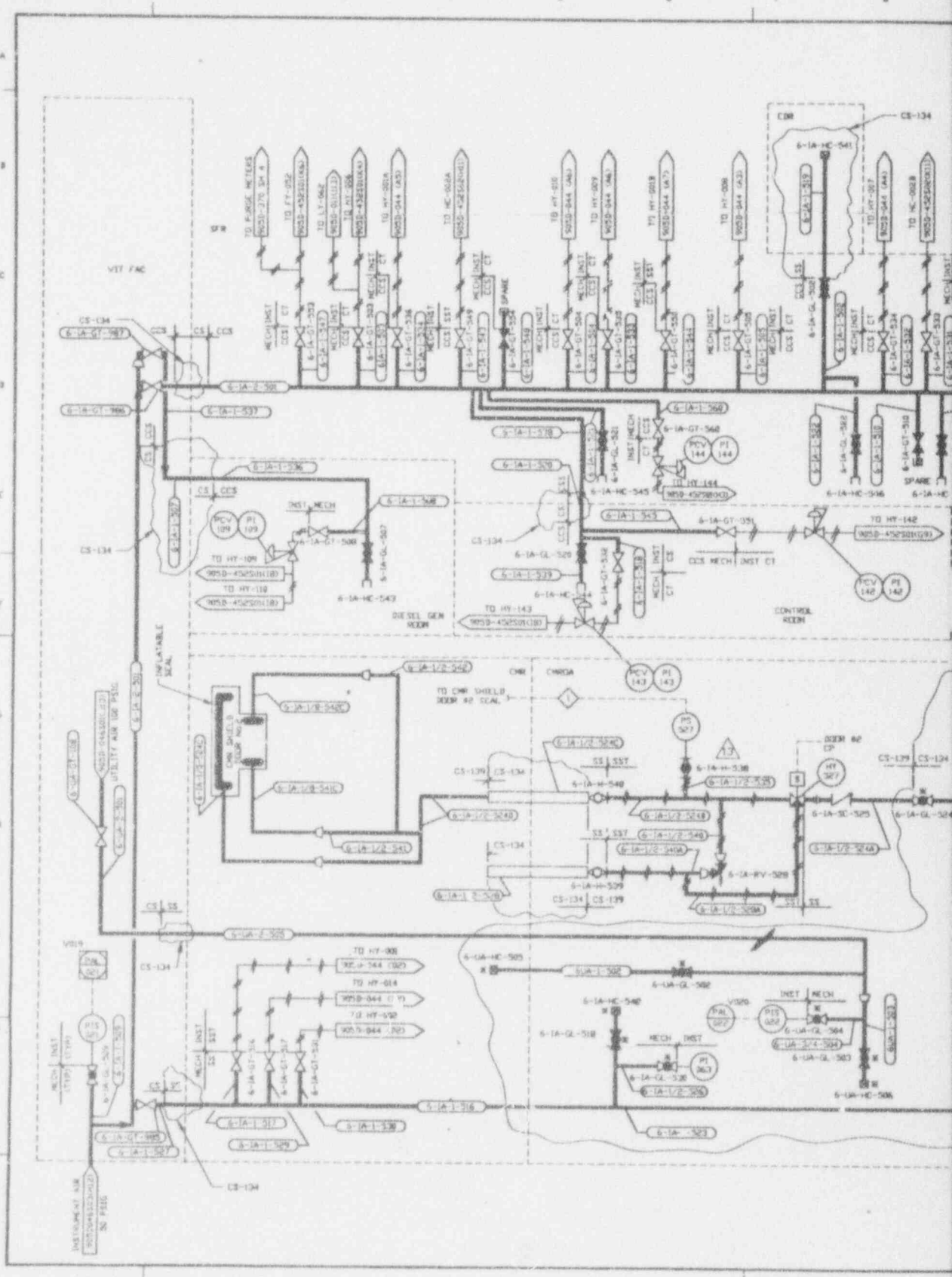
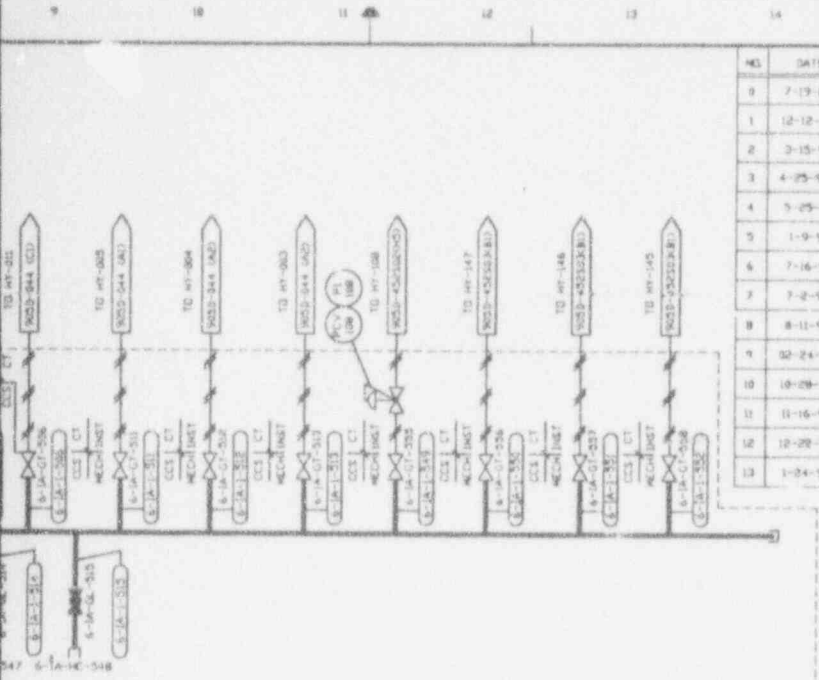
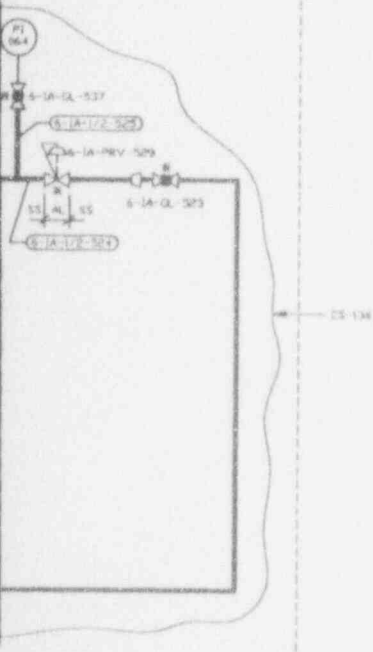

CDR
CS-134
6-1A-HC-541
TO HY-007
TO HC-0018
SPARE
6-1A-HC-546
VIT FAC
SFP
TO PURGE METERS
TO FT-052
TO LI-042
TO HY-014
TO HC-0028
TO HY-010
TO HY-009
TO HY-008
6-1A-GT-562
PCV 144
PI 144
TO HY-144
6-1A-HC-545
6-1A-GT-351
TO HY-142
PCV 142
PI 142
CONTROL ROOM
DIESEL GEN ROOM
TO HY-109
TO HY-110
6-1A-HC-543
TO HY-143
PCV 143
PI 143
CNMT
CNMTA
TO CNMT SHIELD DOOR #2 SEAL
INFLATABLE SEAL
UTILITY AIR 100 PSIG
DOOR #2 CP
6-1A-H-538
6-1A-H-540
6-1A-RV-529
6-1A-H-529
6-1A-SC-525
6-1A-GL-524
6-1A-HC-505
6-1A-GL-502
6-1A-HC-542
6-1A-GL-518
6-1A-GL-564
6-1A-GL-503
6-1A-HC-506
TO HY-008
TO HY-014
TO HY-012
6-1A-GT-514
6-1A-GT-517
6-1A-GT-519
6-1A-GT-985
6-1A-GL-509
6-1A-GT-507
6-1A-1-516
6-1A-1-517
6-1A-1-518
6-1A-1-519
6-1A-1-538
6-1A-523
INSTRUMENT AIR 90 PSIG
CS-134
CS-139
CCS
SS
INST
MECH
CT



NO.	DATE	REVISION	DR	CH	APPROVED
0	7-19-89	CR 1649			JRH
1	12-12-89	REV'D PER EDN 3165	JAV	KMG	D.JR
2	3-15-90	REV'D PER EDN 3382	PES	DRS	D.JR
3	4-25-90	REV'D PER EDN 3505	PES	DRS	D.JR
4	5-25-90	REV'D PER EDN 3669	CTC	DRS	D.JR
5	1-9-91	REV'D PER EDN 4871	AVN	HAB	D.JR
6	7-16-91	REV'D PER EDN 4398	AVN	HAB	D.JR
7	7-2-92	REV'D PER EDN 4891	DAK	HAB	D.JR
8	8-11-92	REV'D PER EDN 5285	VCX	HAB	D.JR
9	02-24-93	REV'D PER EDN 5655	JRC	DRS	PAH
10	10-28-93	REV'D PER EDN [illegible]	KGZ	DRS	JRY
11	11-16-93	REV'D PER EDN 7882	H.K.	JRS	JRY
12	12-22-93	REV'D PER EDN 7961	PAH	HAB	GGT
13	1-24-94	REV'D PER EDN 7944	LPR	pdb	DJR



REFERENCE DRAWINGS:

P & ID VITRIFICATION FACILITY UTILITY AIR SYSTEM.	905-0-046 SO1
P & ID VITRIFICATION FACILITY INSTRUMENT AIR SUPPLY.	905-0-046 S03
INSTRUMENT LOCATION ARRANGEMENT DRAWINGS-HVAC SYSTEM.	905-0-370 SH. 1-7
INSTRUMENT LOCATION ARRANGEMENT DRAWINGS-VITRIFICATION FACILITY.	905-0-373 SH. 1-4

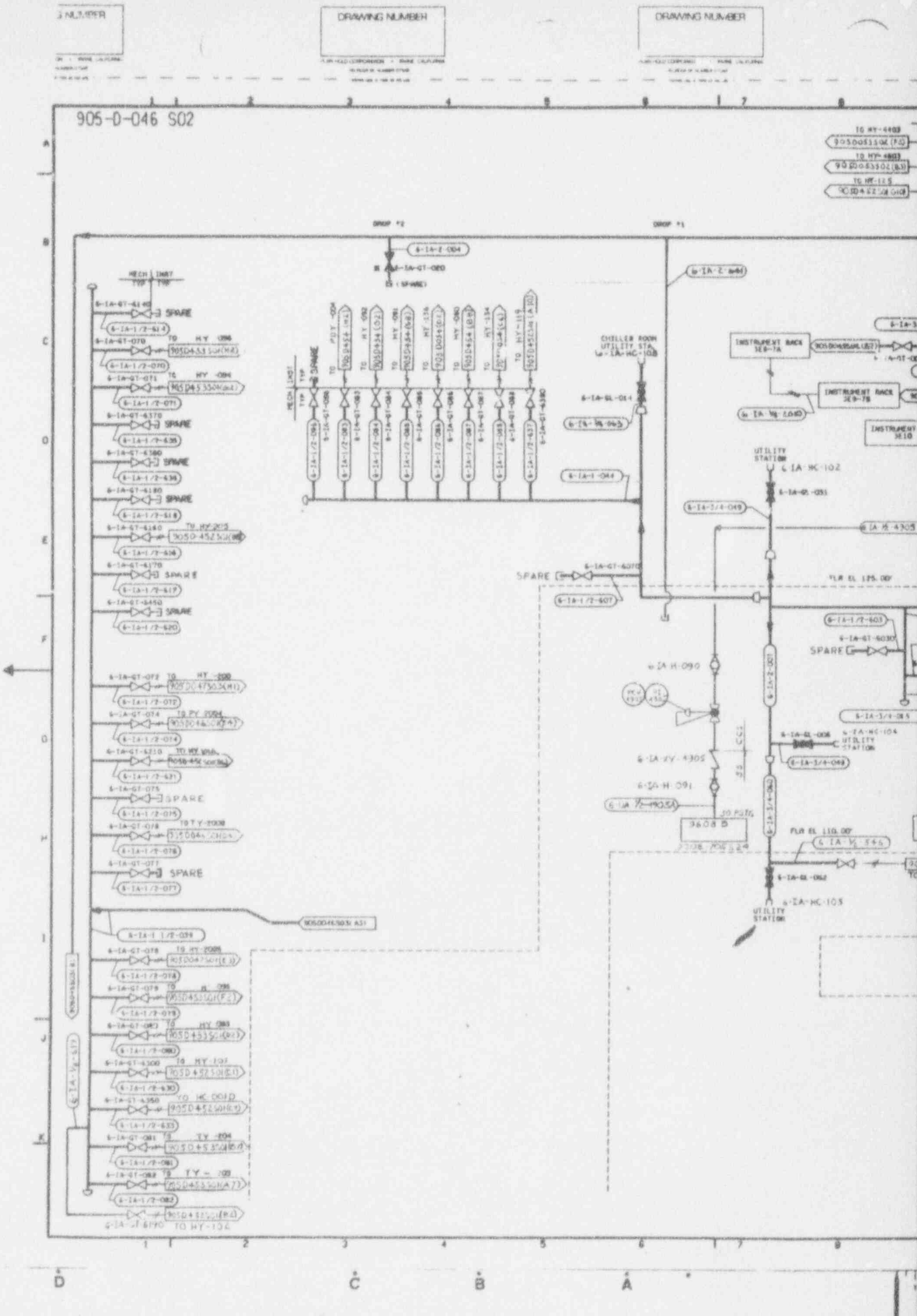
L ✱ DESIGNATES EXISTING EQUIPMENT

NOTES:

FOR DRAWING INDEX SEE DRAWING NO.

APPROVED FOR ISS.	EBASCO SERVICES INCORPORATED
PROJECT MGR.	A/E DRG. NO. [illegible] FOR TASK ORDER 227
M.D. VEINGART 6/30/87	WEST VALLEY NUCLEAR SERVICES COMPANY, INC. WEST VALLEY, NEW YORK
ENGINEER SUPV.	
P.S. KOVALCZYK 6/30/87	WEST VALLEY DEMONSTRATION PROJECT
LEAD DISC. ENGR.	
P.S. KOVALCZYK 6/30/87	P & ID
DESIGN	VITRIFICATION FACILITY
R.J. LEVKO 6/30/87	INSTRUMENT & UTILITY AIR SYS
CHECKED	
R.J. LEVKO 6/30/87	
DRAWN	DATE
T.J. KITZ 6/30/87	
QL-NQST-RUNE 44139	SIZE: D; AREA, SYS, TYP, DISC, SPEC: [illegible]; DRAWING NO. 905D-029; REV. 13
PROJECT NO.	
F-CVV-02275	
SUBCONTRACT NO.	
ISSUED FOR CONSTRUCTION	SCALE: NONE; SPEC. CODES; A/E SHEET NO. S01

9404080208-06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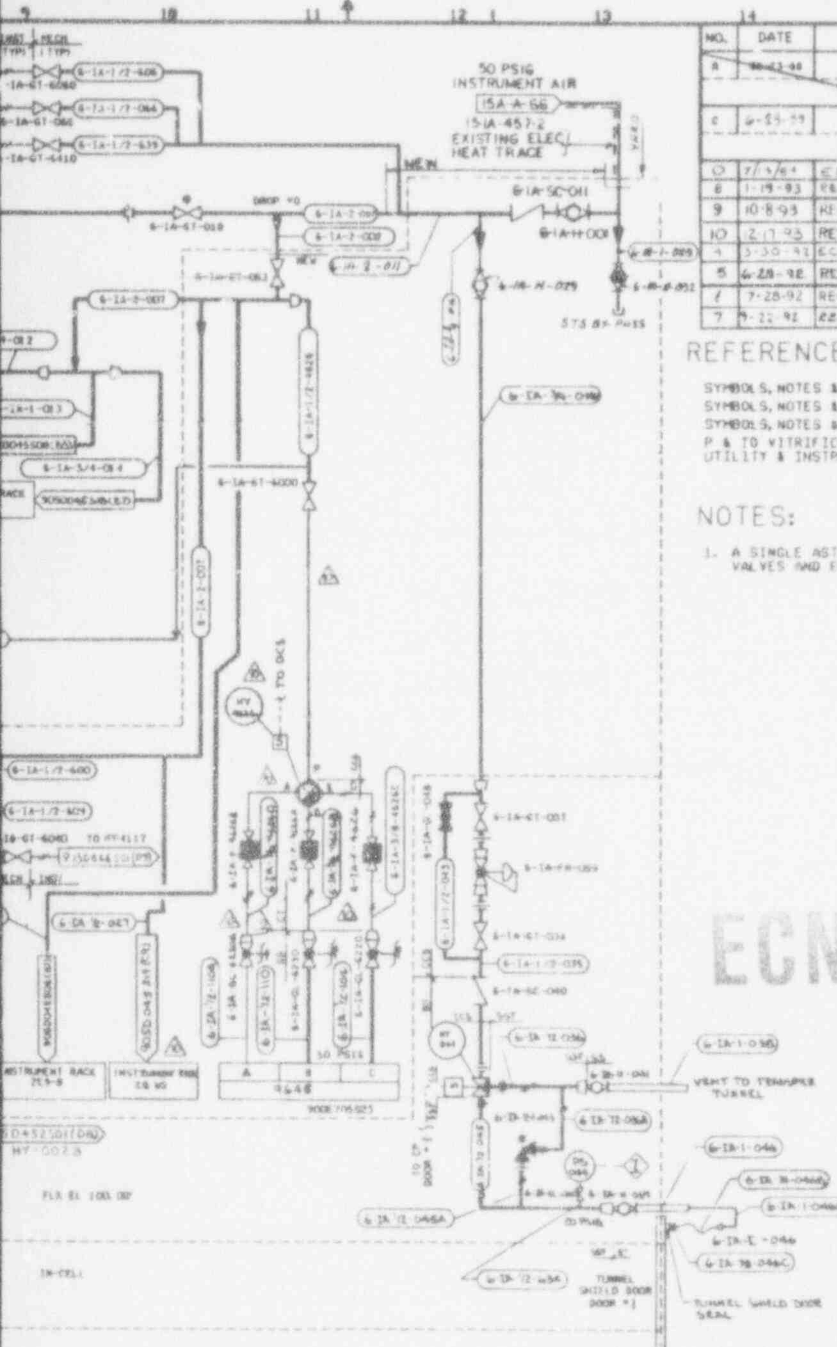

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9	10-8-93	REV/ECN 5586					
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REFERENCE DRAWINGS:

SYMBOLS, NOTES & LEGEND	900-D-1306
SYMBOLS, NOTES & LEGEND	900-D-1307
SYMBOLS, NOTES & LEGEND	900-D-1308
P & ID VITRIFICATION FACILITY UTILITY & INSTRUMENT AIR SYS	905-D-029

NOTES:

1. A SINGLE ASTERISK (*) INDICATES EXISTING VALVES AND EQUIPMENT TO BE RETAINED.

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EBASCO SERVICES INCORPORATED

FOR WEST VALLEY NUCLEAR SERVICES COMPANY, INC WEST VALLEY, NEW YORK

WEST VALLEY DEMONSTRATION PROJECT

P & ID
VITRIFICATION FACILITY
INSTRUMENT AIR SYSTEM

DRAWING NO. 905-D-046 REV. 10

SIZE D

ISSUED FOR CONSTRUCTION

SCALE NONE

A/E SHEET NO. 905-D-046 S02 C

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DRAWING NUMBER

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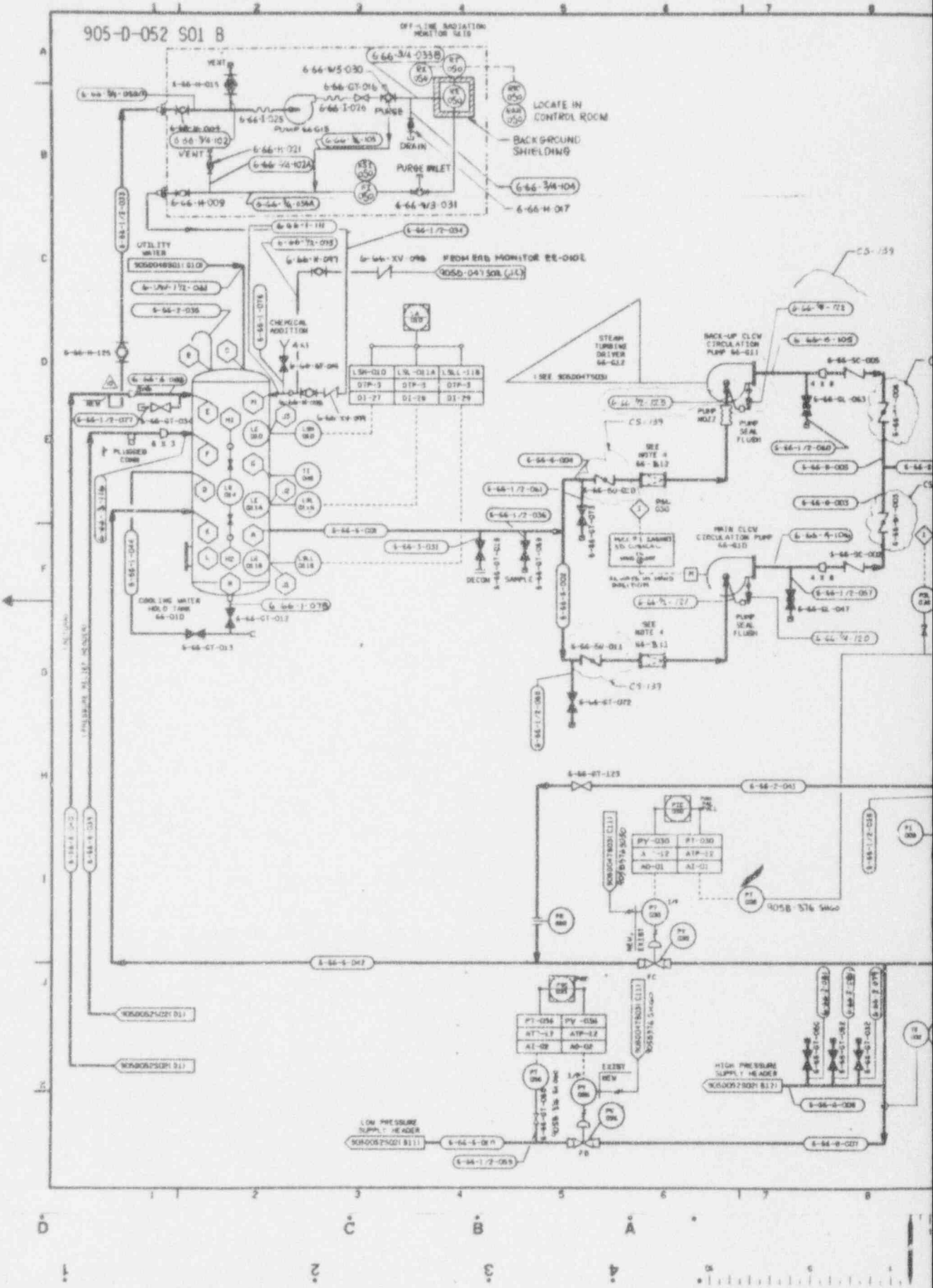
905D-052 SH. 1



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5	9-16-92	REV/ECN 5493	PN6		
6	8-31-93	REV/PER ECN 6599	PD		
7	9-3-93	REV/ECN 6699	PD		
8	11-9-93	REV/ECN 6161	PD		
9	2-14-94	REV/ECN 6908	PN5		
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REFERENCE DRAWINGS

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P & ID VITRIFICATION FACILITY UTILITY WATER	905-0-048SD1
P & ID V.F. INSTRUMENT RACK 3W2-1A	905-0-045 SD1
P & ID V.F. INSTRUMENT RACK 2W2-1B	905-0-045 SD5
P & ID V.F. INSTRUMENT RACK 2E9-8	905-0-045 SD6
P & ID V.F. INSTRUMENT RACK 3WT	905-0-045 SD9
P & ID V.F. INSTRUMENT RACK 3W1	905-0-045 S15
P & ID V.F. INSTRUMENT RACK 2W5	905-0-045 S17
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P & ID V.F. INSTRUMENT RACK 2E1D	905-0-045 S19
INSTRUMENT INSTALLATION DETAILS	905-8-516

NOTES

1. THE SYSTEM DESIGNATOR FOR ALL PIPING COMPONENTS ON THIS SHEET IS 6-66-YY-XXX UNLESS OTHERWISE NOTED.
2. NEW EXIST THIS SYMBOL IDENTIFIES THE SCOPE OF PIPING WORK TO BE UNDERTAKEN TO CONVERT THE EXISTING CLCW SYSTEM TO ITS FINAL HOT CONFIGURATION.
3.
4. BASKET STRAINERS 66-B-12 & 13 ARE START-UP STRAINERS. REMOVE STRAINERS PRIOR TO HOT OPS.

FOR DRAWING INDEX SEE DRAWING NO.

EBASCO SERVICES INCORPORATED
A/E U.F.S. NO. 4156 TASK ORDER 009

FOR
WEST VALLEY NUCLEAR SERVICES COMPANY, INC
WEST VALLEY, NEW YORK

WEST VALLEY DEMONSTRATION PROJECT

VITRIFICATION FACILITY
CLOSED LOOP COOLING WATER SYSTEM P&ID

DESIGN J. J. LEWIS			
CHECKED R. J. LEWIS			
DRAWN P. SANTOS			
PROJECT NO. 9-CWW-02275			
SUBCONTRACT NO.			
ISSUED FOR CONSTRUCTION	SCALE NONE	SIZE D	DRAWING NO. 905-D-052 REV. 10
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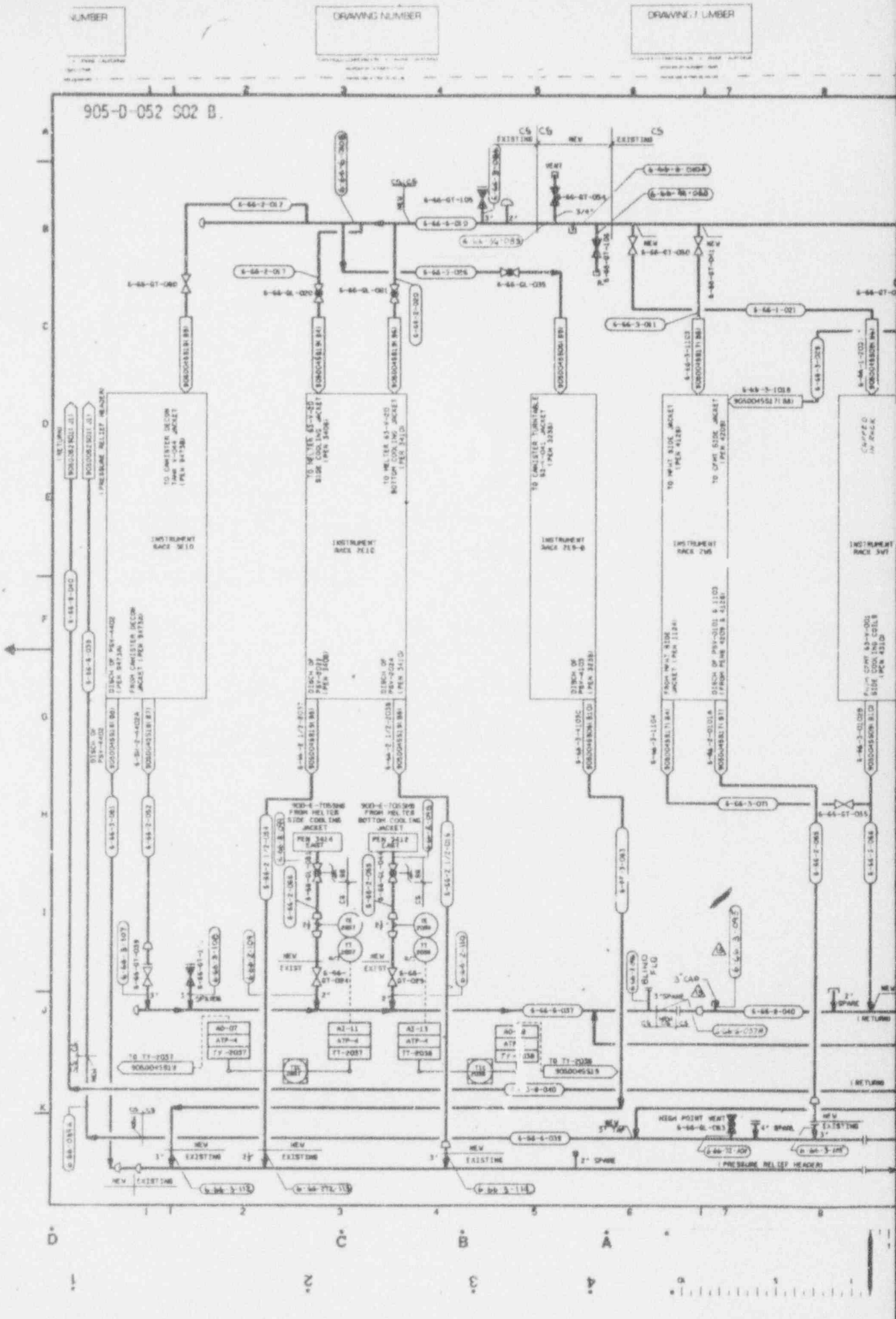
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INSTRUMENT RACK 3W1
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FROM CANISTER DECON JACKET (PEN 3473B)
TO MELTER SIDE COOLING JACKET (PEN 3404)
TO MELTER BOTTOM COOLING JACKET (PEN 3412)
TO CANISTER TURNTABLE JACKET (PEN 3238)
TO HEAT SIDE JACKET (PEN 4128)
TO CAN SIDE JACKET (PEN 4208)
FROM HEAT SIDE JACKET (PEN 1124)
FROM CAN SIDE JACKET (PEN 4310)
FROM MELTER SIDE COOLING JACKET (PEN 3404)
FROM MELTER BOTTOM COOLING JACKET (PEN 3412)
HIGH POINT VENT
PRESSURE RELIEF HEADER
RETURN
EXISTING
NEW
SPARE
BLIND FLG
CAP
TO TY-2037
TO TY-2038
A0-07
A2-11
A2-13
ATP-4
TT-2037
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D C B A
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DRAWING NUMBER

905D-052 SH. 2

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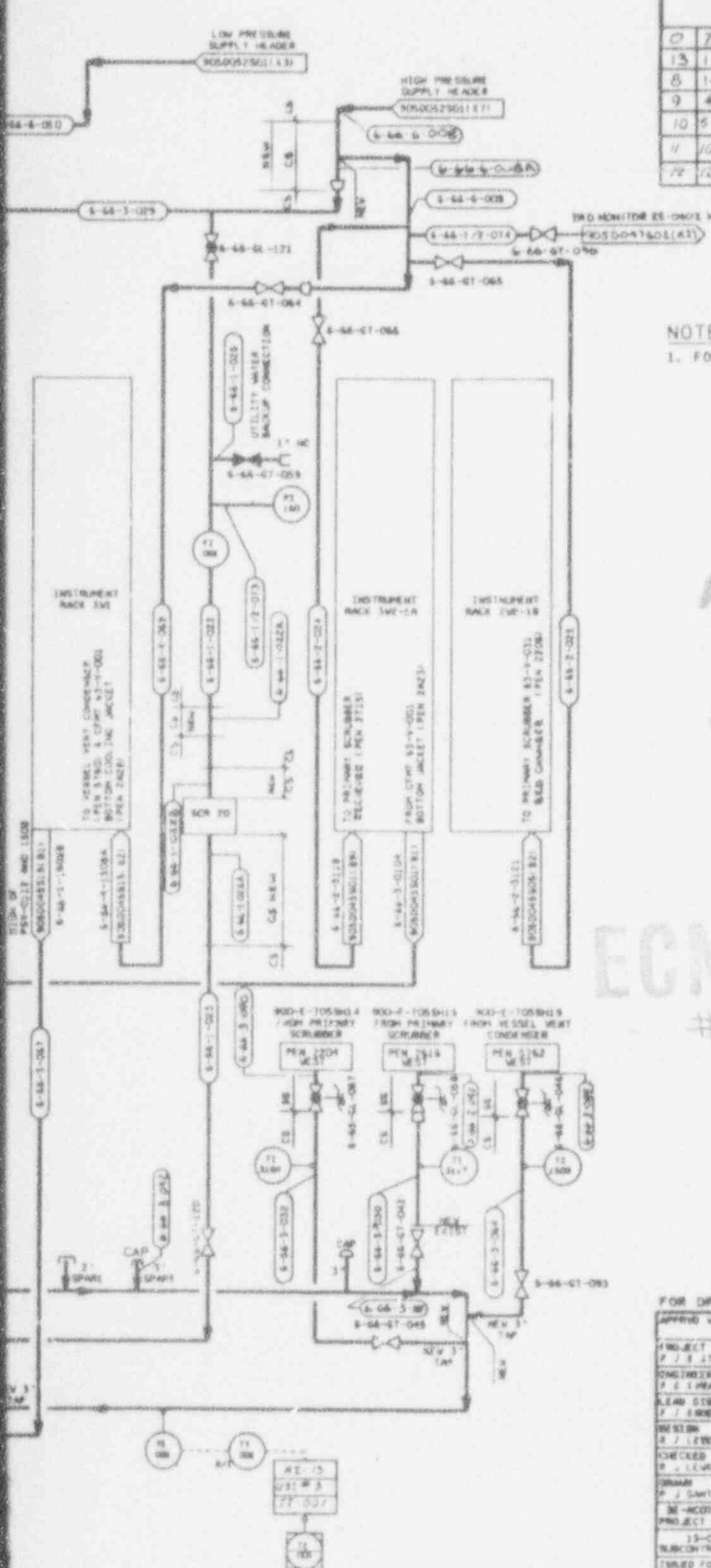

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EBASCO SERVICES INCORPORATED

WEST VALLEY NUCLEAR SERVICES COMPANY, INC
WEST VALLEY, NEW YORK

WEST VALLEY DEMONSTRATION PROJECT

VITRIFICATION FACILITY
CLOSED LOOP COOLING
WATER SYSTEM P&ID

SIZE D

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ISSUED FOR CONSTRUCTION

SCALE NONE

905-0-052 S02 B

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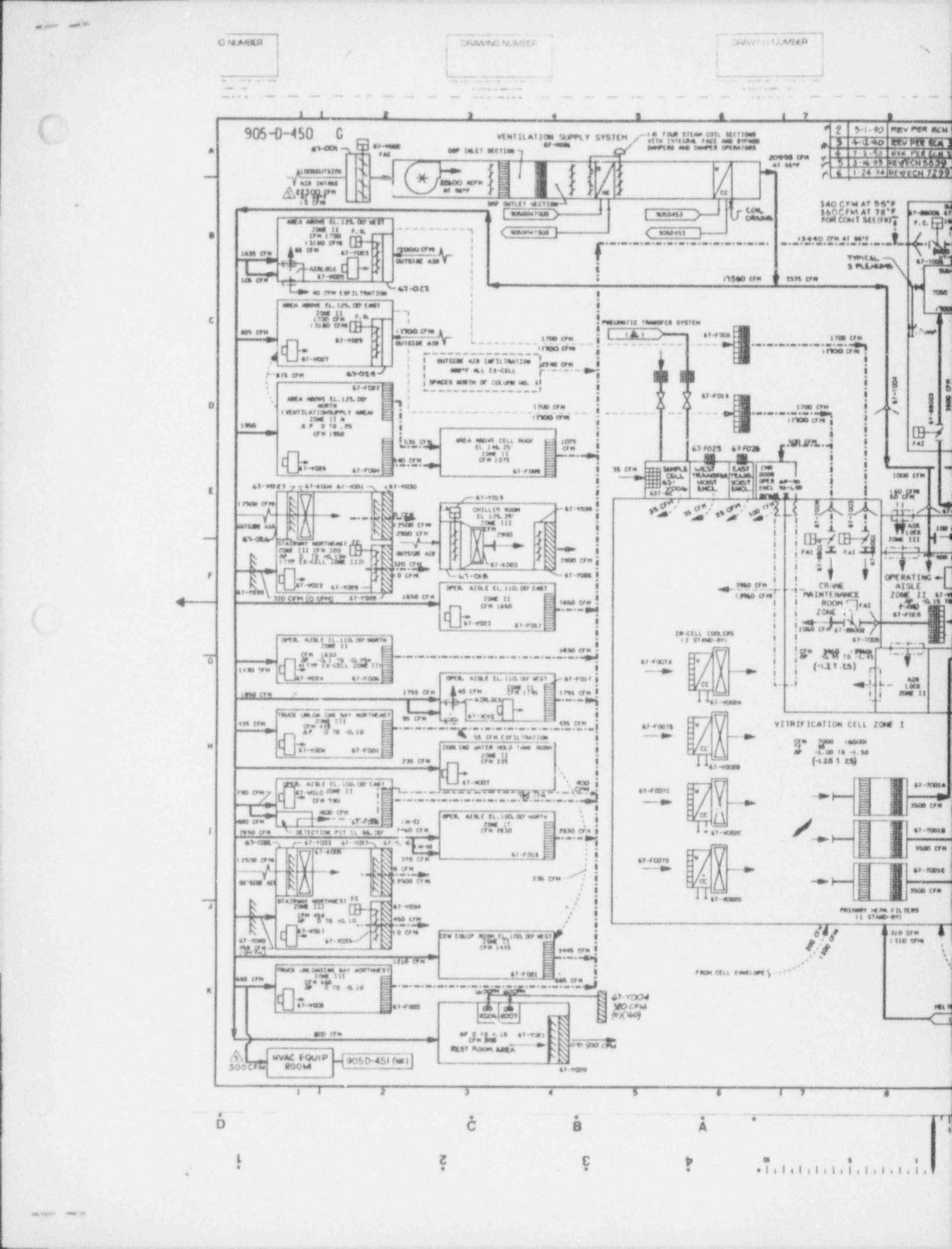
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PNEUMATIC TRANSFER SYSTEM
VITRIFICATION CELL ZONE I
CRANE MAINTENANCE ROOM
OPERATING AISLE
REST ROOM AREA
HVAC EQUIP ROOM
905-D-451 (NR)
FROM CELL ENVELOPE
PRIMARY HEPA FILTERS (1 STAND-BY)
IN-CELL COOLERS (2 STAND-BY)
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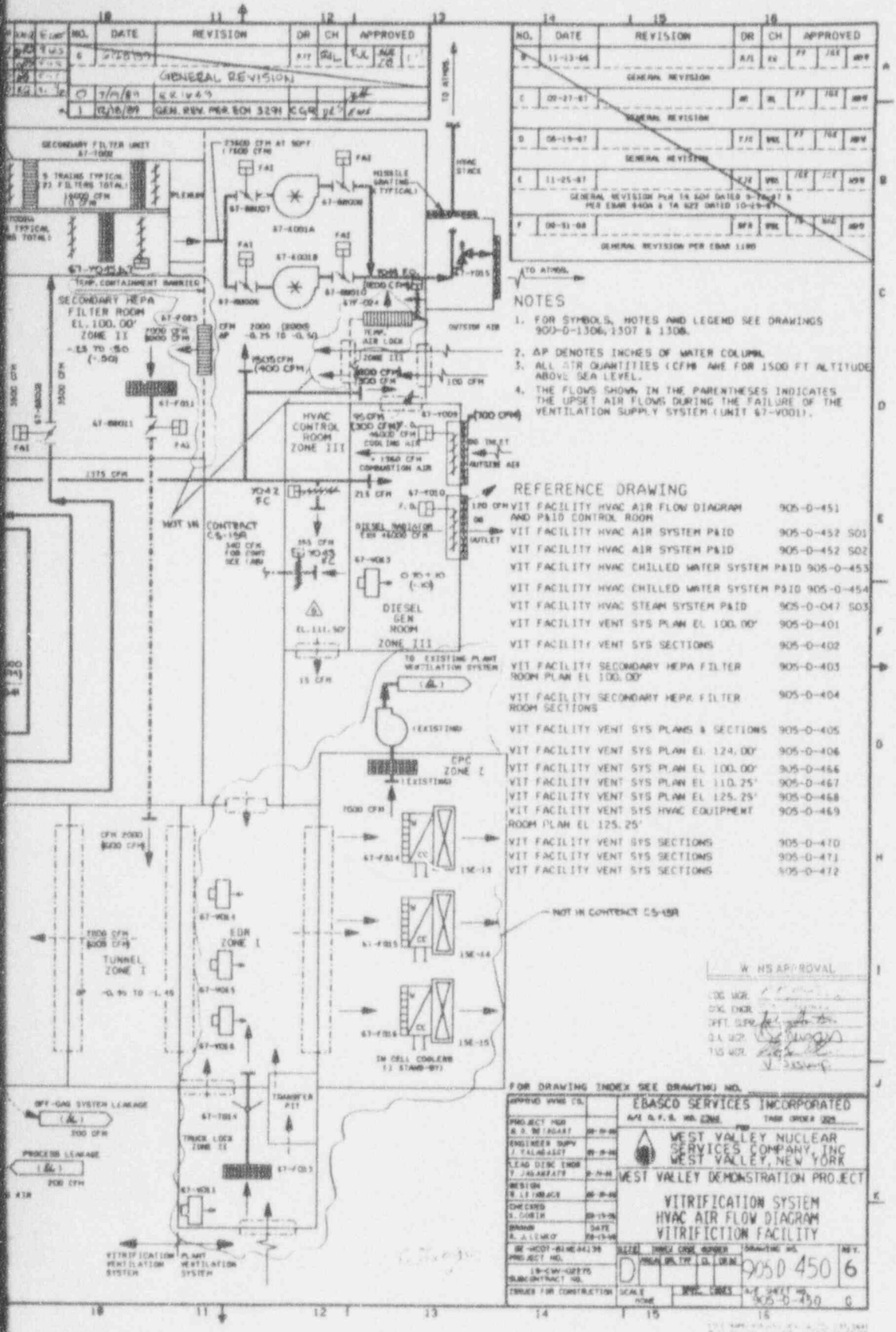
3 4-12-90 REV PER RCN
4 7-3-95 REV PER ECN
5 3-16-95 REVECN 5839
6 1-24-96 REVECN 7299

905D-450



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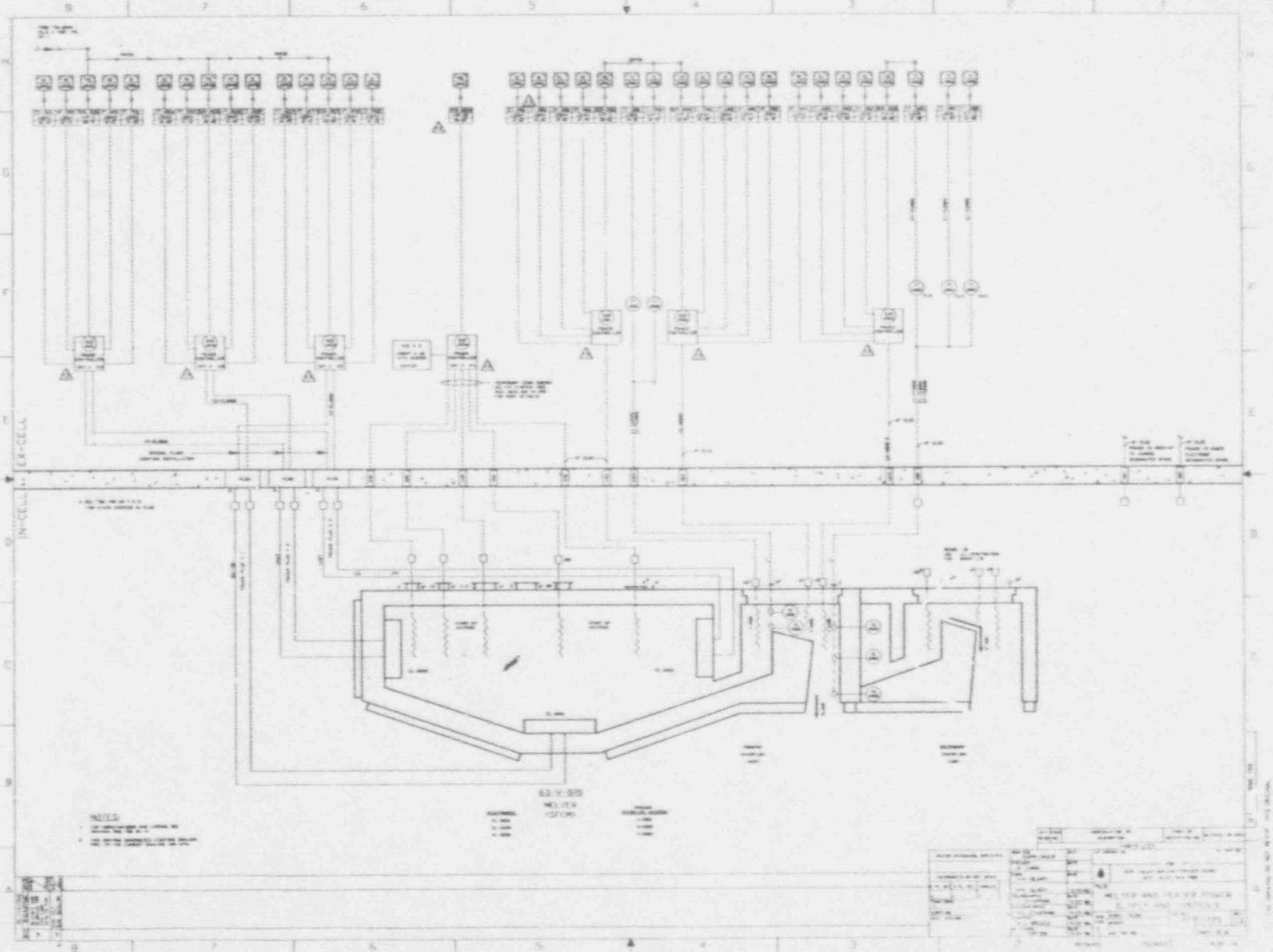

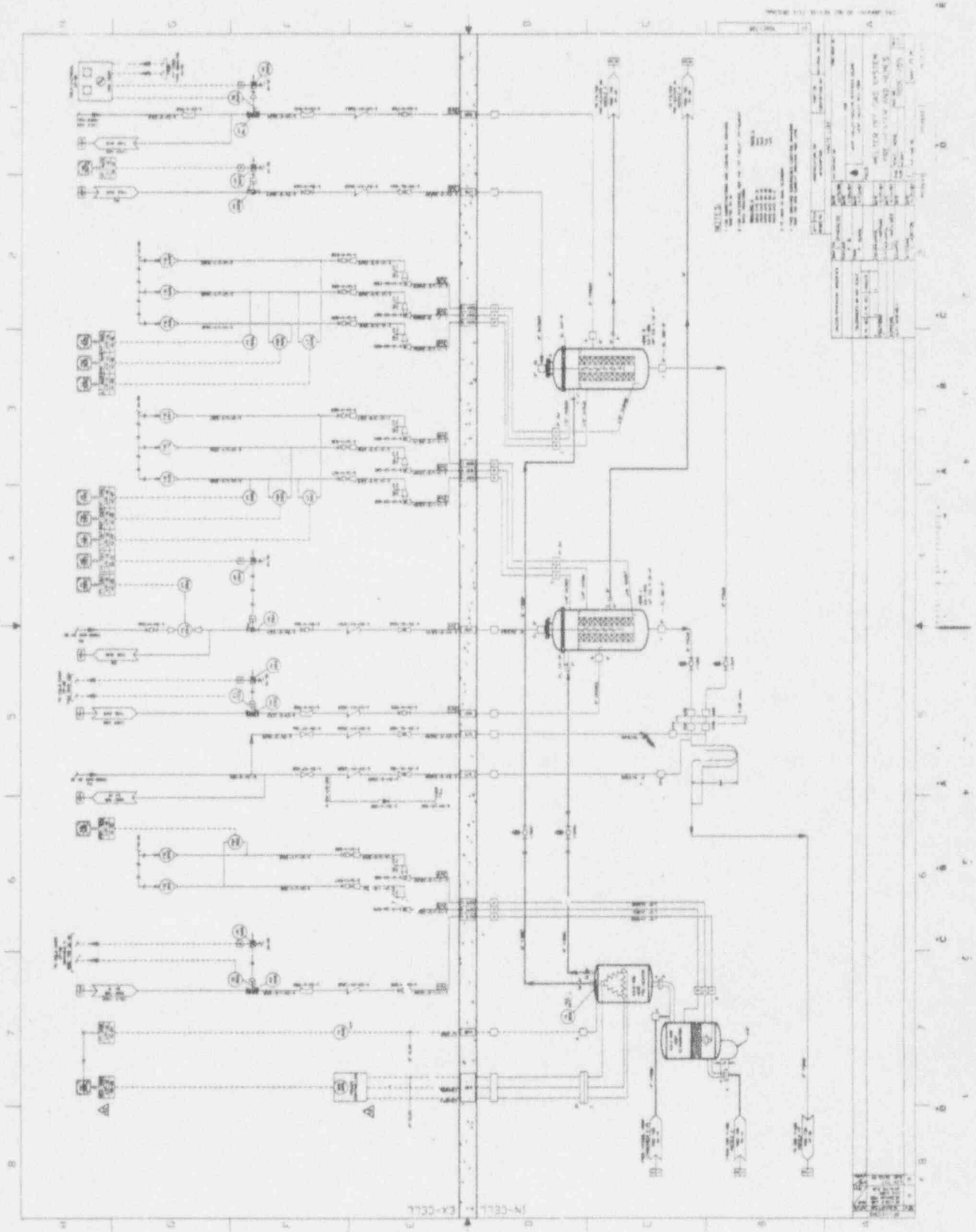

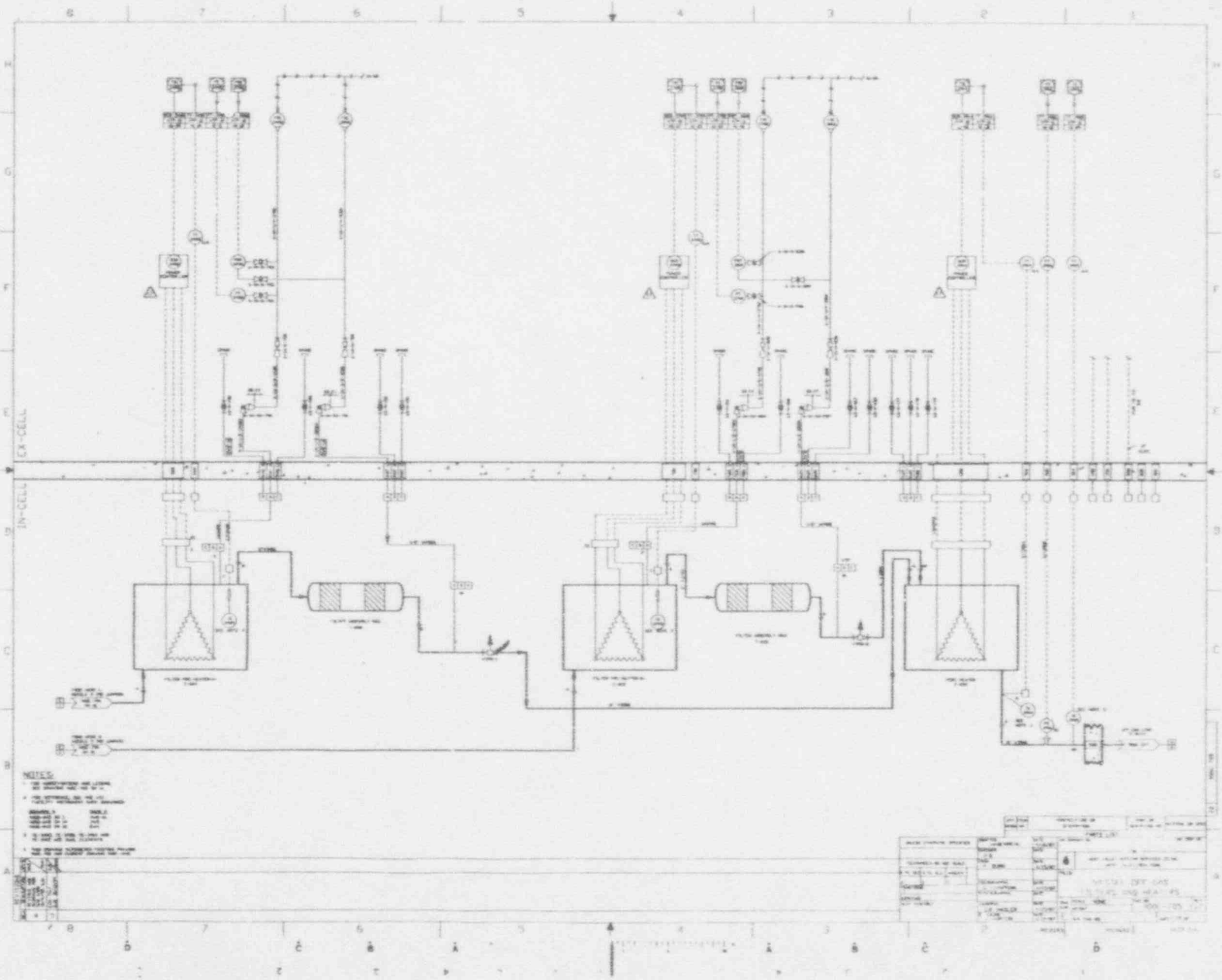
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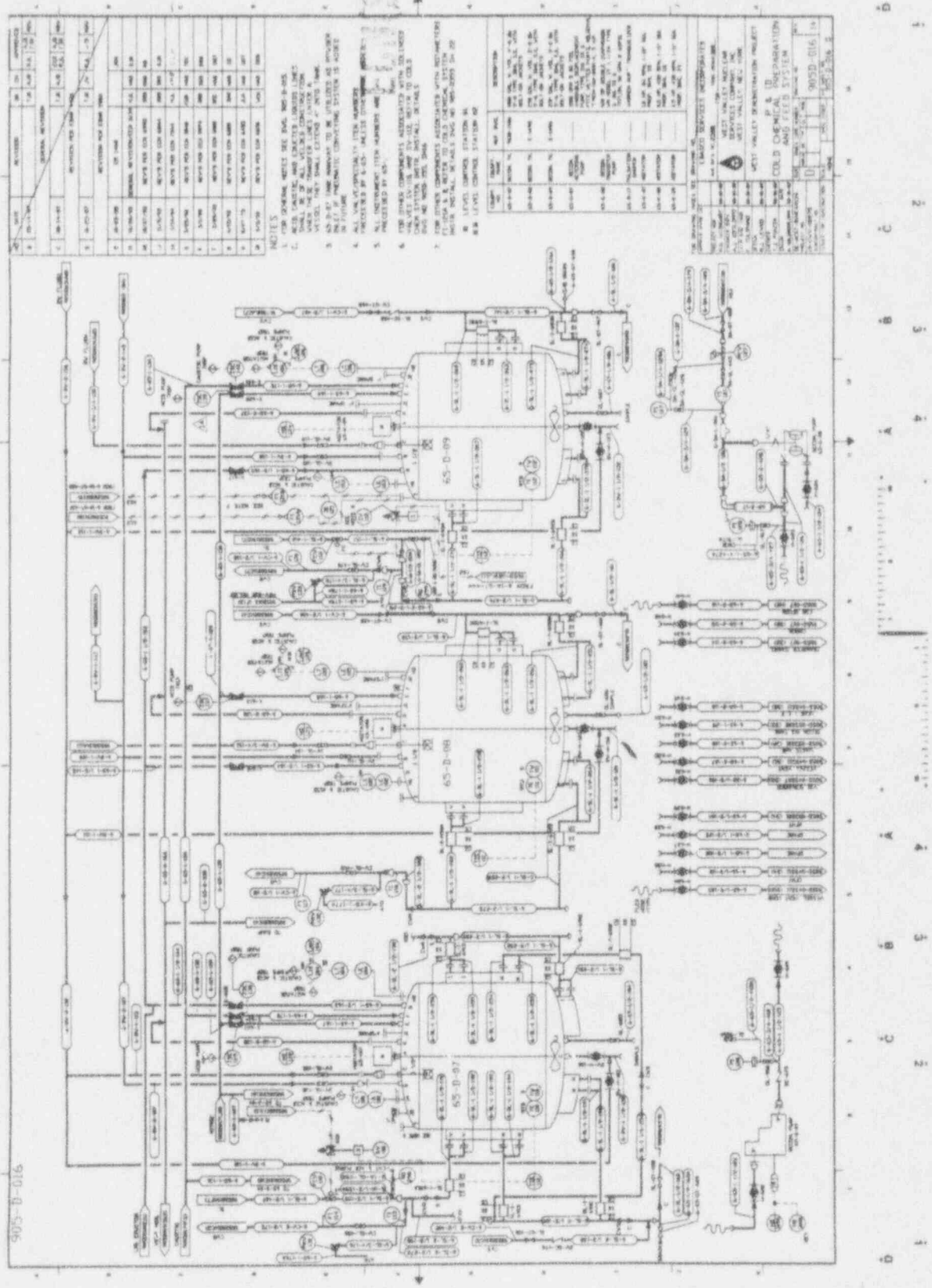

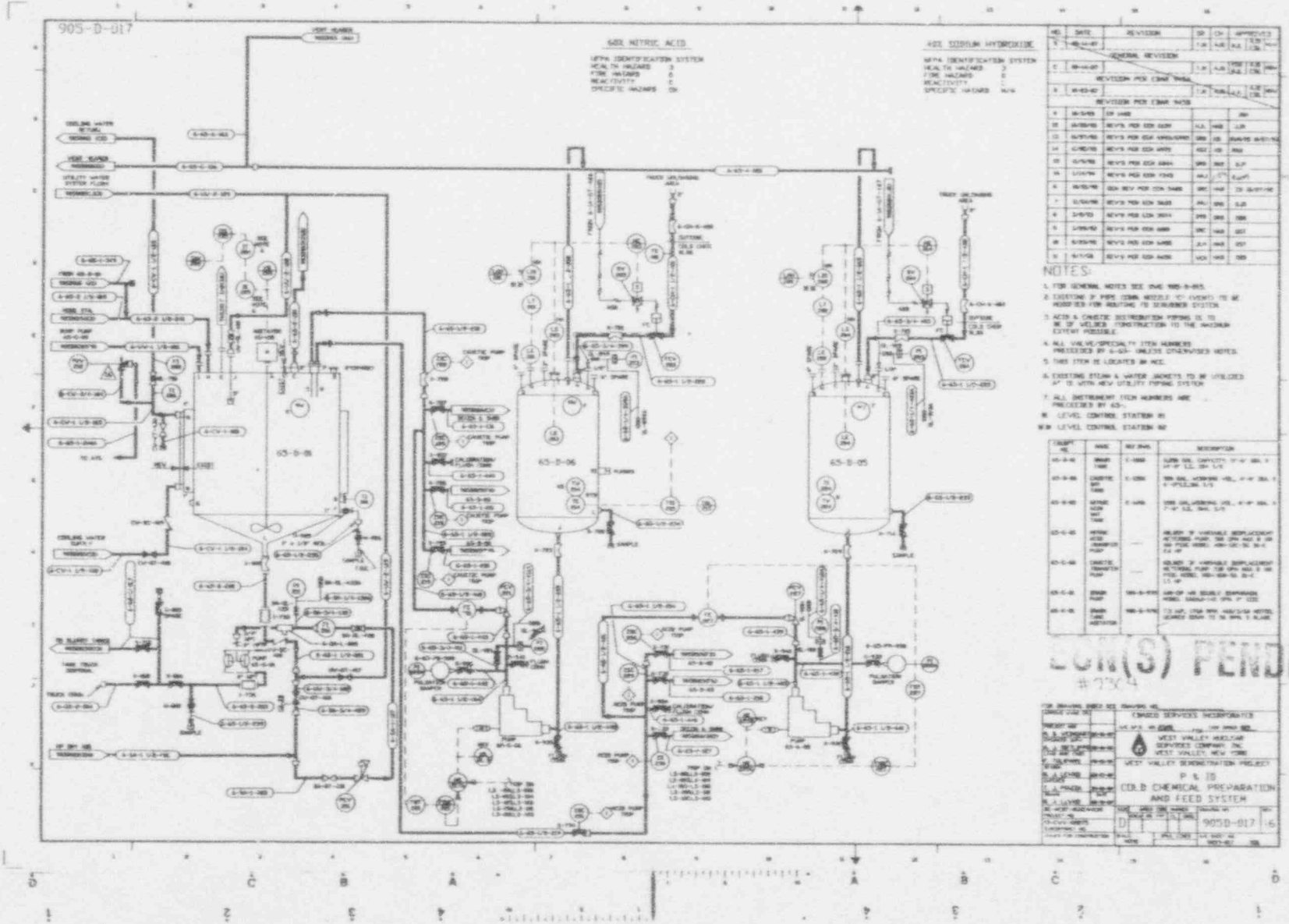
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#734
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P & ID
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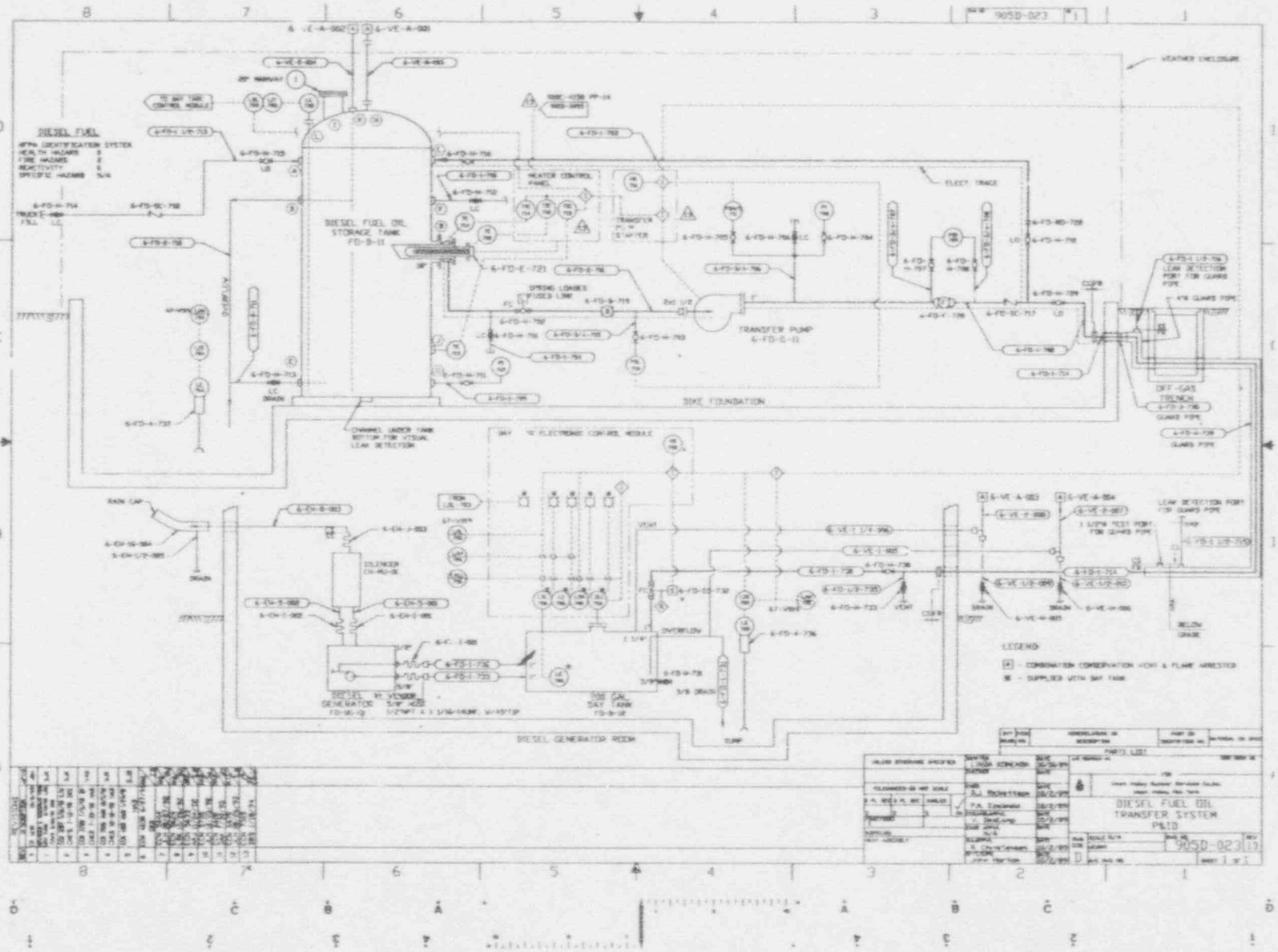
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LEGEND
DIESEL FUEL OIL TRANSFER SYSTEM P&ID
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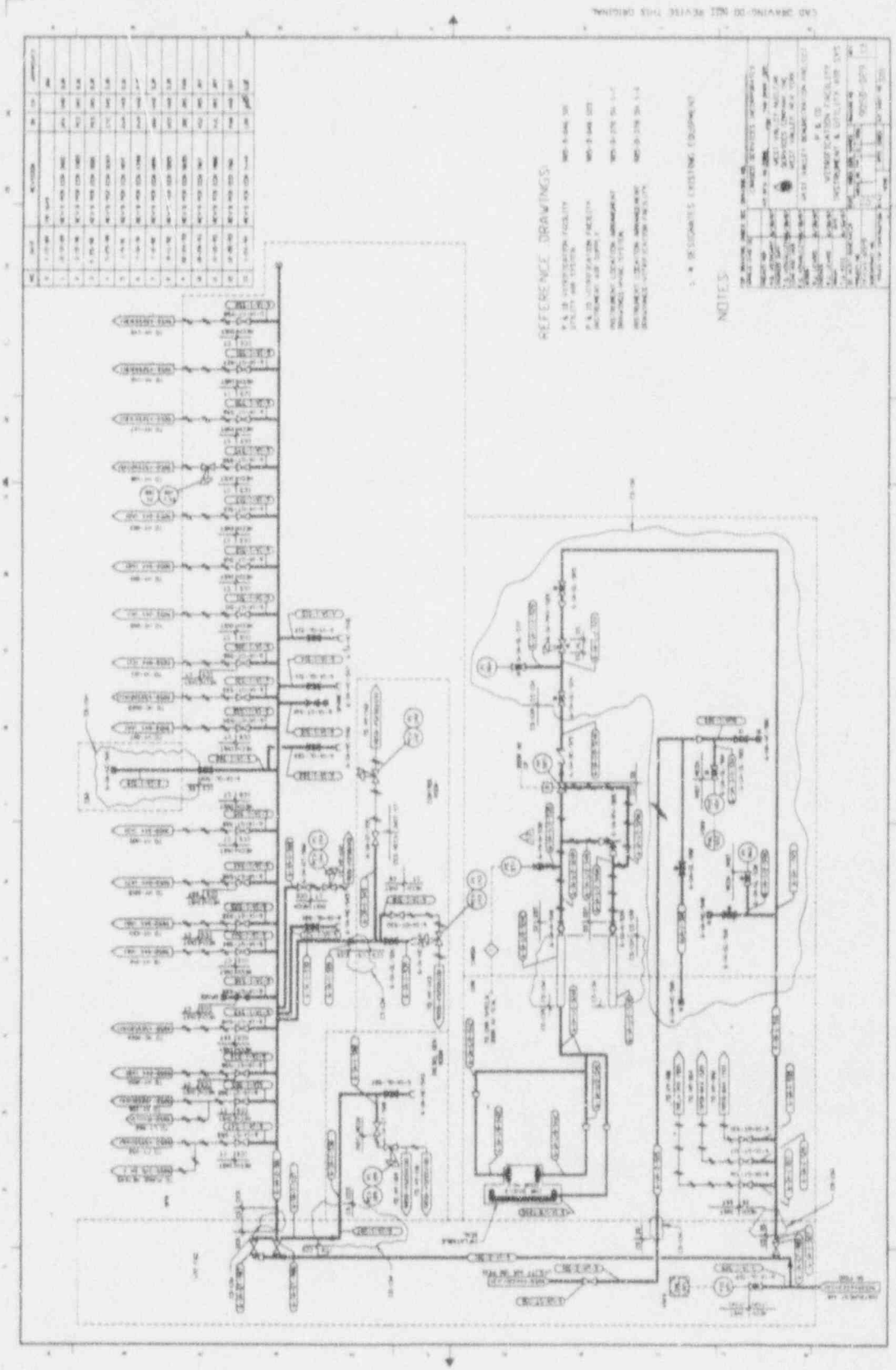
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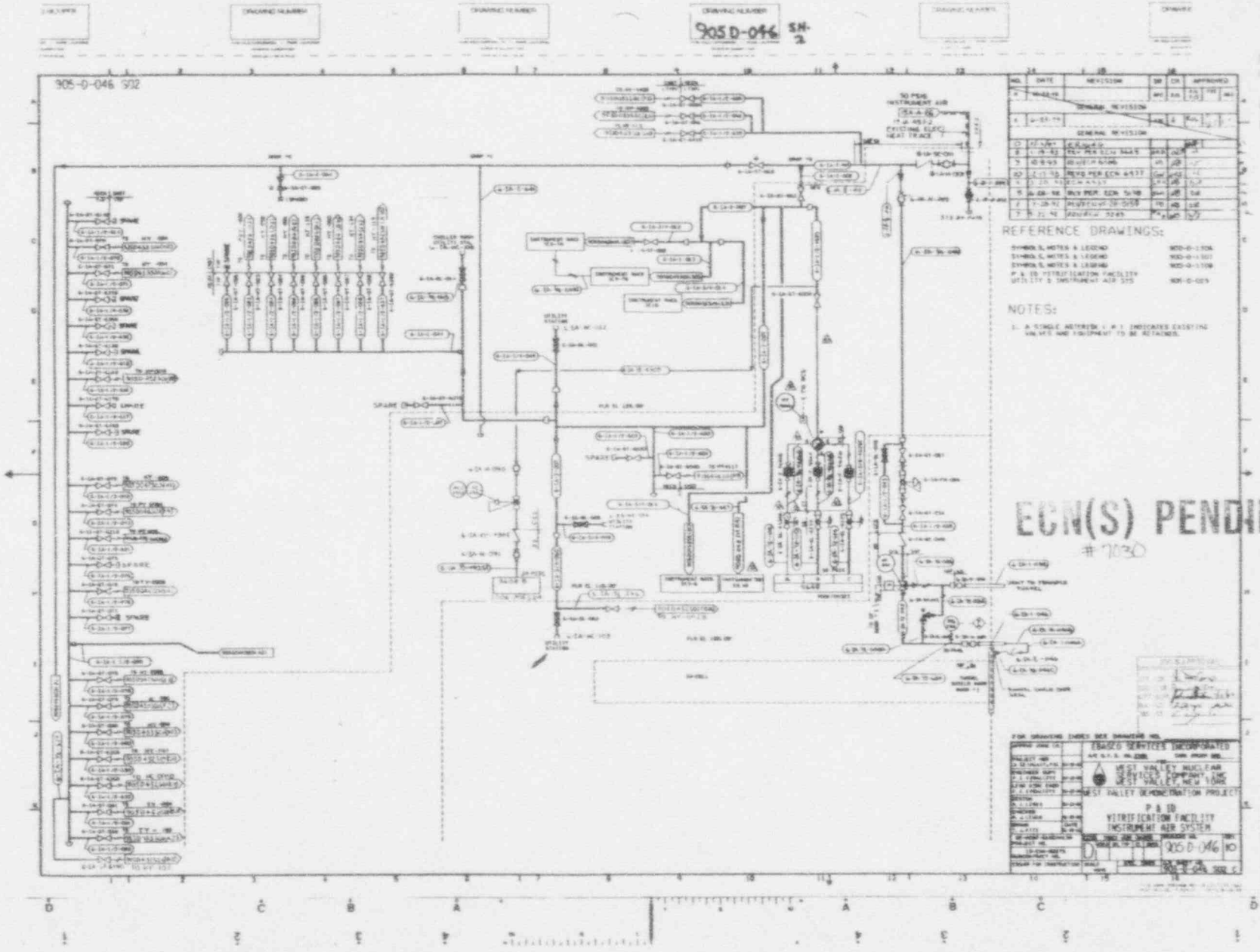
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905-D-046 SH2
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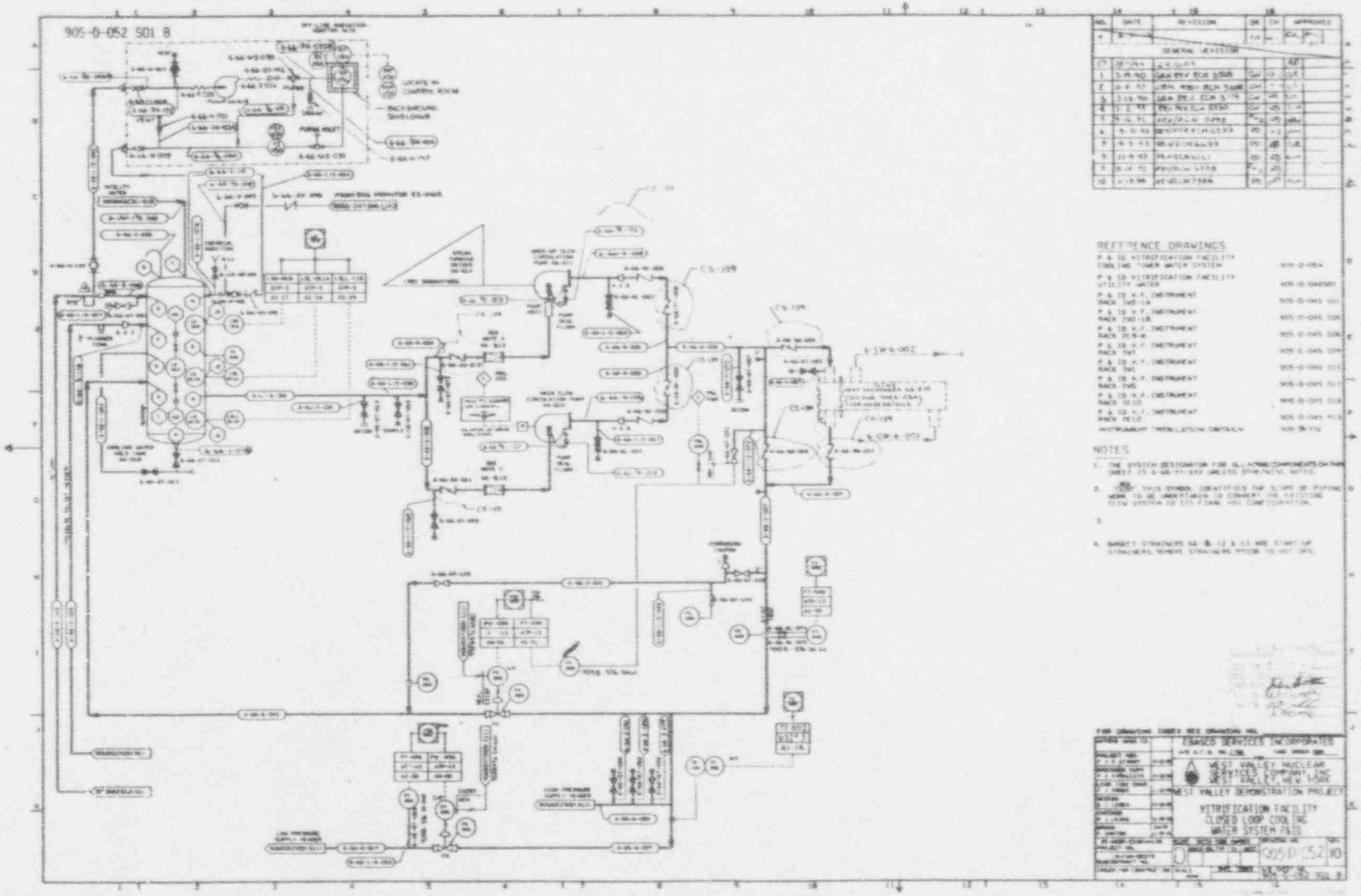
WEST VALLEY, NEW YORK
WEST VALLEY DEMONSTRATION PROJECT
P & ID
VITRIFICATION FACILITY
INSTRUMENT AIR SYSTEM
905D-046

905D-052 SH. 1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CLOSED LOOP COOLING
WATER SYSTEM P&ID
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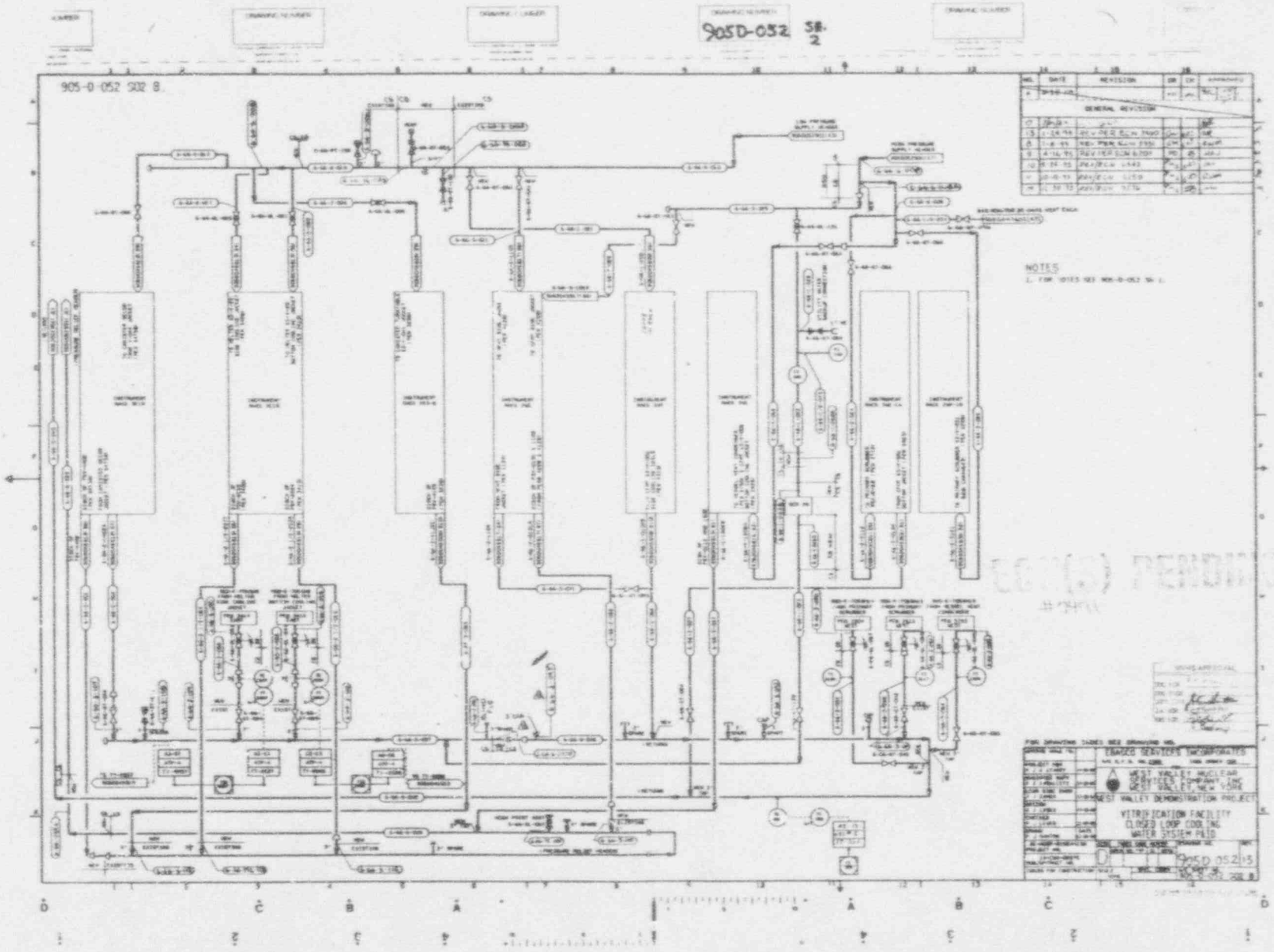
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WEST VALLEY, NEW YORK
WEST VALLEY DEMONSTRATION PROJECT
VITRIFICATION FACILITY
CLOSED LOOP COOLING WATER SYSTEM P&ID
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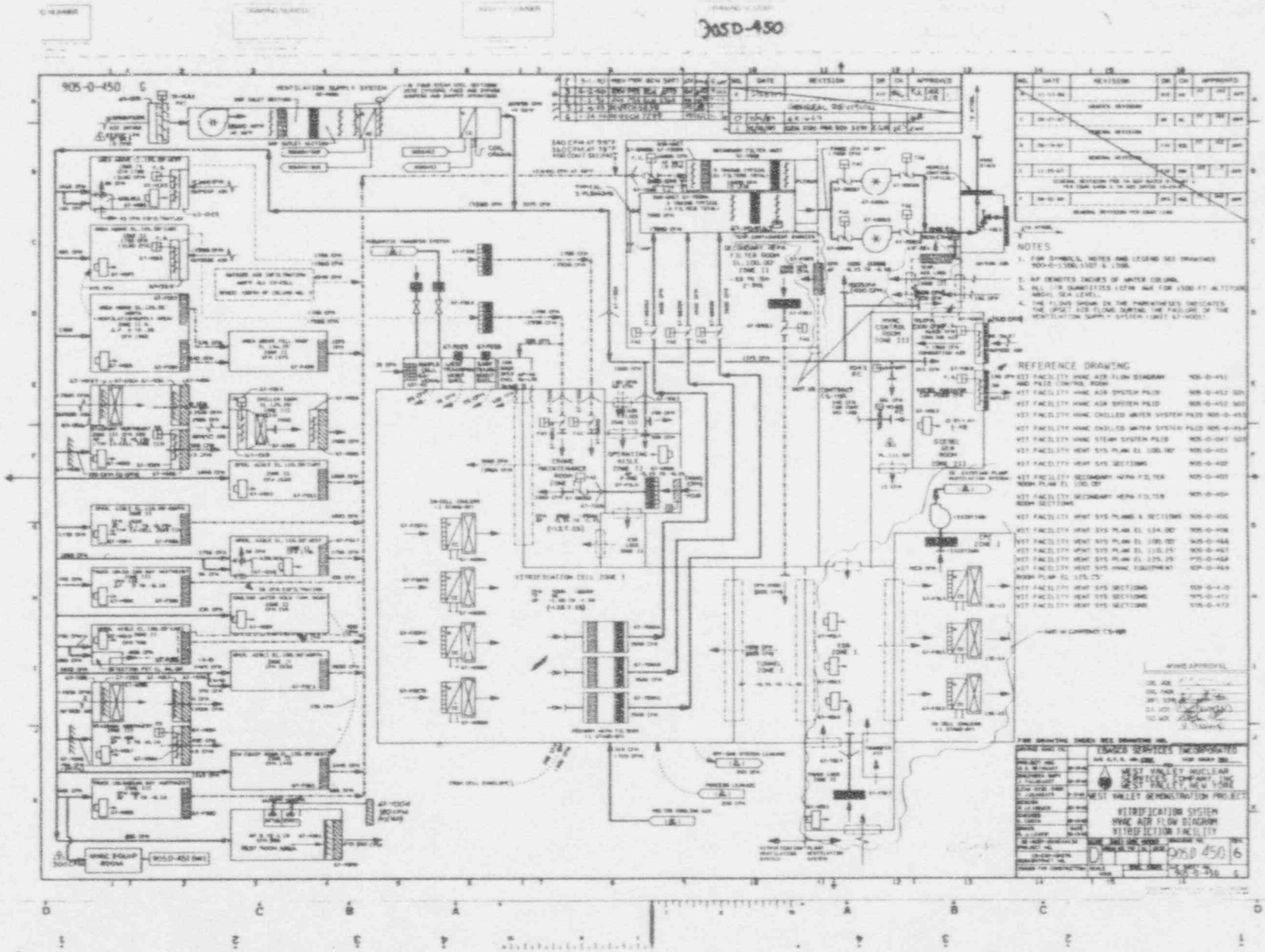
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VITRIFICATION FACILITY
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West Valley Demonstration Project

Doc. Number WVNS-FD-001

Revision Number 0

Revision Date 01/28/94
Engineering Release #2841

FACILITY DESCRIPTION

HIGH-LEVEL WASTE SOLIDIFICATION FACILITIES

PREPARED BY _____ 1/24/94
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Cognizant Engineer

APPROVED BY _____ 1/25/94
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APPROVED BY _____ 1/28/94
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West Valley Nuclear Services Co., Inc.
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FD:0002856.01

RECORD OF REVISION

PROCEDURE

If there are changes to the controlled document, the revision number increases by one. Depending on the document type (per WV-100) changes are indicated by:

- a heavy vertical black line located in the right-hand margin adjacent to the sentence or paragraph which was revised
- an arrow at the beginning of the paragraph which was revised
- identifying as GENERAL REVISION

Example:

The vertical line in the margin indicates a change. |
The arrow in the margin indicates a change. >

Rev. No.	Description of Changes	Revision On Page(s)	Dated
0	Original Issue	All	01/28/94

RECORD OF REVISION (CONTINUATION SHEET)

Rev. No.	Description of Changes	Revision On Page(s)	Dated

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

FIGURES AND TABLES

LIST OF ACRONYMS

ACT	Operating Logic Diagram Activity
ADS	Air Displacement Slurry (pump)
ALARA	As Low As Reasonably Achievable
CC	Cold Chemical
CCR	Chemical Crane Room
CCS	Cold Chemical System
CCTV	Closed Circuit Television
CDS	Canister Decontamination System
CFMT	Concentrator Feed Makeup Tank
CLCWS	Closed Loop Cooling Water System
CMR	Crane Maintenance Room
CPC	Chemical Processing Cell
CR	Control Room
CSS	Cement Solidification System
CTS	Component Test Stand
CTW	Cooling Tower Water
CVA	Chemical Viewing Aisle
CW	Cooling Water
CWS	Canister Welding System
D&D	Decontamination and Decommissioning
DBA	Design Base Accident
DBE	Design Base Earthquake
DCD	Design Criteria Document
DCS	Distributed Control System
DOE	United States Department of Energy
DW	Demineralized Water
EDR	Equipment Decontamination Room
EDS	Electrical Power Distribution System
EOA	Equipment Decontamination Room Operating Aisle
EP	Engineering Procedure
EPA	United States Environmental Protection Agency

LIST OF ACRONYMS

FD	Facility Description
FDP	Fire Detection and Protection
FO	Fuel Oil System
HEME	High Efficiency Mist Eliminator
HEPA	High Efficiency Particulate Air Filter
HLW	High Level Waste
HLWIS	High Level Waste Interim Storage
HLWSF	High Level Waste Solidification Facilities
HVAC	Heating Ventilating and Air Conditioning
I&C	Instrumentation and Control
I&CH	Instrumentation and Control, Hardware
I&CS	Instrumentation and Control, Software
IA	Instrument Air
ILDS	Infrared Level Detection System
IR	Instrument Room
IRHV	In-Cell Remote Handling and Viewing
LL	Load In/Load Out Facility
LLWT	Low Level Waste Treatment System
MFHT	Melter Feed Hold Tank
NYSDEC	New York State Department of Environmental Conservation
OGS	Off-Gas System
P&ID's	Piping and Instrument Drawings
PLC	Programmable Logic Controller
PPS	Primary Process System
PSTS	Pneumatic Sample Transfer System
PVS	Permanent Ventilation System
PW	Potable Water
QA	Quality Assurance
SBS	Submerged Bed Scrubber
SC	Steam and Condensate System
SD	System Description

LIST OF ACRONYMS

SFCM	Slurry-Fed Ceramic Melter
SMS	Sludge Mobilization System
SOP	Standard Operating Procedure
SSC	Sample Storage Cell
STS	Supernatant Treatment System
UA	Utility Air System
UPS	Uninterruptible Power Supply
UW	Utility Water System
Vit Cell	Vitrification Cell
VF	Vitrification Facility
VS	Vitrification System
VSS	Vitrification Sampling System
WAPS	Waste Acceptance Product Specification
WH	Waste Header System
WTFVS	Waste Tank Farm Ventilation System
WVDP	West Valley Demonstration Project
WVNS	West Valley Nuclear Services, Incorporated
WVPO	West Valley Project Office
WW	VF Drain Systems

EQUIPMENT NUMBERS

8D-1	High Level Waste Tank
8D-2	High Level Waste Tank
8D-3	High Level Waste Tank
8D-4	High Level Waste Tank

HIGH-LEVEL WASTE SOLIDIFICATION FACILITIES

REV. 0

I. SUMMARY

The West Valley Demonstration Act passed in 1980 required the United States Department of Energy to solidify over 2 270 m3 (600,000 gallons) of liquid high-level nuclear wastes currently stored in underground steel tanks at West Valley, New York. The West Valley Demonstration Project overall plan is to vitrify the high-level wastes into a borosilicate glass form, making maximum use of existing technology, facilities, and equipment, while minimizing new development.

This document describes the facilities and systems which function collectively to mix and remove High Level Waste from the storage tanks (8D-1, 8D-2, 8D-4) and process that waste into borosilicate glass in stainless steel canisters. It also, includes the transfer and storage of the canisters in the Chemical Process Cell in the existing Main Plant Building.

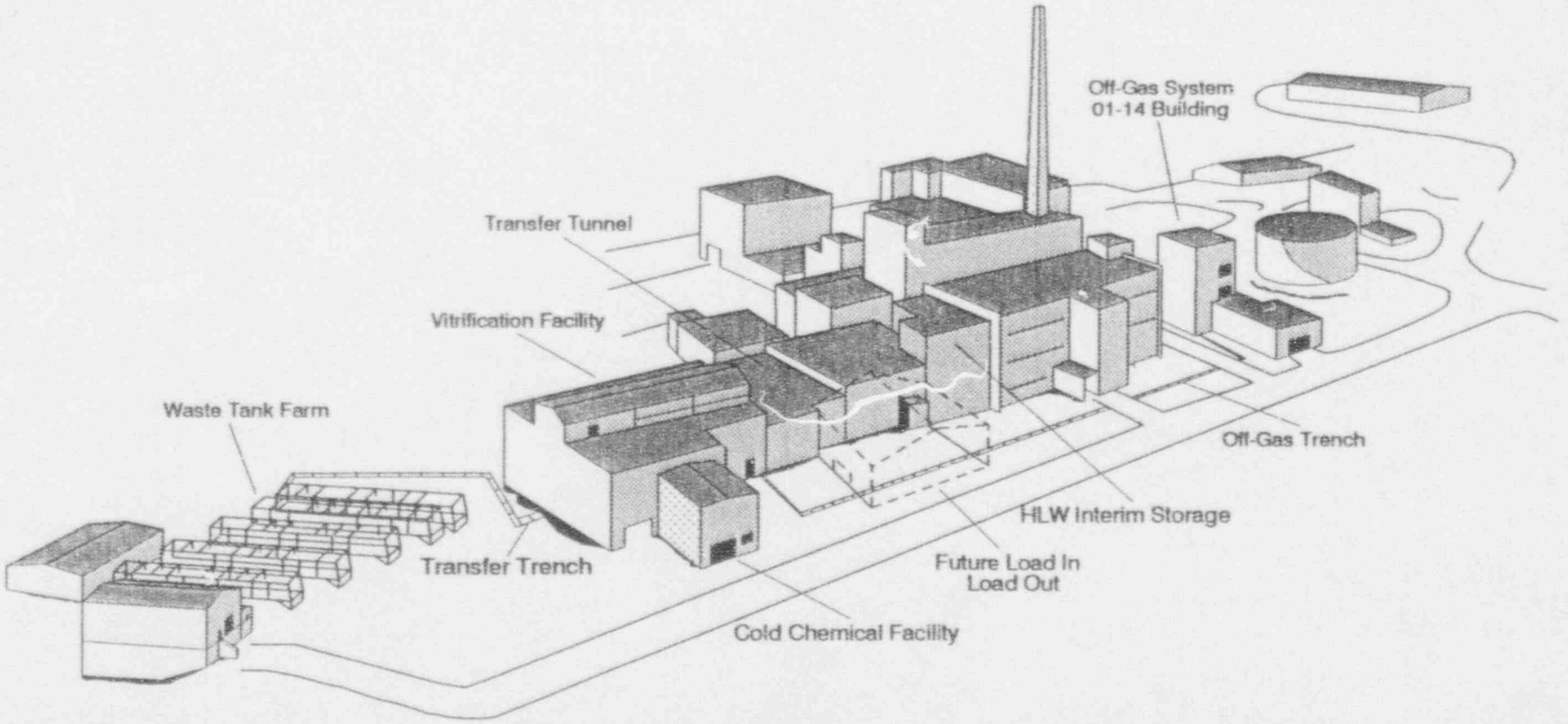
The facilities which will be constructed or modified for use in the solidification of High Level Waste are shown in Fig I.1, "High Level Waste Solidification Facilities." The view identifies five major segments comprising the High Level Waste Solidification Facilities, namely; the Sludge Mobilization Facility, the Vitrification Facility, the Cold Chemical Facility, the Off-Gas Facility and the High Level Waste Interim Storage Facility. These facilities are located on the site of the former commercial nuclear fuel reprocessing plant.

The Sludge Mobilization System consists primarily of equipment to process the High Level Waste for delivery to the Vitrification Facility. The Sludge Mobilization System includes pumps, valves, piping, grinders and leak detection equipment, along with the concrete pits and trenching with covers in which the equipment is housed. The original high level waste tanks and the ventilation system are used as part of Sludge Mobilization System but continue to be part of their original plant system.

The Vitrification Facility consists of the shielded Vitrification Cell which houses the Primary Process System, the canister processing and handling systems and the confinement systems. The Vitrification Facility Ex-Cell, which surrounds the Vitrification Cell, houses the associated vitrification support systems and the Vitrification Control Room from which the High Level Waste Solidification Facilities process is controlled and monitored.

The Vitrification Facility includes the shielded off-gas trench which connects to the Off-Gas Facility. The Off-Gas Facility, which filters and treats the melter off-gases to protect the environment, is housed in the existing 01 14 Building.

West Valley Demonstration Project



HLW Solidification Facilities

Figure I.1

The Cold Chemical Facility, in which batch chemicals are prepared for addition to the process, is housed in a separate independent facility attached to the west side of the VF.

The High Level Waste Interim Storage Facility, which consists of canister storage racks, canister handling equipment, canister monitoring equipment and cooling system is located in the existing Main Plant Building and is connected to the Vitrification Cell by a new shielded transfer tunnel.

All operating parts of the site have been assigned to individual systems for engineering design and analyses. Engineering Procedure EP-1-001 mandated a "Cognizant Responsibilities List for Systems and Facilities at WVDP" [1] be developed and maintained current. The Cognizant Responsibilities List includes more than one hundred systems.

Of the above 100 systems, fifty one systems are identified as part of the High Level Waste Solidification Facilities and are listed in appendix C. Of the fifty one systems ten are no longer used or are not part of the High Level Waste Solidification Facilities process and are designated as "none". Of the remaining forty one systems, twenty are part of the feed preparation cycle or the canister processing and handling cycles. The remaining twenty one systems are ongoing utilities of which 9 are general utilities for the High Level Waste Solidification Facilities and twelve subsystems to the general utilities or are special systems (Argon and Shielding Gas) for one operation.

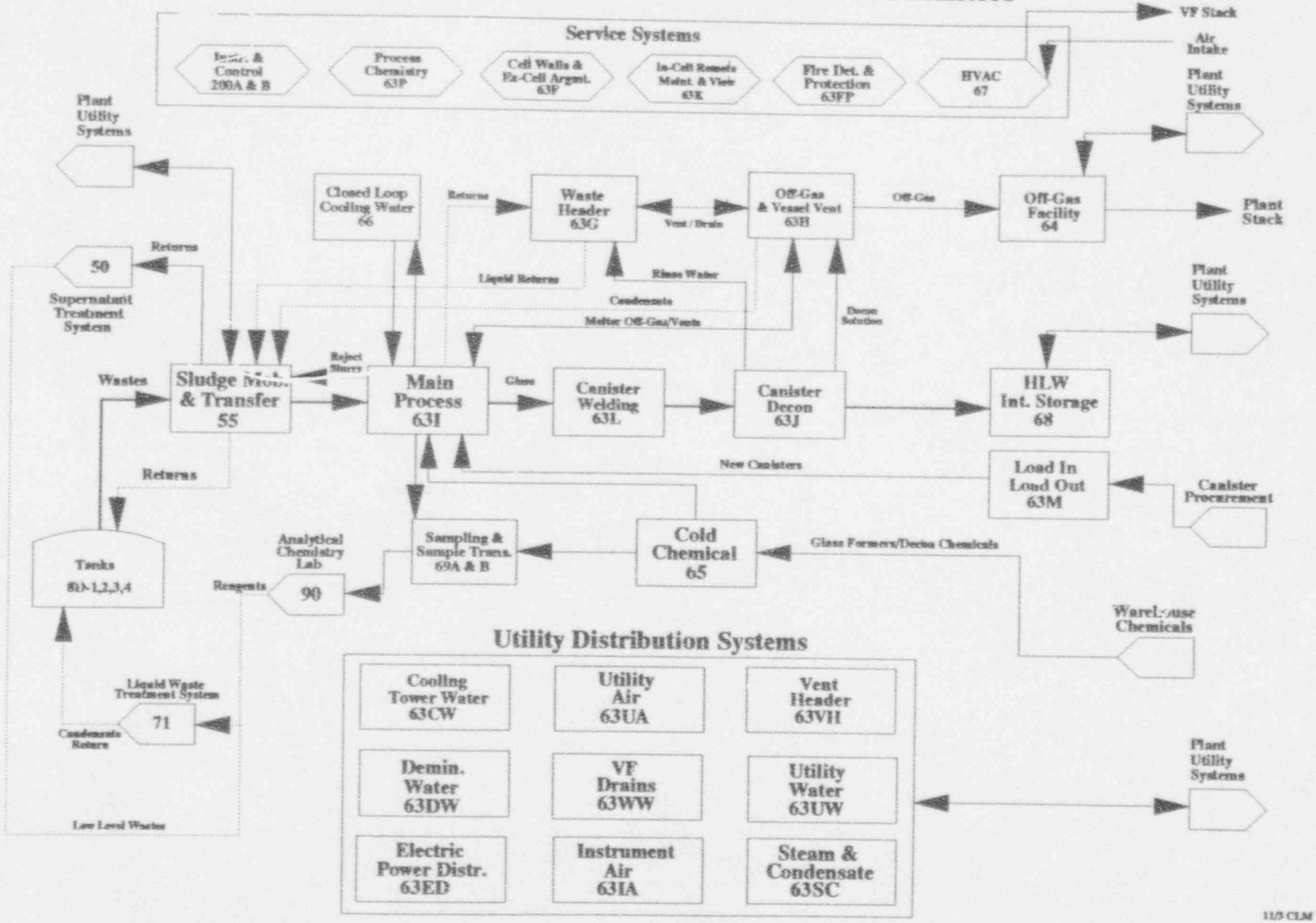
The feed preparation cycle and canister processing and handling cycle, as well as the general utilities are denoted on Figure I.2, "High Level Waste Solidification Facilities." The utilities that are direct support to only one system or are subsystems of the general utilities are not shown on Figure I.2. Figure I.2 represent the total scope of the HLWSF Description Document. All other systems listed in reference [1] are not part of the HLWSF, although many interface with or otherwise serve these facilities.

This document describes the design of the combined facilities with emphasis on the system to system functions. Detailed descriptions of single systems are presented in the individual System Descriptions.

I would like to thank the following cognizant system engineers for their contribution to this document:

B. A. Brill, D. E. Carl, D. D. Daruwalla, R. Dibiase, J. C. Dickens, L. E. Donovan, A. Drobot, W. Etten, J. H. Marlow, R. A. Meigs, D. J. Rickettson, M. A. Schiffhauer, E. W. Sherman, M. G. Studd, R. F. Vance

Figure I.2 High-Level Waste Vitrification Facilities



1.0 FUNCTIONS AND DESIGN CRITERIA

1.1 Functions (Fnctns)

The function of the High Level Waste Solidification Facilities (HLWSF) is to convert the High Level Waste (HLW) from the initial sludge/liquid forms in the HLW tanks into a borosilicate glass waste form in canisters. The canisters are to be temporarily stored in the High Level Waste Interim Storage (HLWIS) area in the existing Main Plant Building.

The major functions for each of the five separate facilities are discussed in this section. Also, the System Description(s) (SD) in which compliance with the function is given in this section.

1.1.1 Sludge Mobilization Facility (SMS) - Fnctns

A. Wash the sludge in Tank 8D-2 to remove soluble salts prior to mixing the waste from the other tanks in Tank 8D-2. (SD-55)

B. Combine the wastes from the other waste tanks (8D-1 and 8D-4) into Tank 8D-2. (SD-55)

C. Suspend and mix (mobilize) the combined HLW in Tank 8D-2 for delivery to the Vitrification Facility (VF). (SD-55)

D. Transfer the combined wastes from Tank 8D-2 to the Primary Process System (PPS) in the Vitrification Cell (Vit Cell). (SD-55 and 63I)

E. Accept process streams returning from the VF and transfer the process streams or slurries between the tanks within the tank farm. (SD-55, 63I, 63H, 63G and 63J)

1.1.2 Vitrification Facility - Fnctns

A. Receive into the PPS the combined HLW from Tank 8D-2. (SD-55 and 63I)

B. Concentrate the HLW and add and mix the glass formers and chemicals with the concentrated HLW mixture, using the PPS feed preparation equipment. (SD-63I)

C. Deliver the verified melter feed mixture to the melter using the feed delivery system. Vitrify the feed in the melter and pour the glass into canisters. (SD-63I and 63P)

D. Using the canister positioning equipment, position an empty canister under the melter pour spout and position the filled canister for removal. (SD-63I)

E. Protect site cooling water from contamination by use of a closed loop cooling water system that can be monitored for radioactivity. (SD-66)

F. Seal the filled canister by welding a closure lid to the canister and verify the weld. (SD-63L)

G. Minimize the risk of contamination spread by use of a canister decontamination system. (SD-63J)

H. Verify process control by use of the sampling and laboratory analysis. (SD-69A, 69B and 90)

I. Collect and deliver contaminated or off-normal process waste, using a waste header system, back to the waste tanks in the tank farm. (SD-55, 63I, 63G, 63H and 63J)

J. Prevent spread of radioactive contamination by use of barriers and differential pressure zones to maintain the air flow from the least to the most contaminated area. (SD-67)

K. Provide fire detection and protection for the VF. (SD-63FP)

L. Arrange the cells, walls, windows, doors, in-cell and ex-cell process equipment and remote handling equipment to facilitate both operations and maintenance. (SD-63F, 63I and 63K)

M. Ensure the safe and effective operation of the HLWSF through the use of Instrumentation and Control Systems. Provide the operators information and operational management for the HLWSF. (SD-200A and 200B)

N. Deliver utility services as required throughout the VF through use of Vitrification Utility Distribution Systems. (SD-63CW, 63DW, 63ED, 63IA, 63SC, 63UA, 63UW, 63VH and 63WW)

O. Provide method for moving empty canister and required equipment into the Vit Cell and removing the filled canister and replaced equipment from the Vit Cell. (SD-63K and 63M)

P. Provide for the safe removal of process gases from the melter and other PPS vessels while maintaining vessels and ducting at a slight vacuum for contamination control. (SD-63H)

Q. Collects radioactivity contaminated materials from the off-gas inside the Vit Cell to assure radiation exposures to operators be kept As Low As Reasonable Achievable (ALARA). (SD-63H)

1.1.3 Cold Chemical (CC) Facility - Fnctns

A. Provide for the receipt, staging, and disposal of nonradioactive process chemicals. (SD-65)

B. Prepare and deliver specified CC and shim mixtures to the PPS. (SD-65 and 63I)

C. Take and transfer samples to the laboratory to verify CC Mixture is acceptable. (SD-65 and 90)

D. Prepare decontamination solution for the VF, as required. (SD-63I, 63G, 63H, 63J and 65)

1.1.4 Off-Gas Facility System (OGS) - Fnctns

A. Provides the motive force to maintain the in-cell waste vitrification equipment at a slight vacuum compared to the vitrification cell ambient pressure for purposes of contamination control (SD-63H and 64)

B. Provides environmental atmospheric protection by removing radioactive particulate and destroying the acidic oxides of nitrogen that escapes the off-gas and vessel vent system. (SD-63H and 64)

1.1.5 High Level Waste Interim Storage - Fnctns

A. Store HLW canisters in the Chemical Process Cell (CPC) in the Main Plant Building pending shipment off site. (SD-68)

B. Store (Vit Cell) failed or used equipment in the CPC, as required. (SD-68)

C. Remove the decay heat from the canisters and protect the CPC concrete cell walls. (Uses existing HVAC System 15)

D. Crane(s) shall interface with a canister transfer cart and be capable of handling canisters and/or equipment in the storage area. (SD-68)

E. Cell walls to provide shielding to permit access as required in the operating aisles (full time access). (SD-68)

1.2 Design Criteria

Design Criteria Documents (DCD) have been prepared for each of the facilities. The designs described in this document are subject to and are mandated to comply with the requirements of the applicable Design Criteria as follows:

WVNS-DC-046 - Sludge Mobilization Waste Removal System [2]

WVNS-DC-022 - Vitrification of High Level Wastes [3]
WVNS-DC-022 - Off-Gas System
WVNS-DC-022 - Cold Chemical System

WVNS-DC-048 - High Level Waste Interim Storage System. [4]

These DCD are higher tier than this Facility Description Document (FD). Any discrepancy between the content of a DCD and the content of this document shall be resolved in favor of the DCD. The latest revision of the above criteria shall apply to this precedence mandate. The design criteria are delineated in the DCD and are to be taken from there. Any subject repeated here from the list of subjects treated in DCD are consistent with and only elaborate upon the DCD content.

1.2.1 Process Requirements (PR)

The process requirements for the SMS, the VF, the CCS, the OGS and the HLWIS are driven by the needs of the vitrification process and constrained by protection of both the environment and the safety and health of the workers and the public.

Some processes occur within one system and others occur across system boundaries. Both types of processes are addressed for each system in the following sections.

A. Sludge Mobilization System - PR

1. The HLW are initially in the three tanks known as 8D-1, 8D-2 and 8D-4. These wastes are mixed together in Tank 8D-2 and delivered in one stream to the PPS. The combined and mixed wastes produce a more uniform composition, which simplifies the feed preparation operations.

2. The piping and valves are arranged to allow selection of flow paths depending on the operation required. The HLW are transferred from tank to tank, to other systems and are received from other systems.

3. Control stations for local SMS operations are located in the Permanent Ventilation System (PVS) Building.

B. Vitrification Facility -PR

1. The HLWSF's goal is to process the HLW into a borosilicate glass waste form in a maximum period of thirty (30) months after the start of radioactive (hot) operations.

2. The PPS is capable of vitrification of the waste slurries delivered from the SMS.

3. The feed preparation cycle is a "batch" operation used to prepare a predetermined melter feed recipe.

4. The vitrification process and canister filling is based on continuous melter operation.

5. Compliance with the requirements of the following documents:

"Waste Acceptance Product Specification for Vitrified High-Level Waste Forms" (WAPS), [5];

WVDP-185, "Waste Form Compliance Plan," (WCP), [6];

WVDP-186, "Waste Form Qualification Report," (WQR), [7];

WVDP-187, "Vitrification Process Control Plan," (PCP), [8]

is required. The vitrification process control parameters will be utilized to ensure the glass characteristics lie within a acceptable range. Sampling and laboratory analysis are provided, to the extent necessary, to verify the process control parameters and provide the data to show compliance with above requirements.

6. The management of the HLWSF Operations is vested in the Vitrification Control Room (CR). A Distributed Control System (DCS) is used to accomplish the appropriate combination of information acquisition and display, and controls, for effecting permissive, stops, and actuation, for the overall management of the operations.

7. Rejected process batches are recycled in the PPS or back to the HLW Tank Farm for reprocessing.

8. The Heating, Ventilation, and Air Conditioning, (HVAC) System will maintain the proper environmental conditions in the VF. The HVAC System's confinement requirements are accomplished by the use of negative atmosphere pressure and differential pressure zones to control the air flow from the least contaminated areas to the most contaminated area of the VF. The exhaust portion of this HVAC system provides filtration to assure discharges to the environment meet the United States Department of Energy (DOE), United States Environmental Protection Agency (EPA), and New York State Department of Environmental Conservation (NYSDEC) regulations.

9. The cell, walls, shielding doors, windows, ex-cell working levels, and remote handling, maintenance, and viewing equipment are designed and arranged to enhance both the operation and maintenance functions and requirements in the VF. This includes every day routine jobs to the change out of major components.

10. The VF utility distribution systems are sized to satisfy the process equipment and/or facility demands. The existing plant and site utility systems are used to the maximum extent possible.

C. Cold Chemical Facility - PR

1. The CC Facility includes the building to house and support the CCS equipment used to receive, mix, sample, and dispose of the chemicals and glass formers used.

2. The CC Facility includes the building and equipment for the preparation and delivery of batch chemicals mixtures in support of the melter feed preparation.

3. The cold chemical and glass former batches are slurries requiring agitation, recirculation and grinding to maintain the solids in suspension for obtaining representative samples for analysis.

4. This system also provides for preparation and delivery of chemical solutions, as needed.

D. Off-Gas System - PR

1. The pressure in the major tankage and melter within the PPS and throughout the off-gas process train upstream of the High Efficiency Particulate Air (HEPA) filters will be maintained at a negative atmosphere pressure, to avoid the spread of contamination through any leak paths.

2. The OGS will filter and process the radioactive particles and toxic gases in the melter off-gas. The EPA and NYSDEC requirements will be met prior to release of the processed off-gas to the environment.

E. High Level Waste Interim Storage System - PR

1. Use the CPC in the Main Plant Building to house and support the HLWIS system equipment.

2. Provide remote equipment for storing the filled canisters and identifying each canister storage location.

3. Modify the existing cranes for use in the HLWIS to transfer filled canisters from the canister transfer cart to two tier high storage racks.

4. Modify the existing HVAC System to remove canister generated heat and to protect the canister and the concrete walls from thermal damage.

5. Control stations for local HLWIS operations are located in the aisle ways adjacent to the CPC near a shielding window for viewing the operations. The viewing is also backed up by a Closed Circuit Television (CCTV) System.

6. Modify the existing Equipment Decontamination Room (EDR) to connect the Vit Cell transfer tunnel to the CPC for the transfer of filled canisters. The EDR will also receive material and equipment for the Vit Cell from the LL Room.

1.2.2 Structural and Component Design Requirements

The structural and component design requirements are delineated in the relevant Design Criteria Documents, viz. DC-046 for the SMS; DC-022 for the VF, the CCS and the OGS Facilities; and DC-048 for the HLWIS Facility. Compliance with the structures and components design and analysis requirements are detailed in the individual system descriptions.

1.2.3 Facility Configuration and Essential Features (C&EF)

The configuration of the HLWSF is heavily influenced by the existing structures and site layout at the start of the project. The new facilities are located and shaped in deference to the given conditions.

The essential features are compelled by the project's central purpose which mandates handling and processing high level radioactive waste. Protection of operating and maintenance personnel from radiation exposure and the protection of the environment from radioactive contamination impose many of the essential features. These considerations are reflected in this section.

A. Sludge Mobilization Facility

The Sludge Mobilization Facility includes the SMS process equipment, the utilities systems and the buildings, vaults, pits and trenches in which the equipment is housed, shielded, and supported. The equipment and structures are shown on General Arrangement Drawing 900-D-2860, "SMS Utilities Distribution to Pump/Distribution Pits General Arrangement."

1. The SMS embodies four pump pits, one for Tank 8D-4, pits 8Q-1 and 8Q-2 and diversion pit 8Q-5, for the transfer of the HLW in the SMS and to be PPS. Each of the pits and trenches are sized to accommodate the required process equipment and piping. Access to the process equipment in the pits or piping in the trenches is through the pit and trench removable covers.

2. Contamination control is maintained by a negative atmospheric pressure in the HLW tanks, the tank vaults and the pump pits. The existing Waste Tank Farm Ventilation System (WTFVS) is used to maintain the confinement in the pits, vaults and tanks. During pit cover removal the PVS is used to maintain the proper air flow across the face of the opening.

3. The limit switches on the HLW valves are used to monitor the valve position and through software act as interlocks for the valves to prevent unwanted diversions of the waste streams.

B. Vitrification Facility - C&EF

The Vitrification Facility includes the process equipment, utilities systems and the Vit Cell, Ex-Cell and buildings, in which the equipment is housed, shielded and supported. The arrangement of the equipment in the buildings and structures is shown on General Arrangement Drawings 900-D-030, 900-D-032, 900-D-034, 900-D-036, and 900-D-037 through 900-D-043. Discussion of the general arrangement follows.

1. The Vit Cell is located immediately North of the Main Plant Building and occupies the same space as the former Component Test Stand (CTS) Facility. To the optimum extent, the CTS structure and equipment have been used in the design and construction of the VF. The PPS and other highly radioactive systems are located in the Vit Cell.

2. The vitrification operating spaces surround the shielded Vit Cell. The Vit Cell shield wall thicknesses are chosen to achieve radiation levels consistent with Full-Time-Access requirements.

3. Shielding windows are provided to allow viewing of the operation and maintenance in the Vit Cell. Viewing of the Vit Cell operation and maintenance is backed up by CCTV system.

4. In-cell handling and maintenance rely upon bridge crane(s) with complete cell coverage capability. The more dexterous jobs (sampling and sample handling) are handled by manipulators.

5. Equipment for remote retrieval of a failed crane to the Crane Maintenance Room (CMR) is installed. The CMR is provided for the decontamination and hands on maintenance of the crane(s). A steel shield door provides crane access to the CMR and personnel protection during maintenance in the CMR. The operations in the CMR are controlled and monitored from an operating space located South of the CMR.

6. The first stages of filtration for the Vit Cell atmosphere and the process off-gases, which are subject to HLW contamination, are located in the Vit Cell to effect control and confinement of the radioactive elements.

7. To support the confinement requirements a seismically designed, tornado protected room located adjacent to the South wall of the Vit Cell houses: the essential exhaust ventilation equipment and the alternate electric power source (diesel generator) for the Vit Cell.

8. Ingress and egress of canisters, material and equipment for the Vit Cell is through a shielded air - lock tunnel and the EDR which interfaces with both the HLWIS and Load In/Load Out Facility. The filled canisters and the replaced equipment are moved from the Vit Cell through the tunnel and EDR to the HLWIS. The empty canisters and required equipment are moved from the LL through the EDR and tunnel to the Vit Cell.

9. Roof hatches in the Vit Cell, the CMR and the Transfer Tunnel are provided in case of unplanned maintenance access demands.

10. Stainless steel cell liners and epoxy coatings, as appropriate, are installed to facilitate post solidification decontamination and decommissioning (D&D)

C. Cold Chemical Facility

The Cold Chemical Facility includes the process equipment, utilities systems and building in which the equipment is housed and supported. The arrangement of the equipment in the building and is shown on General Arrangement Drawings 900-D-041, 900-D-043, and 900-D-044. Discussion of the general arrangement follows.

1. The CCS is located in an independent facility attached to the West side of the vitrification building and houses the equipment for receiving, mixing, sampling, transferring, and disposing of nonradioactive chemicals.

2. The precision metering and weighing devices are provided to mix CC and shim batches to precise specifications.

3. To assure the transfer of the total batch the mix tank and the transfer system are flushed to the PPS.

D. Off-Gas Facility System

The Off-Gas Facility includes the process equipment, supporting utilities systems and the building and structures, in which the equipment is housed, shielded and supported. The arrangement of the equipment in the building and is shown on General Arrangement Drawings 906-D-030, 906-D-031, 906-D-032, 906-D-033, and 906-D-034. Discussion of the general arrangement follows.

1. The OGS is located in the existing 01-14 building. This system is connected to the Melter and vessel vent OGS in the Vit Cell by stainless steel ducting in a concrete trench which runs between the Vit Cell and the 01/14 building.

2. The OGS is used to maintain a negative atmosphere pressure in the PPS major tankage and melter as well as the off-gas system to the blowers.

3. The melter off-gases are processed through HEPA Filters to remove radioactive particulate matter, and Catalytic Reactors to destruct the toxic gases to protect the environment.

E. High Level Waste Interim Storage - C&EF

The arrangement of the HLWIS, including a site key plan, is on drawings 905-D-031, -033, and -035.

1. The HLWIS System canister and equipment storage space is located in the Main Plant Building in the CPC.

2. Canister handling is controlled from outside the CPC. Operator visibility is through shielding windows and/or by remote CCTV to protect the operator from radiation exposure. The shielding is adequate to permit Full-Time- Access outside of the CPC.

3. Storage spaces are provided for up to 396 HLW canisters.

1.2.4 Maintenance (Mntnc)

A. Sludge Mobilization Facility - Mntnc

1. The SMS equipment located in the concrete pump pits is designed for zero maintenance. The pits are sized and configured for remote replacement. Work will be conducted from a safe (radiation exposure) distance and geometry through open hatches in the pit.

2. Operation of any of the process equipment in a pit in which maintenance is being conducted is not allowed.

3. Contamination control is achieved by maintaining an inward air velocity across any pit access opening required for individual equipment manipulations.

B. Vitrification Facility - Mntnc

1. The basic plan for maintenance of in-cell equipment in the Vit Cell is remote removal and replacement. Components in high radiation areas are designed either to be remotely maintainable in place, or remotely removable and replaceable.

2. Routine maintenance or change out operations which are recognized as interruptive to otherwise continuous operations are accommodated by installation of redundant equipment to permit operation while the maintenance or change out is conducted.

3. Components with a high probability of failure are located outside the remote areas to the maximum extent possible. Outside the Vit Cell the equipment is designed for isolation and Hands-On maintenance.

4. Equipment and connections are installed to permit in-situ decontamination to enhance hands-on maintenance where practicable or mandatory. This is most evident in the CMR.

5. Normal egress from the Vit Cell for failed equipment is through the Transfer Tunnel to the CPC.

C. Cold Chemical Facility- Mntnc

1. Hands on maintenance is planned for the CC Facility. Spare tanks are provided so the equipment requiring maintenance can be emptied and flushed before the work begins.

2. The CCS will be maintained using the WVNS procedures for identifying, handling and disposing of nonradioactive chemicals.

D. Off-Gas Facility System -Mntnc

1. The OGS is designed for direct (hands-on) maintenance.

2. The blowers, and OGS equipment upstream from the blowers, outside the 01-Cell, are designed for hands-on maintenance during melter operations with off-gases being directed through equipment connected in parallel.

3. Equipment in the 01-Cell (Preheaters and Catalytic Reactors) is designed for hands-on maintenance when feed to the melter has been suspended, and off-gases are directed through an 01-Cell by-pass line. Before performing work in the 01-Cell radiation and NOx levels in the cell are measured.

E. High Level Waste Storage Facility - Mntnc

1. The existing Chemical Crane Room (CCR) in the Main Plant Building is used as a shielded hands on maintenance area for the HLWIS cranes.

2. Handling and HVAC equipment subject to contamination is repairable by remote tooling.

1.2.5 Surveillance and In-Service Inspection

Surveillance or in-service inspection requirements and features, when and if appropriate, are addressed in the individual system descriptions.

1.2.6 Instrumentation and Control (I&C)

The overall control management scheme invoked in the HLWSF operations is depicted schematically in Fig 1.1, "Vitrification Overall Control Management." All operations which relate to or impact the Vitrification Process are directed, permitted, and/or terminated in the Vitrification CR. A DCS is installed and wired throughout the HLWSF to acquire and display process information, and provide control and data logging for the process. The DCS is used by the operating personnel to manage the process.

This control philosophy extends to site systems not included in the HLWSF, per se, but which interact with the Vitrification Process. The connections to the DCS are permissive, interruptive and/or informational.

In this regard, the Supernatant Treatment System (STS) and the Liquid Waste Treatment System (LWTS) are schematically identified as connected to the DCS, but are actually under administrative control of the CR.

A. Sludge Mobilization and Transfer Facility - I&C

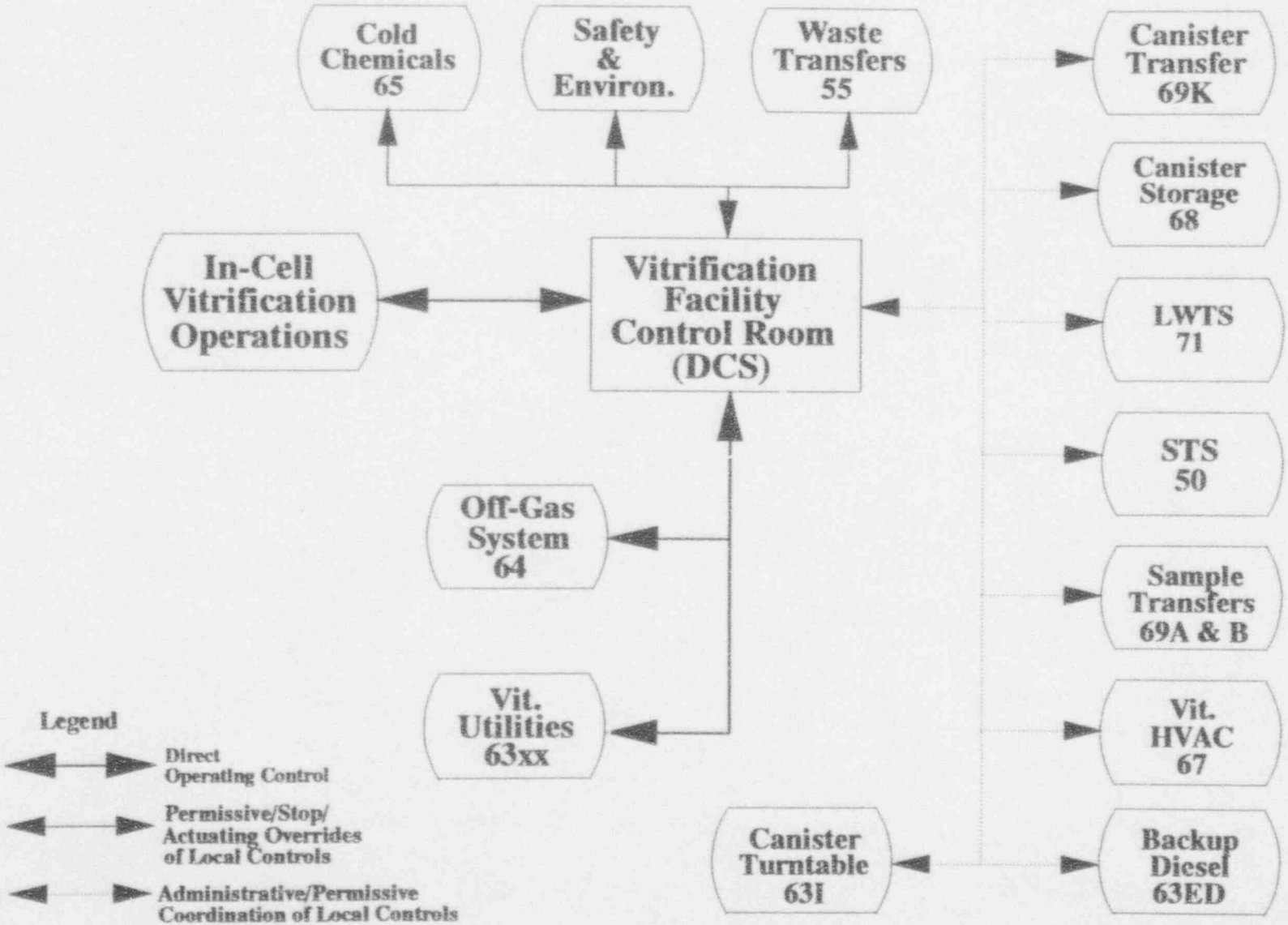
1. An electronic system for monitoring and control of the mobilization and transfer operations is located in the PVS Building.

2. SMS instrument signals showing the information required to effect overall management of the HLW Tank Farm are connected to the DCS in the Vitrification CR.

3. SMS instrument signals are used to effect automatic responses where needed. For example, during transfer to the VF, high level in the CFMT shuts down the sludge transfer pump in Tank 8D-2.

4. The instrumentation in each of the pits is used to monitor the transfer system. Whenever possible, the instrument transmitters are located outside the pits, in a non radiation area, for ease of calibration and maintenance.

Figure 1.1 Vitrification Overall Control Management



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B. Vitrification Facility - I&C

1. Instrumentation is used to monitor the process, fire detection and protection and radiation monitoring systems. The DCS is the central component for process control, process monitoring, information display, and data logging for report generation. The DCS control consoles are located in the Vitrification CR.

2. Alarms are provided in the Vitrification CR, for the safety related and process systems of the HLWSF, to warn the operator when a system or process is off normal. The centralized alarm system provides a display of the HLWSF alarms as part of the DCS and standard alarm displays. The HLWSF alarms are tied into the site alarm systems, as appropriate.

3. Normal operation of the Vitrification Facility is controlled from the Vitrification CR via the DCS. However, in the event the DCS work stations cannot be used, e.g., fire in the control room, loss of communications, etc., most DCS functions are still available from the individual controllers in the field.

4. An uninterruptible power source with automatic switch over is installed in the Vitrification Control Systems. This power source will operate long enough to place the process in a safe stable condition and to monitor the process pending implementation of corrective action.

5. The canister turntable, weld station, decontamination station and handling are remotely controlled from the operating aisles.

6. The canister transfer carts and doors are remotely controlled from the operating aisles. The operation can be viewed from the Vitrification CR using the CCTV.

C. Cold Chemical Facility - I&C

1. A local control panel is provided to monitor and control the weighing and metering of the chemicals and glass formers during the mixing process.

2. A local control panel is provided to monitor and control the sampling and transfer of the CC Mix to PPS.

3. Permissive from the Vitrification CR is also required to transfer the CC mix to the PPS.

4. The alarms in the CC Facility will also alarm in the Vitrification CR if not acknowledged in the CC Facility.

D. Off-Gas Facility System - I&C

Parts of the OGS are monitored and controlled from the Vitrification CR. Other parts are monitored with just the capability of shutting down those part. The instrumentation signals and controls are tied to the DCS through the controllers and PLCs in the 01-14 Building.

1. The blowers are controlled by Programmable Logic Controller (PLC) and are instrumented for remote automatic switch over from one blower to the next should the use of the operating blower be lost for any reason. The PLC interfaces with the DCS.

2. The Ammonia Supply System is monitored and controlled by the DCS in the Vitrification CR. The Continuous NOx Analyzer located upstream from the Catalytic Reactors provide input to the DCS for computation of the required ammonia feed rate and of the NOx destruction efficiency.

E. High Level Waste Storage Facility - I&C

1. Controls for HLWIS crane operations, EDR/HLWIS door, transfer cart motions, and HLWIS cameras are located in the Chemical Viewing Aisle (CVA). The controls are located near a CPC shielding viewing window to facilitate operator viewing of activities.

2. The capability shall exist to identify and record the canister number and its location in the interim storage racks.

3. The Main Plant Building HVAC System is used to remove the canister generated heat and control the temperature in the CPC. The existing Main Plant Building air monitoring systems are used to monitor the ventilation discharge. Back up cooling is provided by forced air through water coolers.

1.2.7 Interfacing Facilities (IF)

The interfaces both physical and programmatic between the facilities, or between a facility and a plant service are most meaningfully expressed in terms of the individual systems involved and the major interfaces are shown on drawing 900 J 1363, "Interconnection Flow Diagram for STS, SMS, LWTS, CSS, HLWSF and Supporting Utilities."

The drawing 900 J 1363 is a block diagram which shows the systems major process interfaces and the utilities that service each of the HLWSF systems. The system interfaces are designated on the drawing by triangles. Each interface has its own unique number. The numbering system is as follows; 55/63-001, the 55/63 designates the flow is from System 55 (SMS) to System 63 (VF) and the 001 is the unique number for the interface.

The specific and quantitative system interface are contained in the individual System Descriptions.

A. Sludge Mobilization Facility - IF

The SMS major system process interfaces are with the STS, PVS, LWTS and VF. The STS interfaces with HLW Tanks 8D-1, 8D-2, and 8D-3. The LWTS interfaces with HLW Tanks 8D-3 and 8D-2. The VF interfaces to HLW Tanks 8D-2, 8D-3, and 8D-4. The SMS also interfaces with System 8, "HLW Tank Farm".

The following service utilities are currently available for the SMS in the HLW Tank Farm.

- 031 Utility Air
- 031 Instrument Air
- 032 Utility Water
- 030 Electrical Distribution
- 031 Steam
- 032 Demineralized Water
- 032 Cooling Water

B. Vitrification Facility - IF

The VF major system process interfaces are with the; SMS, CCS, OGS and HLWIS and the supporting utilities.

The VF interfaces to and from the SMS are as follows:

- HLW Tank 8D-2 to 63I (CFMT)
- HLW Tank 8D-2 to 63I (CFMT) spare
- 63I (CFMT) to HLW Tank 8D-2
- 63I (CFMT) to HLW Tank 8D-4
- 63H (Condenser) to HLW Tank 8D-3
- 63G Waste Header to HLW Tank 8D-4

The VF process interfaces from the CCS are as follows:

- CC Mix Tank to 63I (CFMT)
- CC Mix Tank to 63I (MFHT)
- Shim Mix Tank to 63I (CFMT)
- Shim Mix Tank to 63I (MFHT)

The Decontamination interfaces from the CCS are as follows:

- See SD-65 for the decontamination interfaces.

The VF interfaces to the OGS

- 63H (heaters) to 64 (separator)

The VF interfaces to and from the HLWIS

- 63K (Transfer Cart) to 68 (storage racks)
- 63K (Transfer Cart) from 63M (LL)

The Utilities provided to the VF by the plant systems and internal supply functions can be summarized as:

Plant Systems

- 63CW Cooling Tower Water for VF
- 63DW Demineralized water for VF
- 63ED Electrical Distribution for VF
- 63EH Diesel Exhaust for Diesel Generator
- 63FO Fuel oil to Diesel Generator
- 63IA Instrument Air for VF
- 63PW Potable Water, as required
- 63SC Steam and Condensate for VF
- 63UA Utility Air for VF
- 63UW Utility Water for VF
- 63WW Drains for VF

Internal Systems

- 63R Refrigerant for 67 HVAC
- 63AR Argon Gas for 63I. Welding
- 63CC Chilled Water for 67 HVAC
- 63DA Dry Air part of 63UA
- 63HP High Pressure Air for 63IA

The VF also has internal systems and interfaces with the WVDP site systems or functions. The interfaces are as follows:

- Fire Detection and Protection System
- Radiation Monitoring System
- External and Internal Communication Systems (radios, telephones and intercom)

- Personnel Protection Equipment such as showers and eye washes and emergency medical equipment and supplies

C. Cold Chemical Facility

The CCS has four process system interface which are:

- 65 (Mix Tank) to 63I (CFMT).
- 65 (Mix Tank) to 63I (MFHT)
- 65 (Shim Tank) to 63I (CFMT)
- 65 (Shim Tank) to 63I (MFHT)

The CCS decontamination interfaces:

- See the System Description 65

The following utilities are supplied to the CCS from the VF utilities:

- 63DW Demineralized Water
- 63ED Electrical Distribution
- 63PW Potable Water
- 63IA Instrument Air
- 63UA Utility Air
- 63UW Utility Water
- 63SC Steam and Condensate
- 63CW Cooling Tower Water
- 63DA Dry Air
- 63WW Drains

D. Off-Gas Facility System

The OGS has three system process interfaces. They are:

- 63H (postheater) to 64 (Separator)
- 64 (Catalytic Reactor) to Main Plant Stack

The following utilities are supplied to the Off-Gas Facility System:

- 032 Demineralized Water to 64
- 032 Cooling Water to 64
- 030 Electrical Distribution to 64
- 031 Instrument Air to 64
- 031 Utility Air to 64
- 15 Drains for 64
- 47 HVAC

E. High Level Waste Storage Facility - IF

The HLWIS major process system interface with the VF is System 63K where the canister is removed from the cart and placed in System 68 (storage racks).

The following utilities are supplied to the HLWIS Facility:

- 030 Electrical Distribution to 68
- 15 HVAC

1.2.8 Quality Assurance

The Quality Assurance Program applied to the HLWSF are the eighteen criteria of American Society of Mechanical Engineers Nuclear Quality Assurance (ASME NQA-1), 1986 and all supplements as stated in the Design Criteria Documents DC-022, DC-046 and DC-048. High Level Waste QA Program RW-0333P also applies [9]

The WVNS "Quality Management Manual (QM)" [10] provides information for defining a quality level for the structures and components that will be used on the project. Quality level is established from the safety class and service class considerations and specifies design requirements as delineated in the applicable design criteria.

The Quality Levels are assigned in the individual System Descriptions and/or equipment specifications.

1.2.9 Codes and Standards

Applicable codes and standards are found in the individual DCDs - DC-022, DC-046 and DC-048 or the individual SD.

1.2.10 Reliability Assurance

The reliability requirements for structures, systems, subsystems, and components are evaluated on their required availability, time to repair, ALARA, cost to repair, industrial experience and proven acceptance.

The reliability (service classification) is reflected in the quality level assignments described in the Quality Assurance section 1.2.8 above.

2.0 DESIGN DESCRIPTION

2.1 General

The HLWSF is made up of 41 systems whose primary purpose is to: transfer and receive the mixed HLW from the HLW Tank Farm and mix the HLW with the proper amounts of cold chemicals and glass formers to produce a Borosilicate Glass Waste Form, in the SFCM. The Borosilicate Glass Waste Form is then poured into stainless steel canisters, which are cooled, sealed, decontaminated and transferred to the HLWIS.

2.2 Site Selection and Facilities Overview

2.2.1 Criteria

In selecting the HLWSF locations the following design criteria requirements are given priority: protecting the health and safety of the public and site personnel, protecting the environment, keeping radiation exposure "As Low As Reasonably Achievable" (ALARA), fire protection for the facility and using the existing plant facilities and equipment to the maximum extent possible. Other siting requirements considered are: security, traffic flow to and from the HLWSF, room for future expansion and availability of utilities.

2.2.2 Sludge Mobilization Facility

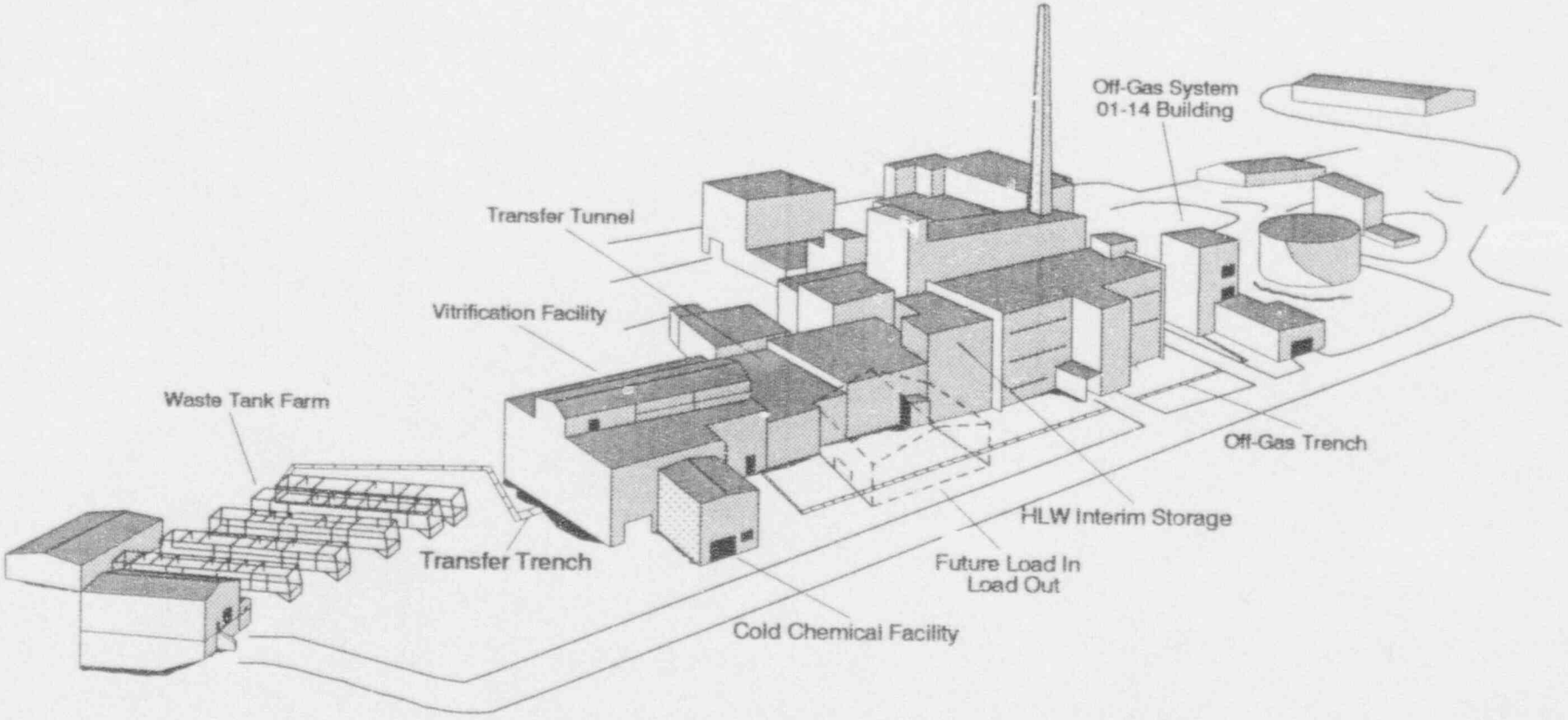
The site location was a given as the HLW to be processed are stored in the existing HLW Storage Tanks. The HLW Tanks 8D-1, 8D-2, and 8D-4 are used in their present locations and are integrated into the HLWSF through the HLW Pipe Trench, Pump Pits, Utility Pits and Diversion Pit.

2.2.3 Vitrification Facility

West Valley Nuclear Services Company, Incorporated (WVNS) recommended and The United States Department of Energy (DOE) concurred that the existing CTS Building should be converted for radioactive operations. The CTS is now designated as the VF. As shown on Figure 2.1 "Vitrification Facility" the VF is located adjacent to and between both the HLW Tank Farm and the HLWIS located in the existing Main Plant Building.

The HLW Transfer Trench is also shown on Figure 2.1. The HLW Transfer Trench provides the shortest distance and shielding for the double wall piping used to transfer the mixed HLW from Tank 8D-2 in the Tank Farm to the CFMT in the VF.

West Valley Demonstration Project



HLW Solidification Facilities

Figure 2.1

The Vitrification Transfer Tunnel is also shown on Figure 2.1. The tunnel provides the shortest distance and shielding for moving the sealed and decontaminated glass filled canisters from the Vit Cell to the HLWIS.

2.2.4 Cold Chemical Facility

The CC Facility as shown in Figure 2.1 is located in an independent facility attached to the West side of the VF. The independent facility was chosen to assure the chemicals and glass formers would not become radioactive. The facility was attached to the VF to provide the shortest transfer distance possible. The West side of the VF was also chosen because space was available and provided good access to the present roads for the delivery of the nonradioactive chemicals.

2.2.5 Off-Gas Facility

In keeping with the ALARA requirements the SFCM off-gas and vessel vent gases are scrubbed and filtered by the OGS in the Vit Cell. Figure 2.1 shows the Off-Gas Trench in which the OGS in the Vit Cell is piped to the OGS in Building 01-14. The off-gas piping, external to the cells is located in the shielded transfer trench and, when operating, is maintained at a negative atmospheric pressure.

Building 01-14 was selected as the location for the OGS as the original off-gas system was located here and some of the existing components are being used in the new system. The 01-14 Building location also provided ready access to the Main Plant Discharge Stack through which the processed off-gas is released to the environment.

2.2.6 High Level Waste Interim Storage

The HLWIS is located in the CPC in the Main Plant Building and is shown in Figure 2.1. The CPC was chosen for canister storage for the following reasons:

A. it is designed for natural hazards;

B. the walls provide adequate shielding;

C. it is large enough to store all the canisters;

D. the existing HVAC provides adequate cooling for the canisters in storage;

E. the existing crane is large enough to handle the canisters and place them two tiers high and

F. the shield door and railroad type tracks are available for moving the canisters into the CPC.

In the CPC the existing equipment has been removed and the cell decontaminated to meet ALARA requirements. The doors, windows, lighting and cranes have either been repaired, refurbished or modified to meet the new design requirements.

The EDR attaches to and forms a part of the Vitrification Transfer Tunnel between the Vit Cell and the CPC. The EDR location and walls provide adequate shielding when transferring the canisters and the cart tracks in the EDR are continued into the CPC.

The EDR is used to receive empty canisters and canister lids, as well as, other equipment such as replacement jumpers and filters, and handling fixtures for transfer into the Vit Cell. Using the EDR crane, the equipment is placed on the canister transfer cart for delivery to the Vit Cell through the Vitrification Tunnel.

A shielding and confinement door provides access from the EDR to the CPC, and to the LL and a confinement door is provided from the EDR to the Vitrification Tunnel.

2.2.7 HLWSF Vehicular and Personnel Access

Using Figures 2.2 "View looking Northwest" and Figure 2.3 "View looking Northeast" it can be seen that vehicular access has been maintained on both the West and East sides of the VF. Vehicular access has also been retained to the HLW Tank Farm, Building 01-14 and to the Main Plant Building. Personnel access has been provided on the West, North and East sides of the VF. The existing personnel access to the HLW Tank Farm, Building 01-14 and the Main Plant have been maintained.

2.2.8 Utilities Availability

The utilities such as water, steam, condensate return, air, cooling water, and electrical power for the VF are available from the adjacent Main Plant Building and Utility Room. The utilities are run directly to a distribution header and electrical buses in the VF for distribution to the systems and equipment requiring them. The utilities are already available in the SMS Facility, Off-Gas Facility, and Main Plant Building.

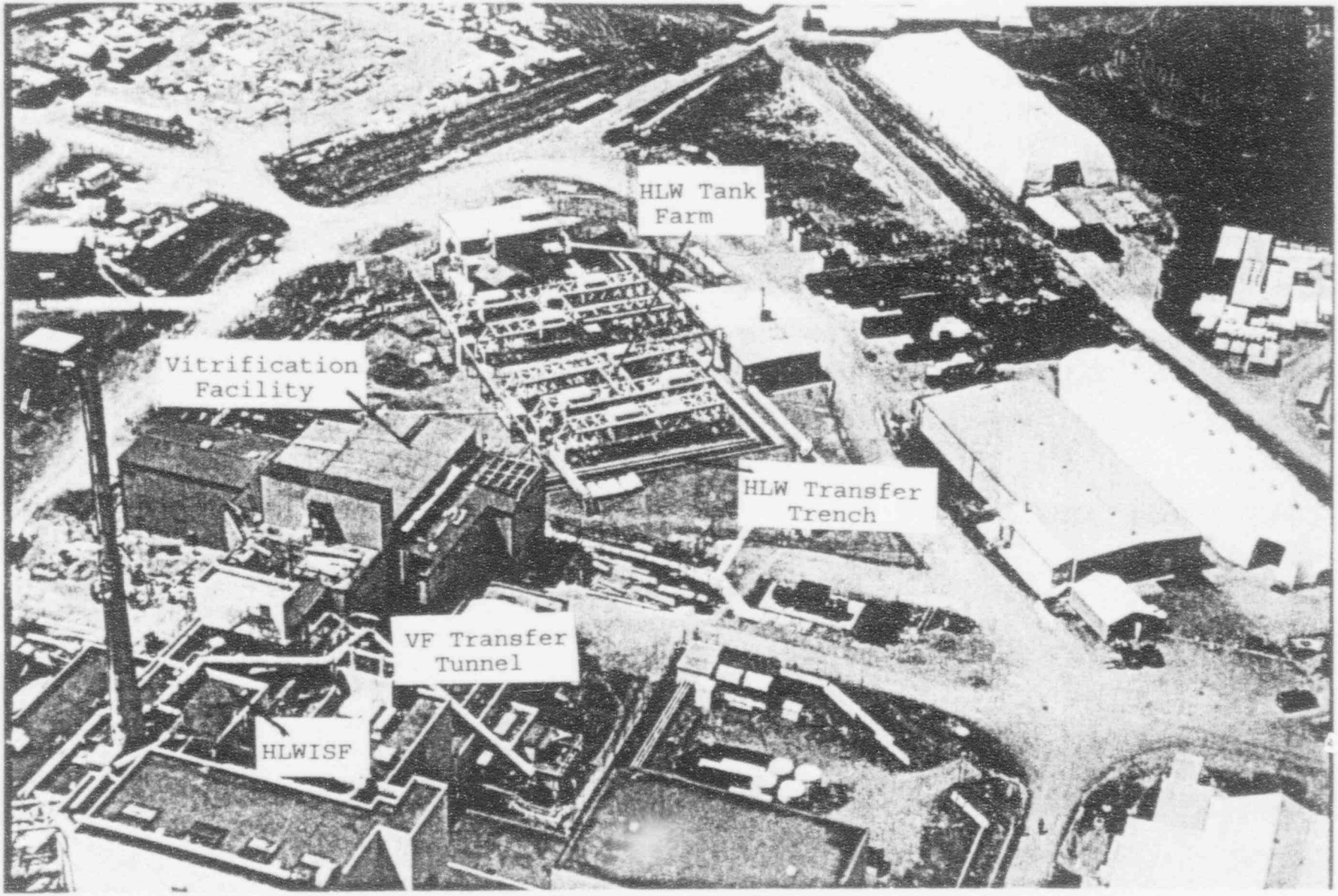


Figure 2.2 HLWSF, View Looking Northwest

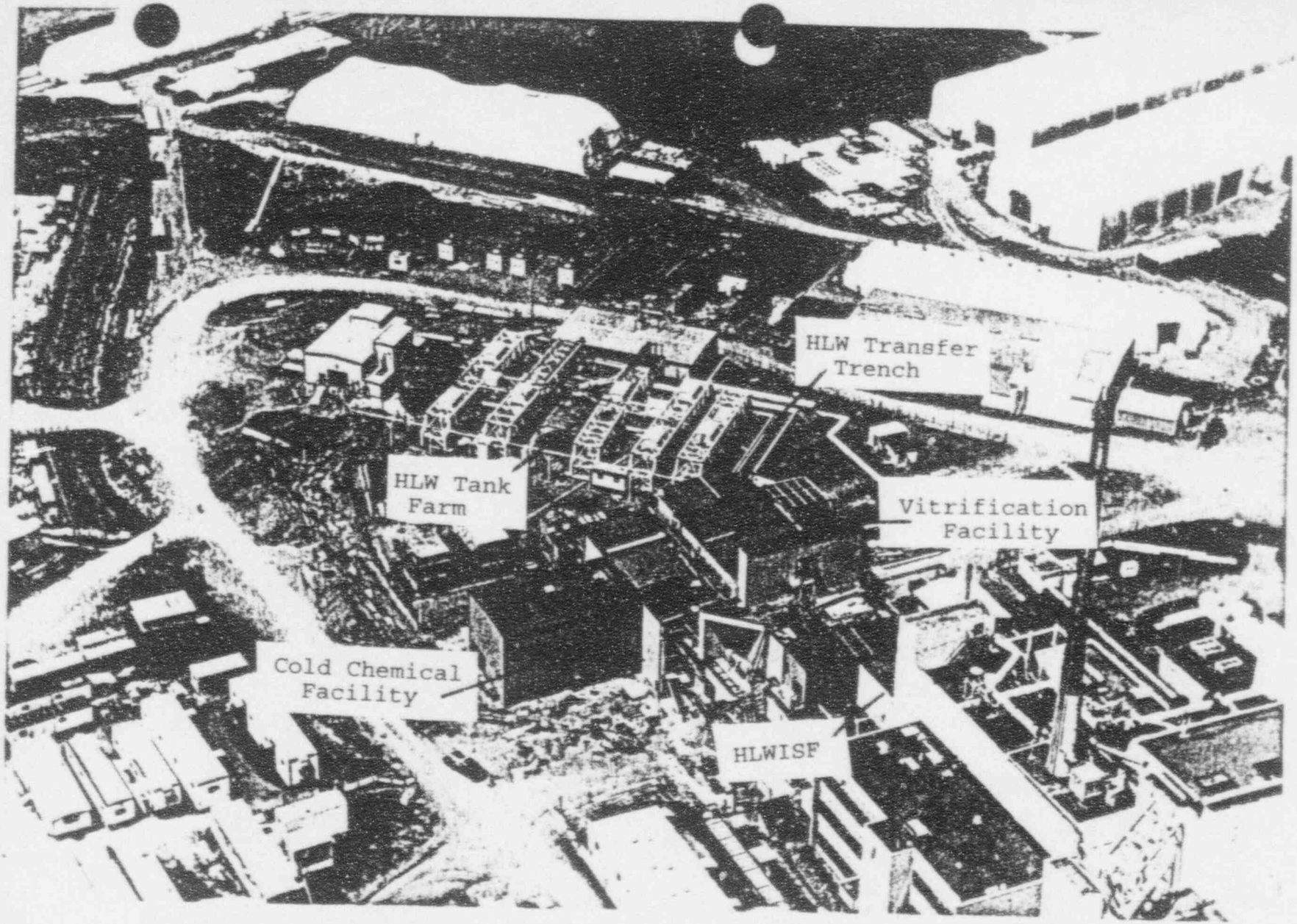


Figure 2.3 HLWSF, View Looking Northeast

Additional utilities and services required to support the HLWSF operation such as: chilled water for the HVAC and argon and shield gas for welding are included in the new design.

2.2.9 Security

The location selected for the HLWSF is inside the existing security area. The security area is fenced and controlled access is provided to both the area and to the HLWSF.

2.2.10 Fire Protection

The VF and CC Facilities are sited to utilize the existing Fire Protection System water piping which loops around the Main Plant Building. The VF and CC Fire Protection System ties into the fire protection piping in two separate places to provide flow in two directions. The Fire Pump Station and Water Storage Tank are also located in the same general area south of the main plant. The SMS and HLWIS Facilities use their existing Fire Protection Systems and the Off-Gas Facility fire protection is being modified to accommodate the building and equipment changes.

2.2.11 Future Expansion

Figures 2.2, "View Looking Northwest" and 2.3, "View Looking Northeast" shows there is room for future expansion on both the East and West sides of the VF and West side of the HLW Tank Farm. Figure 2.1, "HLW Solidification Facilities" shows in phantom the future Load In/Load Out Facility (LL). The present plan calls for the LL to provide space for receiving, inspecting and transferring new canisters into the EDR and from there to the Vit Cell.

2.3 Programmatic Requirements

2.3.1 Criteria

The facility and equipment arrangement is not only determined by efficient operations and maintenance, but also by two other major factors: 1) the use and arrangement of the existing facilities and equipment, and 2) Design Criteria (DC-022, DC-046, DC-048) which requires the utilization of a "Safety Classification System."

2.3.2 Safety Considerations

The "Safety Classification System" determines the importance of each component and structure relative to ensuring the health and safety of the workers and the general public during all phases of the project, as well as protecting the environment. The bases for the safety classifications is given in Figure 2.4, "Safety Classification."

The safety classification for each component and structure is provided in each SD.

Safety Classification

Criteria for Determination Based on Type of Risk

Type		Criteria			
General Risk	On-site	A ---	B >1 Fatality	C >5 Injury	N Routine
	Off-Site	A >1 Fatality	B >1 Injury	C ---	N Routine
Radiological Risk	On-site	A ---	B >5 rem	C >1 rem **	N <0.01 rem
	Off-Site	A >25 rem	B >0.5 rem	C >0.01 rem	N <0.01 rem
Chemical Risk	On-site	A ---	B >1 IDLH	C >1 STEL	N Routine
	Off-Site	A ---	B ---	C ---	N Routine
Environs Damage		A Longterm Damage	B Significant Transient Damage	C Minor Damage	N No Damage

** Radiation Worker Qualified

Figure 2.4

In designing the HLWSF the safety classifications for the components and structures are considered. The basic engineering approach is to eliminate the hazard, provide engineered barriers, provide redundancy, increase the reliability of the components or structures, or make the component easily replaceable. The Design Criteria major design considerations for safety are as follows:

A. Natural Hazards - Structures or components that are required to confine radioactive material that could be hazardous to the public or workers, shall be able to withstand the effects of natural hazards without loss of their capability to perform their confinement functions,

   Natural hazards include: earthquakes, tornados, differential pressures, wind forces, snow loading and flooding.

B. Radiation - The principle of ALARA shall be applied to all aspects of radiation exposure. The shielding design shall be based on the highest energy radiation source, distance from the source(s) and time of exposure (full-time occupancy, full-time access or no occupancy).

C. Confinement - Confinement of radioactive material shall be accomplished using three primary design principles: sufficiently air tight physical boundaries, multiple confinement barriers and maintaining pressure differentials between confinement barriers.

D. Criticality - Provide criticality safety through the use of geometry, fixed external Neutron-absorbing materials and facility design for normal and abnormal operating and maintenance conditions consistent with the existence of fissile material in the waste. A criticality alarm system with detectors, local and remote alarms and readouts shall be provided if required.

E. Fire - Occupied areas shall be protected by an automatic wet-pipe system and be provided with fire detection systems that will monitor and alarm. The HLWSF fire protection and alarm system shall be integrated into the existing plant fire protection and alarm system, as required.

F. Industrial/Occupational Safety - The design requirements in the industrial/occupational safety area are numerous. The designer must reference the source documents DOE Order 5480.1 [10] and Occupational Safety and Health Act (OSHA) Document 29-CFR-1910 [11].

Items such as chemical receiving, handling and disposal; electrical, welding, material handling and pressurized equipment; aisles, walkways and platforms; dust, fumes, vapors and gases; and personnel protective equipment need to be addressed.

G. Emergency planning - The facility design shall include emergency equipment and assure that facility features provide for ease of personnel evacuation. The facility alarm and public address (PA) systems shall be integrated into the WVDP site alarm and PA systems.

H. System or Control Malfunctions - A "Fail Safe" philosophy shall be used in designing the HLWSF. A single failure or malfunction, of any system or equipment item, shall not initiate a failure sequence that results in uncontrolled release of radiation to the environment or radiation exposure to the operating personnel and the general public that exceed the limits of reference [7].

I. Loss of Normal Electrical Power - An alternate power system shall be provided to those systems and equipment necessary to maintain confinement. Alternate power shall be unaffected by natural hazards, fire or other failure in the normal power switch gear or cables.

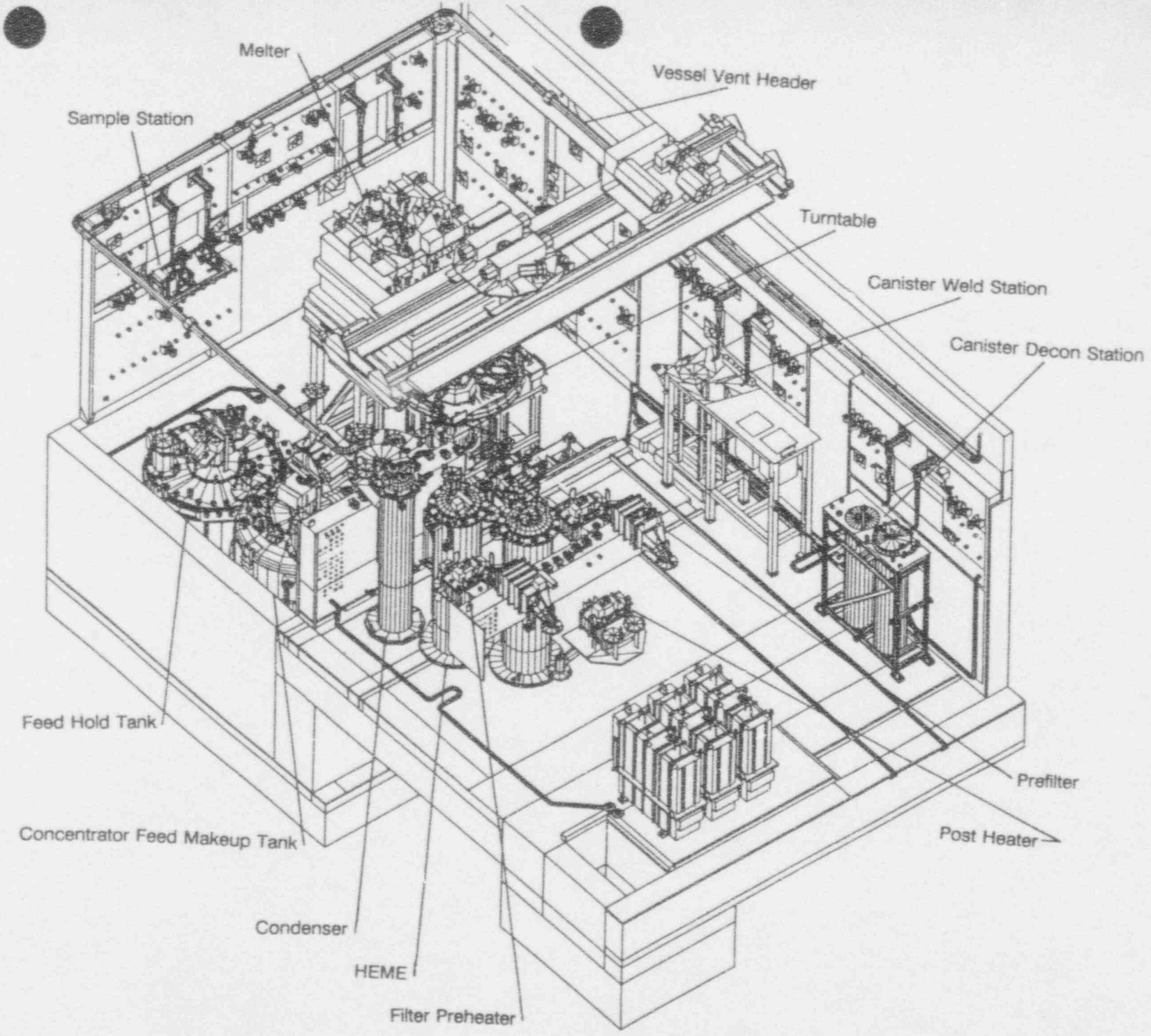
2.4 Vitrification Cell and Equipment Arrangement

2.4.1 Engineered Barriers

After the safety classifications for the components and structures were completed and reviewed, it was determined that an engineered barrier designed for natural hazards and confinement is required. Figure 2.5 "Vitrification Cell Equipment" and General Arrangement and Section Drawings: 905 D 030, 032, 034, 036, 037, and 038 shows the barrier encloses the following systems and their components;

A. System 63I, "PPS" which includes CFMT, MFHT, SFCM, Canister Turntable, ILDS, Canister Weighing System, and the associated piping, electrical, instrumentation and controls, and jumpers.

B. System 63H, "OGS" which includes the SBS, High Efficiency Mist Eliminators (HEME), preheaters, two prefilters in series, Vessel Vent Header, Vessel Vent Condenser and its associated piping, electrical, instrumentation and controls and jumpers.



Vitrification Cell Equipment

Figure 2.5

C. System 63G, "WH" is a stainless steel header that is mounted on the cell walls and is designed to receive overflows from the tanks in the Vit Cell and waste from the Vit Cell sumps.

D. System 63J, "CDS" which contains a packaged work station for decontaminating, rinsing and disposing of the decontamination and rinse solutions. A manipulator and pass through drawer are available for swabbing the decontaminated canister and transferring the swab out of the Vit Cell for analysis.

E. System 63L, "CWS" which contains a packaged work station for: removing glass shards from the canister and placing them in sample bottles, handling and aligning the canister lid, remotely welding the lid to the canister, and remotely performing a visual inspection of the weld.

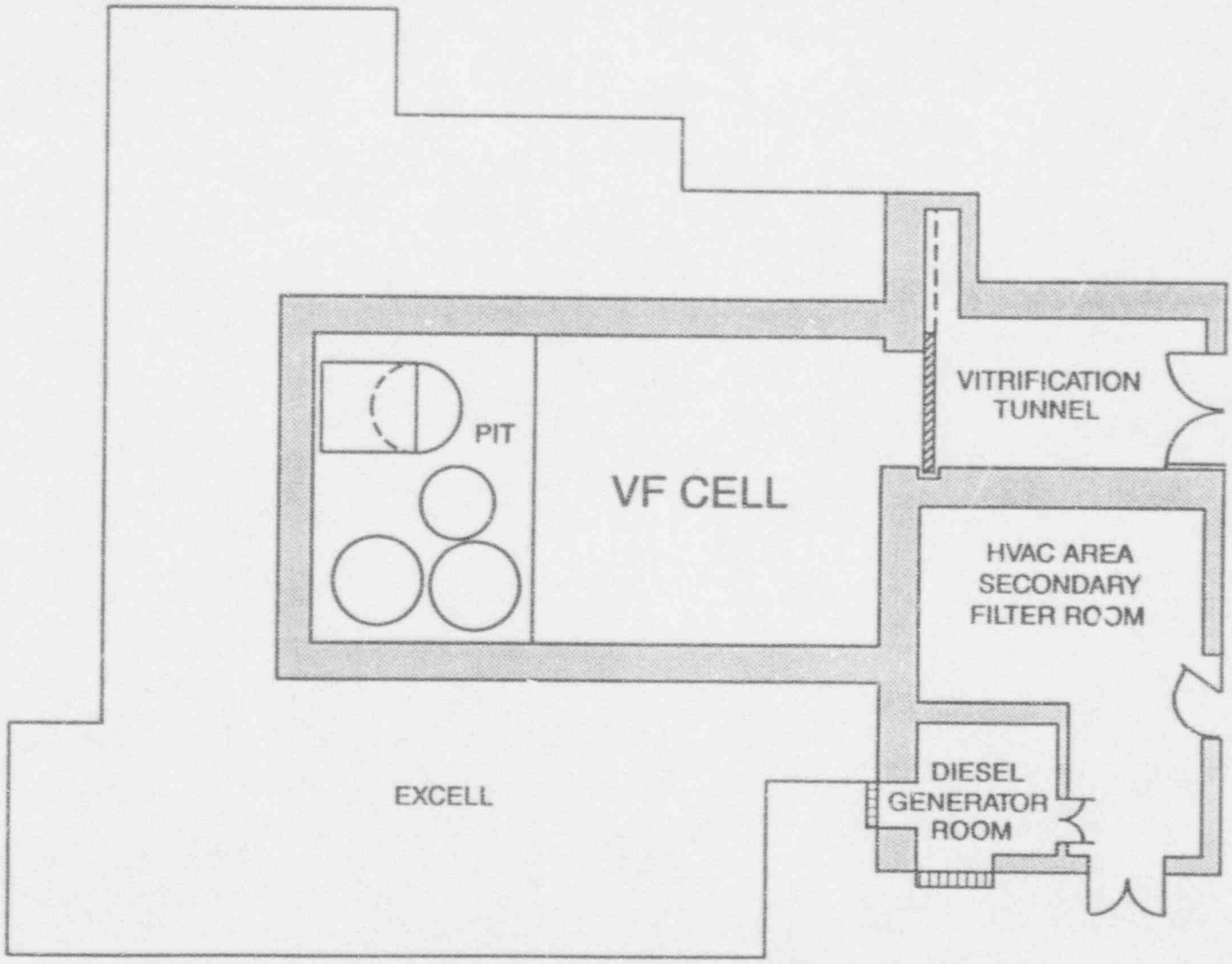
F. System 63K, "IRHV" which consists of the doors, overhead cranes, manipulators, CCTV, transfer cart, canister storage racks and the associated equipment to remotely repair, remove, handle and install the components in the Vit Cell remotely.

G. System 69A, "VSS", which consist of the shard sampler, the slurry samplers, the "C" samplers and their associated pipes and pumps. The CFMT and MFHT are sampled by the slurry samplers, the SBS and decon station are sampled by the "C" sampler, and the glass shard are removed from the filled canisters.

2.4.2 Radiation Protection

The Vit Cell, which forms a shielded confinement boundary, having approximately 10.37 m (34 ft.) wide by 16.16 m (50 ft.)long by 13.11 m (43 ft.) high interior dimensions, provides the engineered barrier for the above systems and components and is shown in Figure 2.6 "Vitrification Facility Plan at Elevation 100" and Figure 2.7 "(N-S) Section Vitrification Facility."

The Vit Cell boundary is determined by the existing pad of the original CTS building and is designed to withstand natural hazards. Much of the wall structure consists of prefabricated "wall modules" placed between previously cast-in-place concrete columns. The modules consist of a structural frame work to support internal piping and various penetrations for windows and utilities. A stainless-steel plate faces the radioactive or "hot" cell interior. The nonradioactive or "cold " side of the 1.22 m (4 ft) thick module was formed after the modules were installed by filling each module with concrete. A total of seven wall modules



VITRIFICATION FACILITY
PLAN AT ELEVATION 100

Figure 2.6

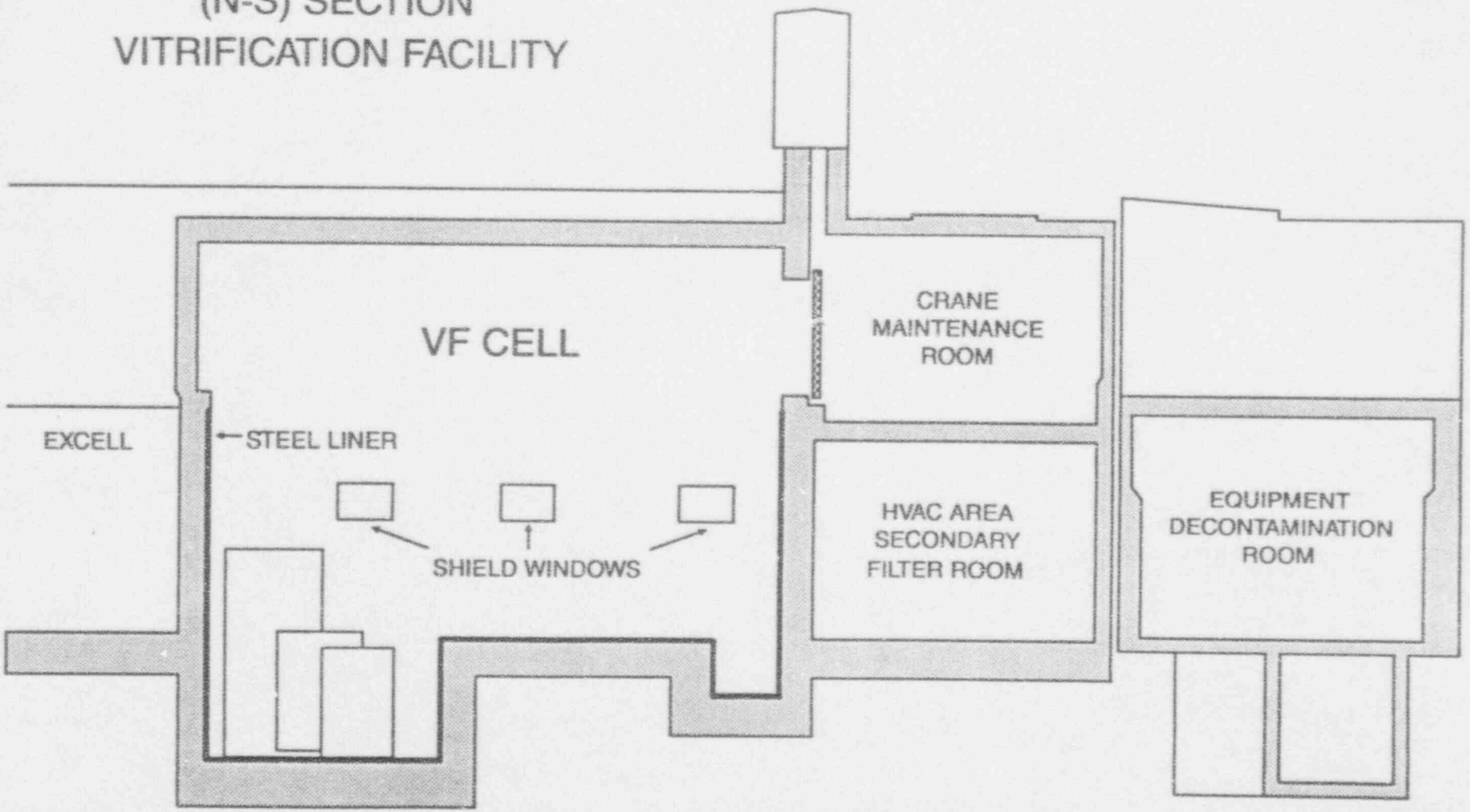

(N-S) SECTION
VITRIFICATION FACILITY
VF CELL
CRANE
MAINTENANCE
ROOM
EXCELL
STEEL LINER
SHIELD WINDOWS
HVAC AREA
SECONDARY
FILTER ROOM
EQUIPMENT
DECONTAMINATION
ROOM

Figure 2.7

were installed and welded together. They form an integral part of the cell's structural, radiological and seismic barrier. The upper walls and ceiling of the Vit Cell are cast-in-place reinforced concrete approximately 0.838 m (2.75 ft,) thick. These are thinner than the lower walls and as determined by the distance from in-cell radiation sources and anticipated occupation of these areas.

2.4.3 Confinement

The rest of the Vit Cell confinement is made up of shield doors. Door No. 1 is to the Vit Cell Transfer Tunnel and provides access and egress to the Vit Cell for canisters and other equipment and supplies during radioactive operations. Door No. 2 is to the CMR which allows for the cranes operations and maintenance during radioactive operations. Both Doors 1 and 2 are designed to satisfy confinement and shielding.

The Exhaust portion of the Vit Cell Heating Ventilation and Air Conditioning (HVAC) System is required to maintain the Vit Cell as a confinement cell by maintaining a negative atmospheric pressure. Based on this requirement, the Vit Cell HVAC Exhaust System, the HVAC Area Secondary Filter Room, the Diesel Generator Room and the HVAC Control Room are designed to withstand natural hazards.

2.4.4 Criticality

Based on the Feed Preparation Cycle being a batch operation, the HLW in Tank 8D-2 being thoroughly mixed, the quantity of boron in the HLW mix and the size of the feed preparation batches, it was determined that criticality would not occur. The Vit Cell in-cell equipment geometry is not designed specifically to address criticality.

2.4.5 Fire Detection and Protection

During radioactive (hot) operations personnel are not allowed in the Vit Cell. A review showed that combustible materials are not used in the Vit Cell, so fire protection is not provided.

2.4.6 Industrial and Occupational Safety

Based on no occupancy in the Vit Cell industrial/occupational safety design is concentrated on assuring the reliability of In-Cell remote handling, maintenance and viewing capabilities. Cranes are provided in the Vit Cell and shall be used for every day operation such as canister handling and sampling and for maintenance such as jumper removal and replacement and other high capacity lifts, as required. This

system includes a double 4.5-ton crane, a 25-ton backup crane, a powered hook rotator, an impact wrench, a bridge trolley and rails and special handling equipment. Cranes allow for the remote replacement and or removal of the vitrification equipment.

In-cell piping, valves, instrumentation and electrical components are incorporated into crane-removable jumpers. Most major components in the Vit Cell are remotely removable using only crane mounted equipment.

Additional remote handling requirements within the Vit Cell are performed by manipulators. Operations requiring manipulator use are primarily high-dexterity jobs such as sampling and sample packaging.

In addition to shielding windows, operations occurring in the Vit Cell are also monitored using a CCTV System.

2.4.7 Emergency Planning

The emergency planning in the Vit Cell is based on supporting the operation and maintenance of the equipment in the Vit Cell.

- The equipment is designed to be remotely replaceable.
- Sumps and Waste Header System is provided to clean up a possible overflow from the process vessels.
- A retrieval system is provided to move the overhead crane back to the CMR in case of failure.
- Redundancy is provided for both the Melter Off-Gas and Vessel Vent System and the Vit Cell HVAC System.
- Piping is provided to recycle an unacceptable process batch back to the tank farm for reprocessing.

2.4.8 System or Control Malfunctions

In case of a system or control malfunction the PPS is shut down and placed in a stable condition. The process is also monitored until the malfunction is identified and resolved. The Vitrification Control System is backed up by an uninterruptible power supply (UPS) in case loss of normal electrical power occurs. At the same time a negative atmospheric pressure is maintained in the Vit Cell maintaining confinement.

The Vit Cell HVAC system has parallel filter trains and blower systems, that are backed up by alternate power systems in case loss of normal electrical power occurs.

2.4.9 Loss of Power

In the case of the loss of Normal Electrical Power an UPS provides control power to: shut down and monitor the vitrification process; shut down the Vit Cell HVAC Inlet System; close the Vit Cell inlet dampers and valves sealing the Vit Cell; and open the exhaust valves and dampers. The Vit Cell can continue to vent through the filter trains, the exhaust fans, the VF stack to the atmosphere. The alternate power source, the diesel generator, will provide power to the HVAC exhaust fans to maintain the negative atmospheric pressure in the Vit Cell.

2.4.10 Decontamination and Decommissioning

The Vit Cell design incorporates features that facilitate future D&D of the facility. The cell walls are lined with stainless-steel up to 6.71 m (22 ft.) above the floor. See Figure 2.8, "Vit Cell walls". The tunnel shield door is epoxy-coated carbon steel. All areas above the 122 ft. level (the cell floor is at the 100 ft. elevation) are painted with an epoxy coating suitable for decontamination.

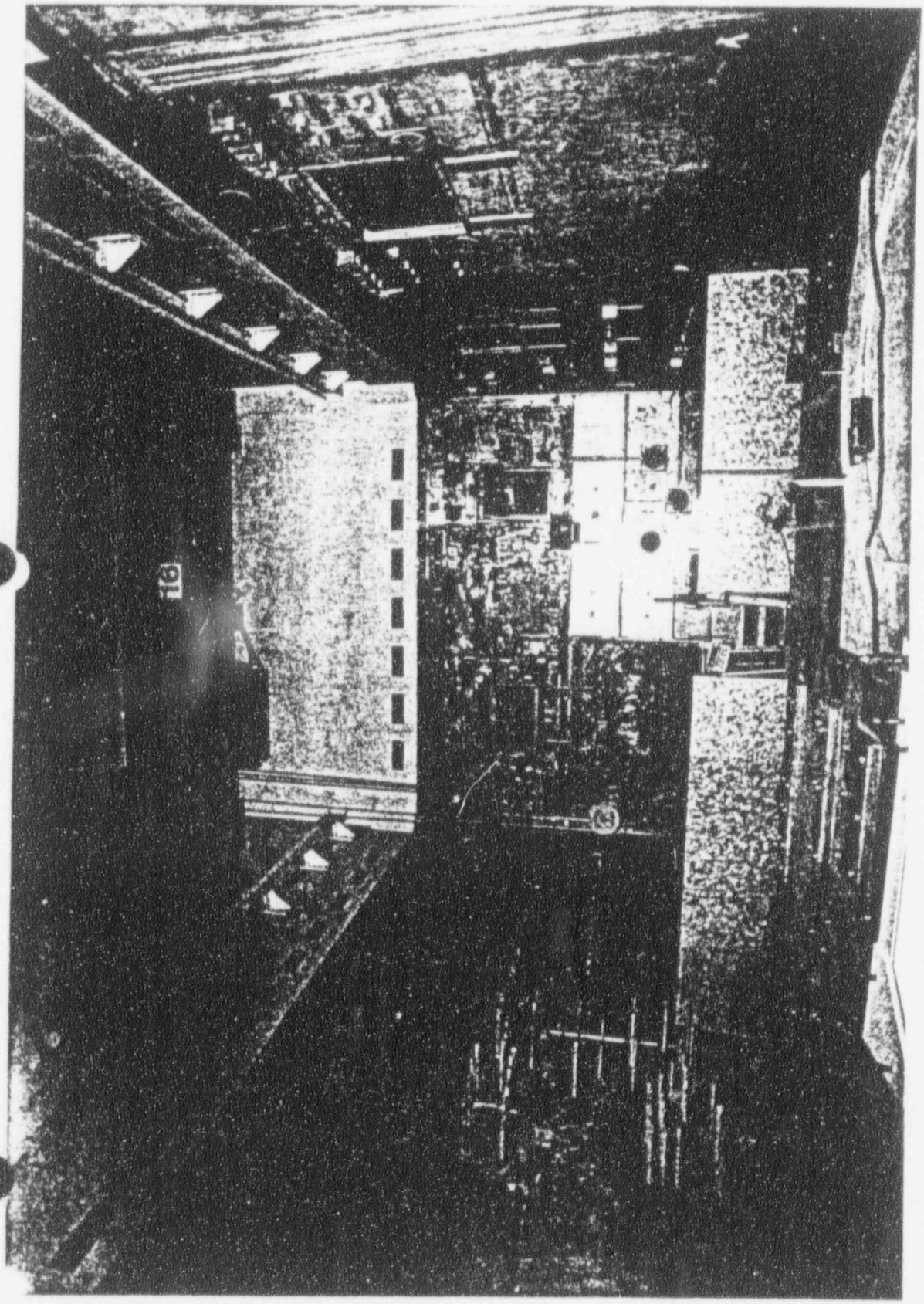
2.4.11 Drains

The sloped floor in the cell allows radioactive contaminants to drain or be washed to one of three sumps for removal through the Waste Header System. Contaminated liquids present in the waste header are eventually returned to the Waste Tank Farm where they are reintroduced to the vitrification process.

2.5 VF Ex-Cell Arrangement on the North, East and West Sides of the Vit Cell

2.5.1 Ex-Cell General

The primary purpose of the Ex-Cell portion of the VF is to house the systems that support the vitrification systems housed in the Vit Cell. Figure 2.9, "Vitrification Facility" is a cut away view of the VF showing the VF Ex-cell surrounds the Vit Cell on three sides, the East, North and West. The Ex-Cell has three working levels; 100 ft., 110 ft., and 124 ft., with the Vitrification CR located at 114 ft. and 117 ft. levels.



Vitrification Cell Liner
Figure 2.8

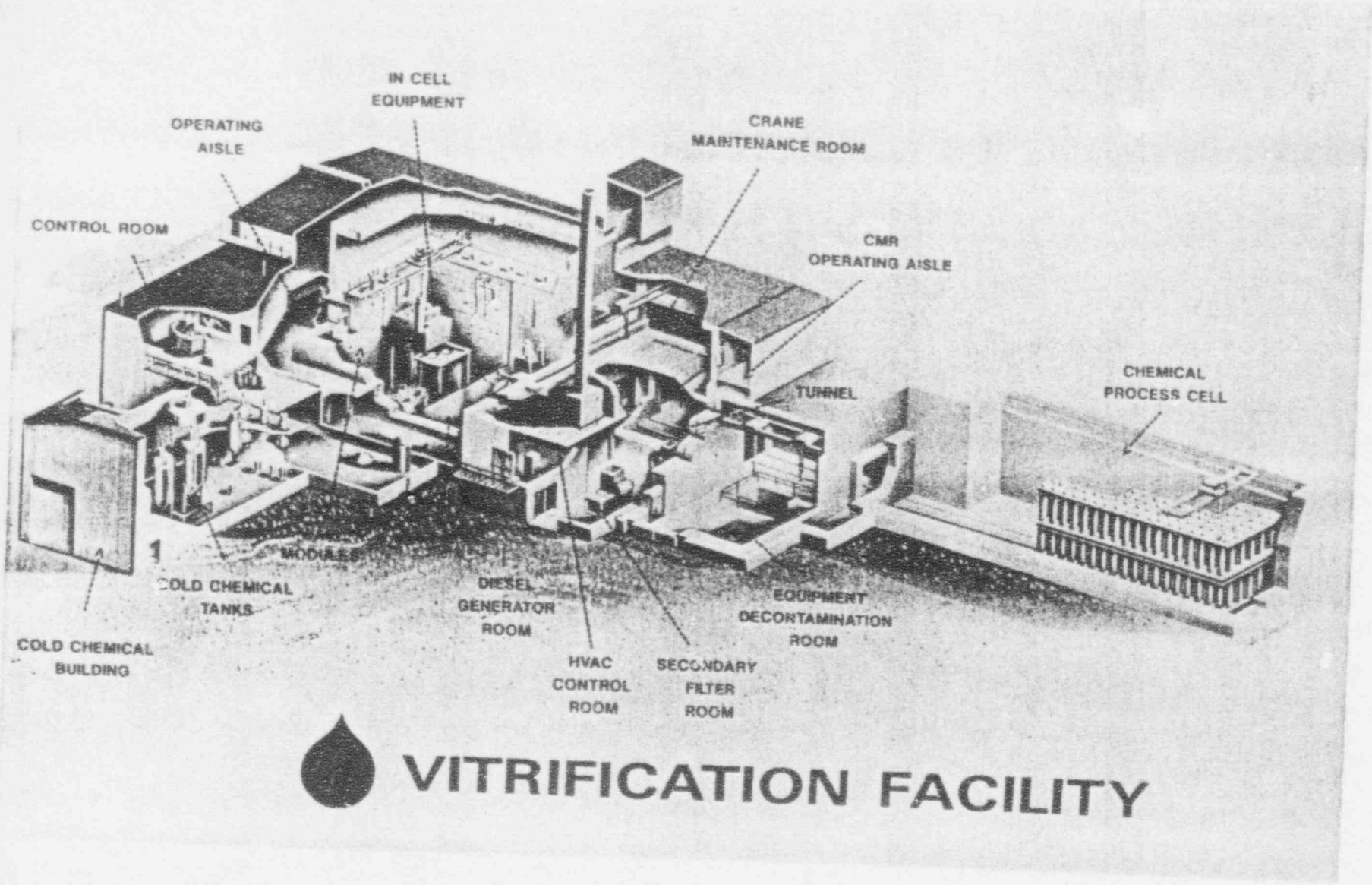

IN CELL
EQUIPMENT
OPERATING
AISLE
CRANE
MAINTENANCE ROOM
CONTROL ROOM
CMR
OPERATING AISLE
TUNNEL
CHEMICAL
PROCESS CELL
MODULE
COLD CHEMICAL
TANKS
DIESEL
GENERATOR
ROOM
EQUIPMENT
DECONTAMINATION
ROOM
COLD CHEMICAL
BUILDING
HVAC
CONTROL
ROOM
SECONDARY
FILTER
ROOM
VITRIFICATION FACILITY

Figure 2.9

2.5.2 Ex-Cell Arrangement at the 100 ft. Level

General Arrangement Drawing 905-D-030 shows the VF Ex-Cell 100 ft. level which contains the following systems and their components:

A. System 63H, "OGS" which includes the heater control cabinets;

B. System 66, "CLCWS" which includes the pumps, heat exchanger, water hold tank and radiation monitoring rack;

C. System 63SC, "SC" which includes the condensate return tanks, and the condensate radiation monitor rack;

D. System 69B, "SST" which includes the Vit Cell sample transfer cell and the PSTS.

E. System 63ED, "EDS" which includes transformers, motor control center, bus enclosure, the power controller for the melter, switchgear, cables, UPS, power distribution and lighting panels.

NOTE: 63ED IS ON ALL EX-CELL LEVELS

2.5.3 Ex-Cell Arrangement at the 110 ft. Level

General Arrangement Drawing 905-D-032 shows the VF Ex-Cell 110 ft. level which is the operating aisle providing access to both the Vitrification and HVAC CRs and contains the following systems and their components:

A. System 63K, "IRHV" which includes six viewing windows, ten manipulators, and four fixed plug-in control stations for the Vit Cell cranes;

B. System 63FP, "FDP" which includes the halon fire protection system for both the Vitrification and HVAC CRs;

C. System 200A, "Instrumentation and Controls, Hardware" (I&CH) which includes the DCS, IO cabinets and nine instrument racks for the various support utilities;

D. System 67, "HVAC" which includes the VF instrument racks for the stack radiation monitoring;

E. System 63J, "CDS" which includes the swab transfer drawer.

2.5.4 Ex-Cell Arrangement at the 124 ft. Level

General Arrangement Drawing 905-D-034 shows the VF Ex-Cell 124 ft.level and includes the following systems and their components:

A. System 67, "HVAC" which includes the air handling units for the Vitrification CR and the VF HVAC Intake System;

B. System 63J, "CDS" which includes the cold chemical mixing tank;

C. System 200A, "I&CH" which includes; the piping corridor and drop offs to the eleven (11) instrument racks which support process and Utility Systems.

2.5.5 Vitrification Control Room

General Arrangement Drawing 905-D-032 shows the Vitrification CR located at the 114 and 117 ft. levels and includes the following systems and equipment:

A. System 200A, "I&CH" and System 200B, "Instrumentation and Controls, Software" (I&CS) which includes three control stations each consisting of: two DCS viewing screens and controls, two CCTV viewing screens and controls, one Telephones and Intercom System console and one ILDS viewing screens and controls, reference manuals, and procedures. The stations also contain bookshelves for the software and a common screen and event logging printer.

Two of the stations are located on the 114 ft. level and are designated for the operators and the third station is located on the 117 ft. level and is designated for the shift engineer.

There is a fourth DCS station, for the shift supervisor, on the 117 ft. level consisting of a single DCS viewing screen, key board and mouse, and CCTV screen with controls.

There are cabinets for the hardware for the Fire Detection and Protection System, the ILDS, the CCTV, the Radiation Monitoring System, the Melter Viewing System and the Glass Pour Viewing System.

In addition to the above components and equipment the control room has space to store and review blueprints, a Vax Terminal and dot matrix printer, a Vax laser printer, a copy machine, fax machine and lateral filing cabinets.

2.5.6 Structural

The VF Ex-Cell is designed to meet the New York State "Code Manual for the State Building Construction Code."

2.5.7 HVAC System

The VF Ex-Cell is also designed to provide barriers for the three differential pressure zones to maintain the air flow from the area with the least potential for contamination to the area with the most potential for contamination. The three zones are as follows: zone III Vitrification CR (full-time occupancy), zone II operating aisles (full-time access) and zone I (confinement areas). The VF-HVAC differential pressure zones and flow paths are shown on Figure 2.10, "Vitrification Facility - HVAC Zones", Figure 2.11, "Vitrification HVAC Supply System and Figure 2.12, "Vitrification Exhaust Ventilation System."

2.5.8 Emergency Planning

The VF has addressed Emergency Planning by providing: emergency equipment such as first aid equipment, fire blankets, eye washes and safety showers and exits on the North, East, and West sides on all working levels of the VF. Both the VF Fire Detection and Protection System (63FP) and the Radiation Monitoring and Alarm System alarms and indicates the location of the problem in the VF in the Vitrification CR. The Fire Detection and Radiation Monitoring detection and alarm systems are tied into the WVDP site alarm and monitoring systems, as appropriate. The VF "Emergency Plan" is part of the over all "WVDP Emergency Plan", WVDP-022 [13].

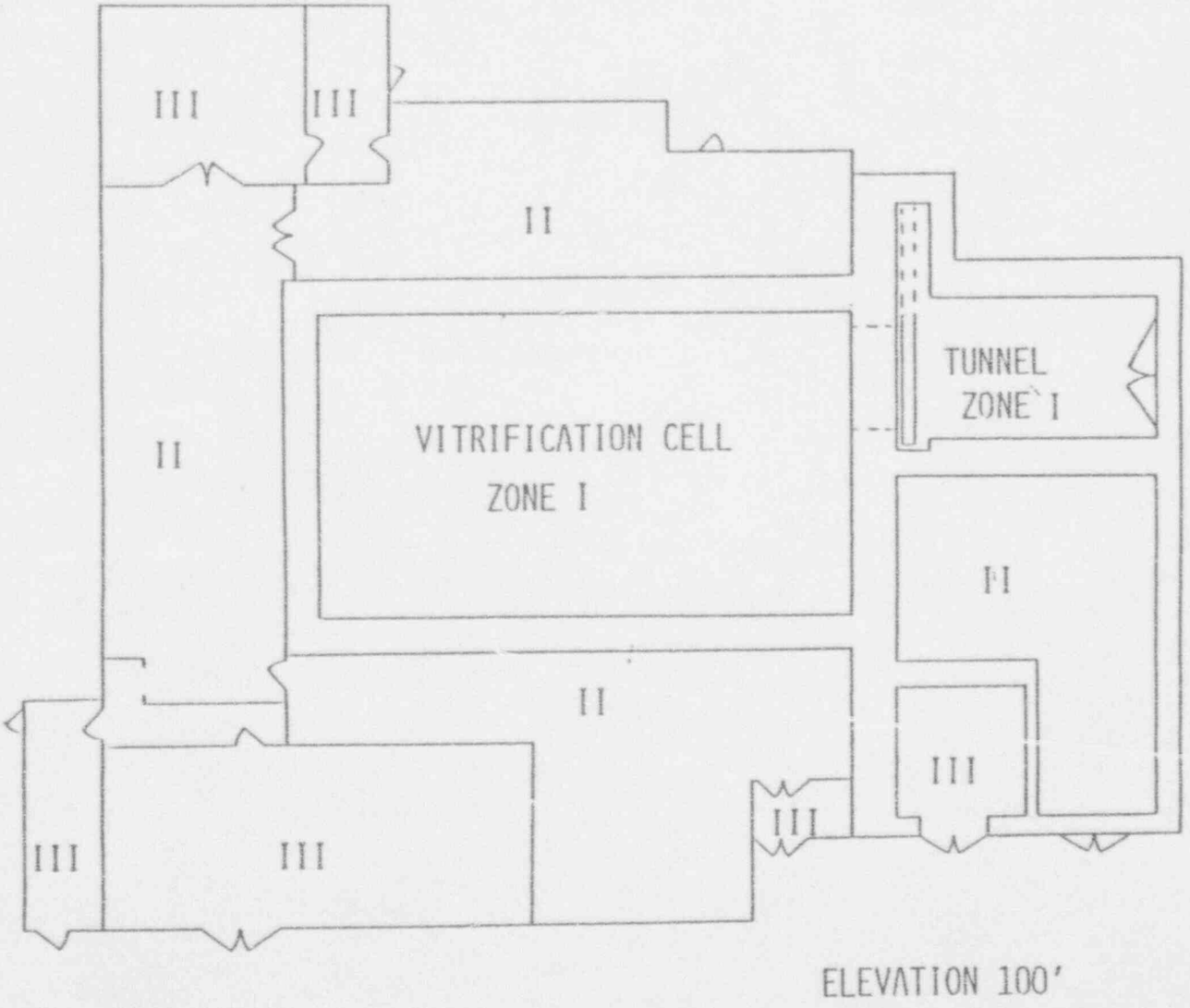
2.6 Ex-Cell Arrangement South Side (SS)

2.6.1 General

The VF HVAC Area Secondary Filter Room, Diesel Generator Room, HVAC Control Room, CMR and Vitrification Transfer Tunnel are designed for natural hazards and are located on the South side of the Vit Cell with working levels at 100 ft., 112 ft. and 124 ft..

2.6.2 Ex-Cell SS Arrangement (100 ft. level)

General Arrangement Drawing 905-D-030 shows the South side of the Vit Cell at the 100 ft. level which includes the following systems and their components:



Vitrification Facility - HVAC Zones

Figure 2.10

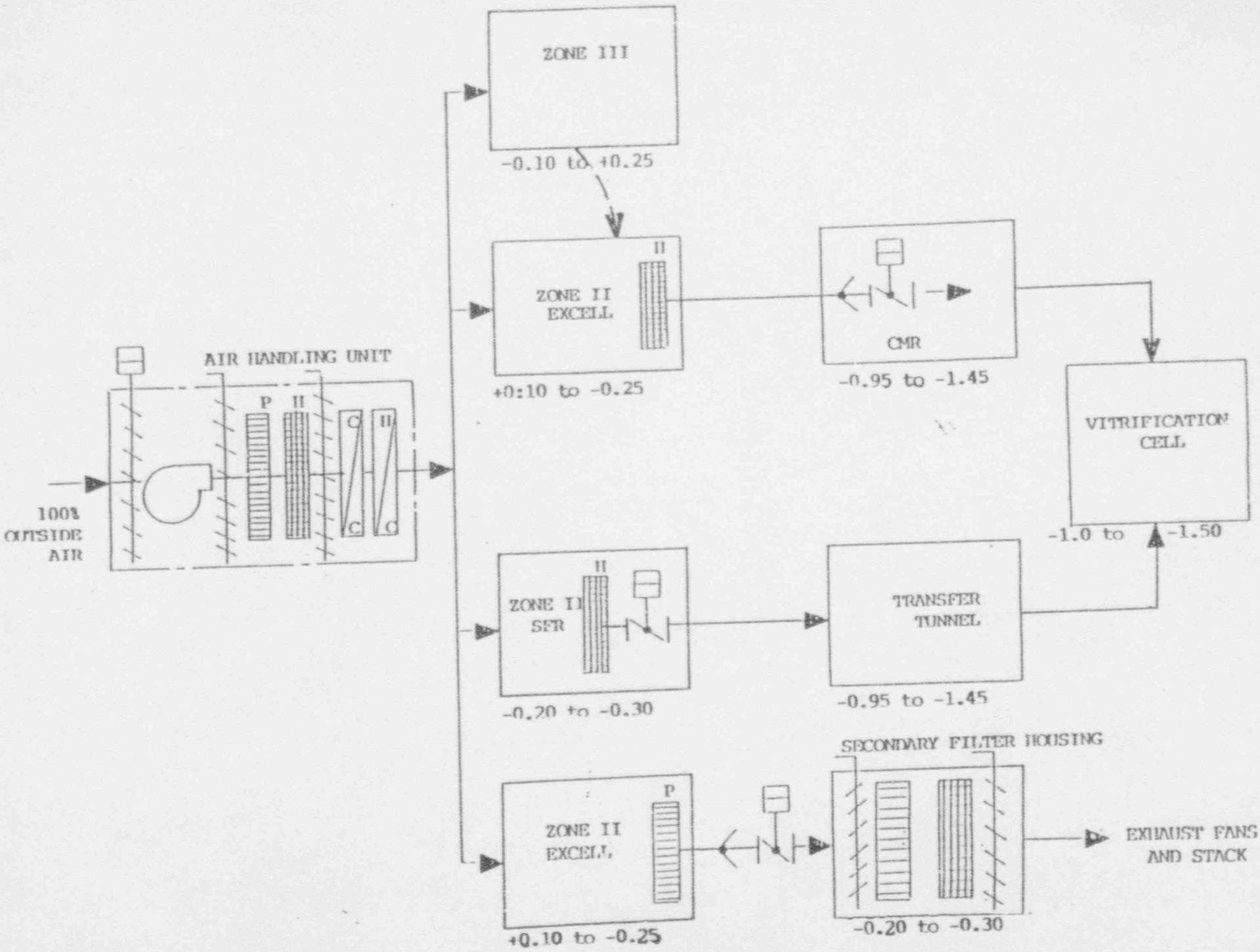


Figure 2.11 VF, Ventilation Inlet System

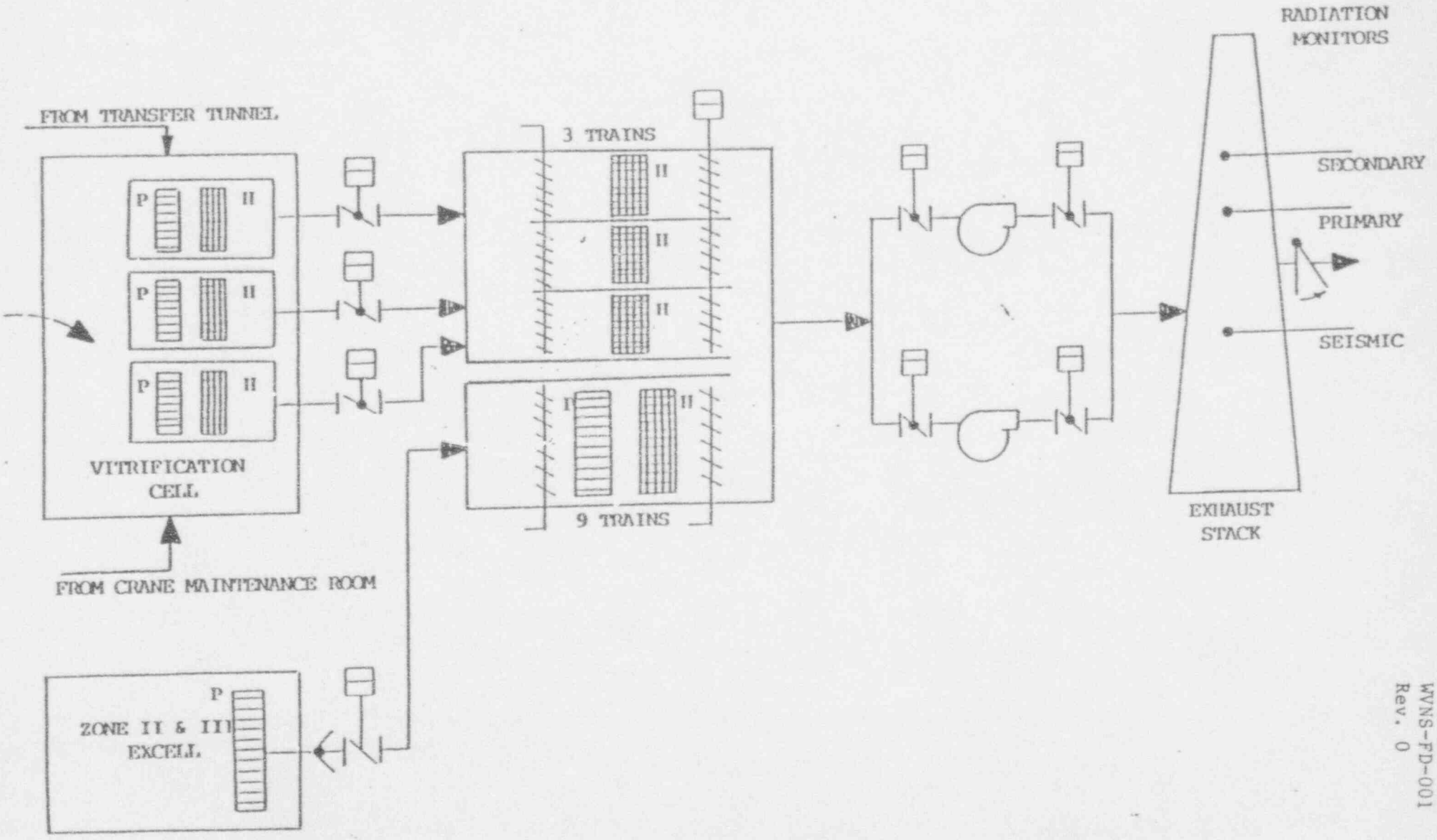


Figure 2.12 VF, Ventilation Exhaust System

WVNS-FD-001
Rev. 0

10

A. System 67, "HVAC" which includes the filter trains, and the exhaust fans. The HVAC components are designed to perform their contamination confinement function during and after the occurrence of a DBE, and DBA.

B. System 63ED, "EDS" which contains the DG, DG day tank, diesel exhaust system, battery charger, and the HVAC 480 volt switch gear, power distribution and lighting panels. The alternate electrical supply is designed for DBE, and DBA.

C. System 63K "IRHV" which contains the Vitrification Transfer Tunnel (connecting the Vit Cell and the EDR), Shield Door No. 1 between the Vit Cell and the tunnel and Shield Door No. 8 between the tunnel and the EDR. Door No. 1 is designed for DBE, confinement and shielding. Door No. 8 is designed for confinement.

2.6.3 Ex-Cell SS Arrangement (level 112 ft.)

General Arrangement Drawing 905-D-032 shows the South side of the Vit Cell at the 112 ft. level which includes the following systems and their components:

A. System 67, "HVAC" which contains; the HVAC controls panel and the start of the VF exhaust stack.

B. System 63ED, "EDS" which contains the 24 volt battery package for the diesel generator, the 480 volt switch gear, and the uninterruptible power supply.

C. System 63K, "IRHV" contains the Vitrification Transfer Tunnel connecting the Vit Cell with the EDR and a shielded viewing window for the secondary filter room.

2.6.4 Ex-Cell SS Arrangement (level 124 ft.)

General Arrangement Drawing 905-D-034 shows the South side of the Vit Cell at the 124 ft. level and above which includes the following systems and their components:

A. System 63F, Cell Walls and Ex-Cell Arrangement which includes the roof section above the HVAC CR and Secondary filter Room, the CMR, and the tunnel's roof hatches.

B. System 67, "HVAC" which includes the VF stack and the duct connections from the Ex-Cell 124 ft. level to the CMR.

C. System 63ED, "EDS" which includes CMR lighting station , maintenance crane panel, and the VF-Cell crane system power and CCTV panels.

D. System 200A, "I&CH" which includes crane transfer hoist main enclosure , Door No. 2 control cabinet, and Vit Cell crane system operator control station.

2.7 Other HLWSF Facility

2.7.1 General

There are four (4) systems that are located in facilities separate from the VF, but are considered part of the HLWSF. See Figure 2.1. They are:

A. System 55, "Sludge Mobilization System" located in the HLW Tank Farm;

B. System 65, "Cold Chemical System" located to the West of the VF in an attached but independent facility;

C. System 64, "Off-Gas System" located in a section of Building 01-14;

D. System 68, "High Level Waste Interim Storage System" located in the existing Main Plant.

2.7.2 Sludge Mobilization System

The SMS is located North of the Vit Cell in the HLW Tank Farm. The functional and design requirements are in Design Criteria DC-046, "Sludge Mobilization and Waste Removal System" and System Description SD 55, "Sludge Mobilization and Waste Removal System."

Figure 2.13, "HLW Tank Farm Layout" and Figure 2.14, "Sludge Mobilization and Vitrification Facility" show the following major components: High Level Waste Tanks 8D-1, 8D-2, 8D-3, and 8D-4; Pump Pits: 8Q-1, 8Q-2, 8Q-4 and Diversion Pit 8Q5; PVS Building, the Equipment Shelter for the WTFVS and the HLW Transfer Trench.

Other equipment required to perform the operations in the HLW tank farm, not shown in the above figures are, mobilization pumps, transfer pumps, zeolite size reduction equipment, transfer piping, instrumentation and controls, containment system and utilities.

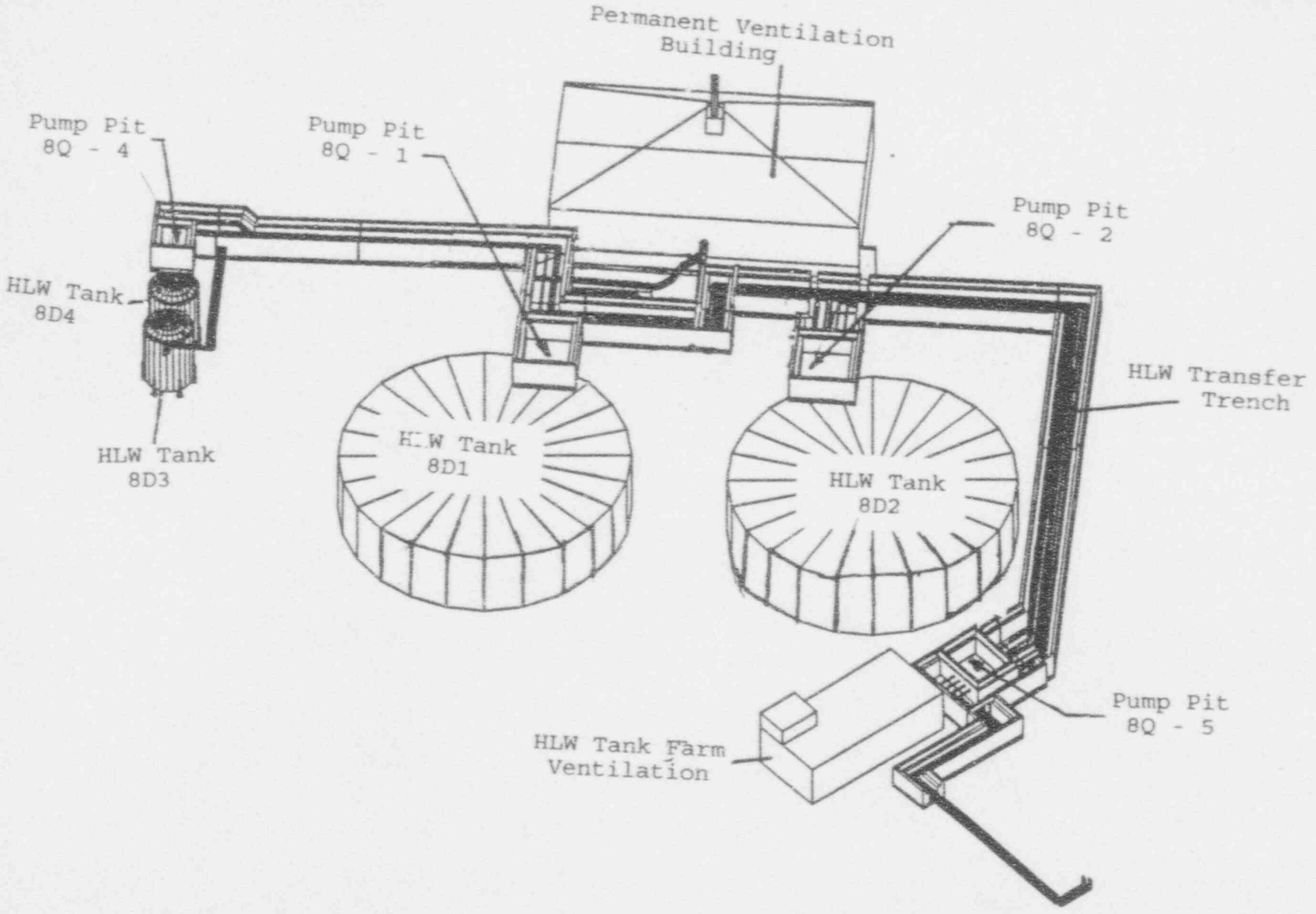


Figure 2.13 HLW Tank Farm Layout

SLUDGE MOBILIZATION AND VITRIFICATION FACILITY

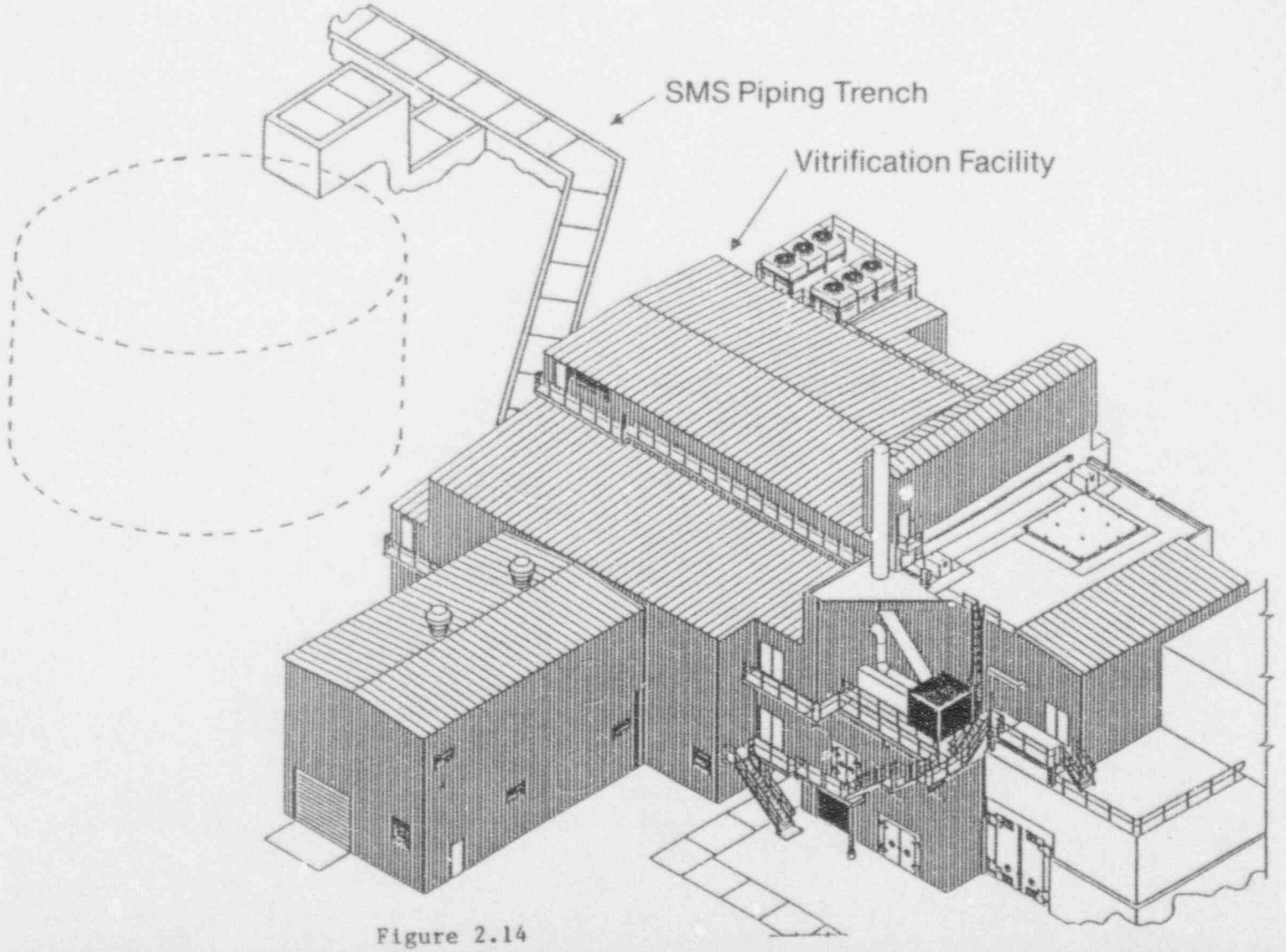


Figure 2.14

A. HLW Tank 8D-4

HLW Tank 8D-4 is an existing tank that contains an active THOREX Waste. It is located at the North end of the waste tank farm in a concrete reinforced vault that houses both the 8D-4 and the 8D-3 HLW Tanks. The 8D-4 HLW Tank is stainless steel and is 3.7 m (12.15 ft) in diameter and 4.8 m (15.76) high. It is used by the following systems:

1. System 55, "Sludge Mobilization and Waste Transfer System" - during the waste transfer the THOREX transfer pump in Tank 8D-4 will pump the THOREX waste through the HLW Transfer Trench to Tank 8D-2 to be mixed with the other wastes to be transferred to the PPS.

2. System 63C, "WH" - during the Vitrification Campaign each canister's decontamination rinse solution is pumped to the VF waste header which is piped directly to Tank 8D-4 through the HLW Transfer Trench. See SD-63J, "CDS" for the chemical composition and the amount of rinse solution for each canister. See SD-63G, for the types and amounts of unscheduled wastes that could be sent to 8D-4. See SD-63I for the sampling, chemical adjustment and when and where the Tank 8D-4 content is to be transferred.

TBD The Cognizant System Engineers for Systems 63I, 63G, 63J, and 55 are reviewing both the design and operations of these systems to determine if the canister rinse solution can be transferred to a tank other than 8D-4.

B. HLW Tank 8D-3

HLW Tank 8D-3 is an existing stainless steel tank 3.7 m (12.15 ft) in diameter and 4.8 m (15.76 ft) high located in a reinforced concrete vault with Tank 8D-4 at the north end of the HLW Tank Farm. Tank 8D-3 is used by the following systems:

1. System 50, "STS" - Tank 8D-3 was used at the end of the process as the final receiver. Tank 8D-3 was sampled, the final analysis made and if acceptable the Low Level Waste (LLW) was transferred to the Integrated Radwaste Treatment System.

2. System 55, "SMS" - Tank 8D-3 is not used during this operation.

3. System 63H, "OGS" - Tank 8D-3 is used during the Vitrification Campaign to receive the Vessel Vent Condenser condensates. The Vent Header Condenser is located in the Vit Cell and is piped directly to Tank 8D-3 through HLW Transfer Trench.

   See SD 63H and SD 63I for the times and amount of condensate to be sent to Tank 8D-3.

   The STS facilities will support System 63H and are used as follows: to sample the 8D-3 condensate, transfer to the samples to the laboratory, to make chemical adjustments to the condensate, if required and to transfer the condensate to other tanks.

   Where to transfer the condensate depends on the condensate's level of radioactivity. See SD-63I for when to sample and where to transfer the condensate in Tank 8D-3.

C. HLW Tank 8D-1

HLW Tank 8D-1 is an existing carbon steel tank with a diameter of 21.3 m (69.92 ft) and 8.23 m (27.01 ft) high located in a reinforced concrete vault in the HLW Tank Farm. HLW Tank 8D-1 is used by the following systems:

1. System 50, "STS" - Tank 8D-1 was used to store the cesium loaded zeolite.

2. System 55, "SMS" - during the sludge mobilization the five Zeolite Mobilization Pumps are used to mix and suspend the cesium loaded zeolite in Tank 8D-1. The 8D-1 zeolite transfer pump transfers the content of 8D-1 through the HLW Transfer Trench to the 8Q-2 pump pit. In the pump pit the zeolite is size reduced by the grinder which discharges into Tank 8D-2. For this operation see SD-55.

TBD Tank 8D-1 is being reviewed for possible storage of the condensate and/or waste returned from the vitrification process to the tank farm. The plan is to make the returns available as make up water for mobilization in Tank 8D-2 and recycle to the CFMT.

D. HLW Tank 8D-2

HLW Tank 8D-2 is an existing carbon steel tank 21.3 m (69.92 ft) in diameter and 8.23 m (27.81 ft) high located in a reinforce concrete vault in the HLW Tank Farm and contained approximately 2200 m^3 (560,000 gallons) of Purex Waste to be processed. Tank 8D-2 is used by the following systems:

1. System 50, "STS" - HLW Tank 8D-2 had the supernatant (liquid on top of the sludge) removed during this operation. The supernatant was processed through zeolite columns and the cesium coated zeolite was dumped into Tank 8D-1. The remaining Low-Level Wastes (LLW) were sent to the Low-Level Waste Treatment System (LLWTS) and then processed through the Cement Solidification System (CSS) into cement drums.

2. System 55, "Sludge Mobilization and Washing System" - Tank 8D-2 is used to wash the sludge. Water is added to the sludge and the five Sludge Mobilization Pumps mix the sludge and dissolves the soluble material in the sludge. The mobilization pumps are shut down and after the solids have settled the liquid on top of the sludge is pumped off and processed through the STS. This cycle is repeated until most of the soluble material is dissolved and removed. See SD-55 for this operation.

3. System 55, "Sludge Mobilization and Waste Transfer System" - The Purex waste, the THOREX waste and the Cesium Loaded Zeolite are mobilized into one mixture in Tank 8D-2. The 8D-2 five Sludge Mobilization Pumps run continuously during the transfer of the wastes from Tank 8D-4 and during the addition of chemicals to assure the proper pH. See SD-55 for this operation.

4. System 55, "Sludge Mobilization System" - The mobilization is completed, and the mixture is homogenized in Tank 8D-2 prior to transferring to the CFMT. Tank 8D-2 valves are aligned for transfer to the CFMT. The 8D-2 Sludge Removal

Pump is started and brought up to speed to obtain the proper flow rate through the transfer piping to the CFMT. The 8D-2 Sludge Removal Pump is shut down when the predetermined amount to be transferred is registered on the flow totalizer. The valves are aligned to isolate Tank 8D-2 from the CFMT and the process lines to both the CFMT and Tank 8D-2 are flushed. See SD-55 and 63I for this operation.

E. Ventilation and Confinement

1. System "WTFVS" - will continue to exhaust air for contamination control from the HLW Tanks and the pump pits. Following treatment of the exhaust air it is combined with other effluent and monitored at the Main Plant Stack prior to release to the environment.

2. System 56, "PVS" - supports the WTFVS during installation of equipment in the tanks and during pump pit cover removal. When the PVS is used the gases are passed through roughing filters and two sets of HEPA Filters and are monitored for radioactivity in the PVS stack prior to release to the environment.

3. The PVS Building is used to house the Permanent Ventilation System, the stack monitoring system, controls for the SMS operations and the backup diesel generator and air compressor.

2.7.3 Cold Chemical Facility

A. General

For the functional and design requirement see DC-022 and SD-65. The CCS is a batch plant for the preparation and transfer of nonradioactive slurries, decontamination solutions, and water to the VF during integrated testing and radioactive operational phases of the Vitrification Campaign.

The functional requirements are: the system is able to measure or meter the chemical and glass formers accurately to the mix tanks, the slurries are uniform and thoroughly mixed, samples of the mixture are taken and analyzed, and the mixtures are transferred to the proper receiver.

B. Arrangement

General Arrangement Drawings 905-D-001, 043 and 044 shows the independent 56 ft. x 34 ft. Cold Chemical building West of the VF and the system physical arrangement which includes the following systems and their components:

1. System 65, "CCS" - which includes the following components; main mix tank, shim mix tank, holding tank, three chemical addition tanks, five product pumps, three grinders, six sampling stations, four weigh scales, nitric acid day tank, sodium hydroxide day tank, drain tank with a pneumatic pump, conveying subsystem (dry), liquid conveying subsystem, nitric acid delivery system, sodium hydroxide delivery system. and the vessel ventilation subsystem. See SD-65 For description and function of the above equipment.

2.7.4 Off-Gas Facility

A. General

For the functional and design requirements see: DC-022, and SD 64. See Figure 2.15 "Off-Gas and Vessel Vent System" for a progress flow diagram of the system.

The OGS provides for the safe removal of process gases from the melter while maintaining the melter, related vessels and ducting at a slight vacuum for contamination control.

The OGS in the Vit Cell is connected, through an insulated 250 mm (10 inch) duct located in the shielded Off-Gas Trench, to the Separators in the OGS in building 01-14.

In the OGS the off-gases are filtered through HEPA filters, and the oxides of nitrogen (NOx) are eliminated by selective catalytic destruction, before release to the environment.

B. Facility Utilization

The facilities in the 01-14 Building used by the OGS are the shielded 01 Cell, the air lock to the 01 Cell, the blower rooms, pipe chase, and Ammonia Valve Gallery.

OFF-GAS AND VESSEL VENT SYSTEM

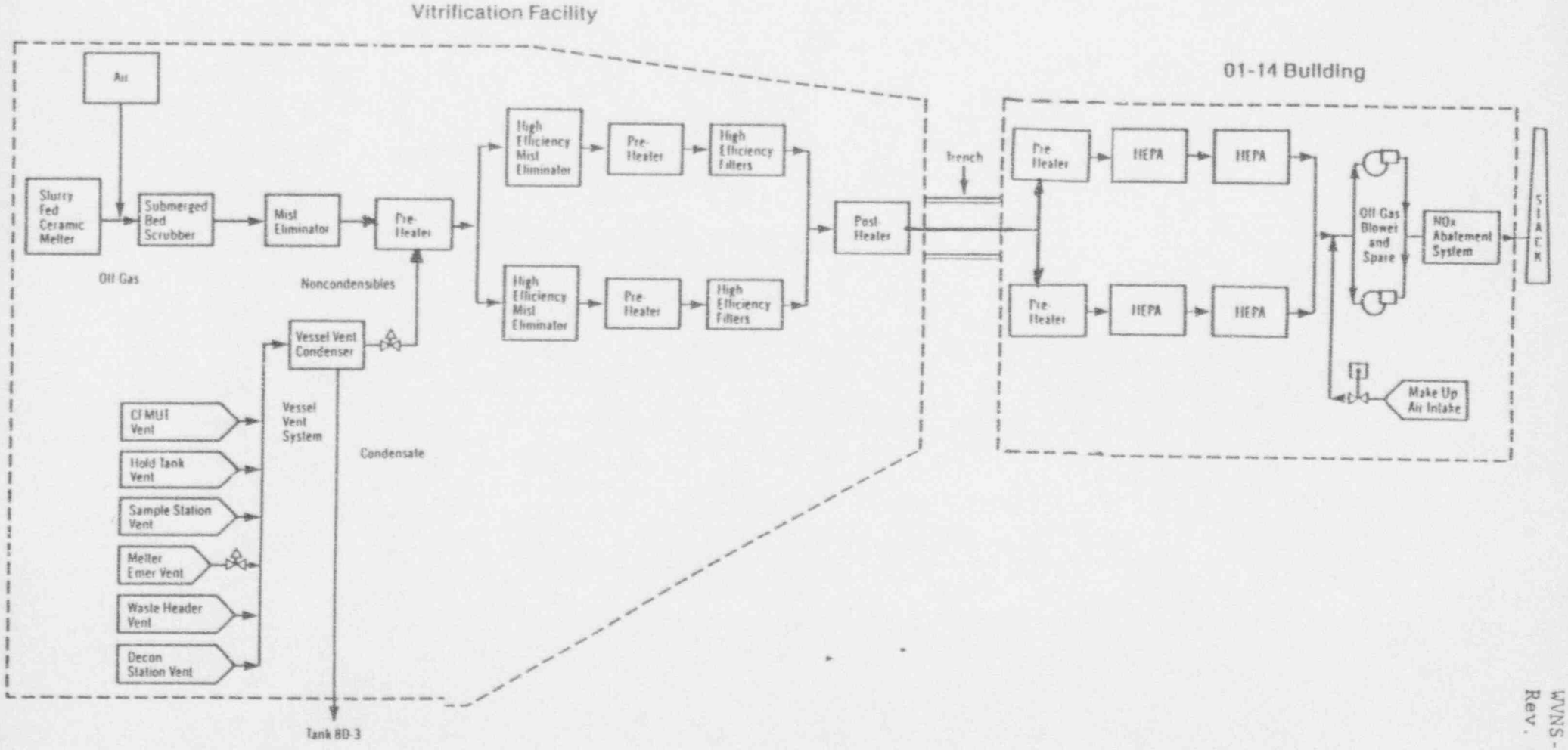


Figure 2.15

C. Facility Arrangement

General Arrangement Drawings 906-D-030, 031,032, 033, 034 and 035 show the equipment arrangements at elevations 98.00 ft., 116.50 ft., 130.00 ft., 144.00 ft. and various sections in Building 01-14.

1. 01 Cell

The 01 Cell is approximately 4.57M x 4.57M (15 x 15 feet) and extends from the 98.00 ft level to the 144 ft level. The walls are designed to the Uniform Building Codes (UBC) Zone 3 1961 requirements and provide shielding for ALARA. The 01 Cell contains parts of the following system and its components:

a. System 64, "OGS" which includes redundant process lines. Each line contains two Reheaters in series, two HEPA Filters in series, a Preheater, and a Selective Catalytic Reactor.

2. Blower Rooms

The OGS Blower Room is located at the 144 ft level and houses part of the following system and its components:

a. System 64, "OGS" which includes three Electrically Driven Blowers and the associated ducting, valves and utilities.

3. Instrument Room

General Arrangement Drawing 906-D-037 shows the plan view at elevation 124 ft, and the layout in OGS Instrument Room (IR) and contains the following systems and their components:

a. System 200A, "I&CH" which includes I&C Racks and controllers for the DCS, the Ex-Cell Off-Gas Control Panel, two NOx Analyzer Enclosures and one NOx and NH-3 analyzer Enclosure.

b. System 30, "EDS" which includes the Uninterruptible Power Supply (UPS), Lighting Transformer, and two Electrical Distribution Panels.

4. Ammonia Valve Gallery

The Ammonia Valve Gallery is located below the Instrument room at the 117.5 ft level. The gallery contains the connecting piping and valves for transferring the ammonia from the Ammonia Storage Tank and Vaporizers to feed the Catalytic Reactors.

5. Pipe Chase

The pipe chase is located below the ammonia valve gallery at the 111.5 ft. level. The duct from the Vit Cell is routed through the pipe chase into the 01 Cell to the reheaters.

6. Electrical Distribution

The electrical equipment is located in the MCC Room, a separate building, located at ground level on the West side of the 01-14 Building

7. HVAC

Drawings 906-D-018 and 019 show the existing System 47, "HVAC System" which is used in the 01 Cell, the 01 Cell Air Lock, the blower room, Ammonia Valve Gallery, and the Pipe Chase.

The OGS-IR uses an independent roof mounted HVAC System, but is listed as part of System 47.

2.7.5 High Level Waste Interim Storage

A. General

The HLWIS is located South of the Vit Cell in the existing Main Process Building in the CPC. For the functional and design requirements see DC 048, and SD-68. The VF and the Main Plant Building are connected from the Vit Cell to the EDR by the Vitrification Transfer Tunnel. For the canister movement see Figure 2.16 "West Valley Demonstration Project Canister Movement.

B. Facility Utilization

The HLWSF will use the following facilities and cells in the Main Process Building: CPC, Chemical Viewing Aisle (CVA) and the Chemical Crane Room (CCR).

WEST VALLEY DEMONSTRATION PROJECT
CANISTER MOVEMENT

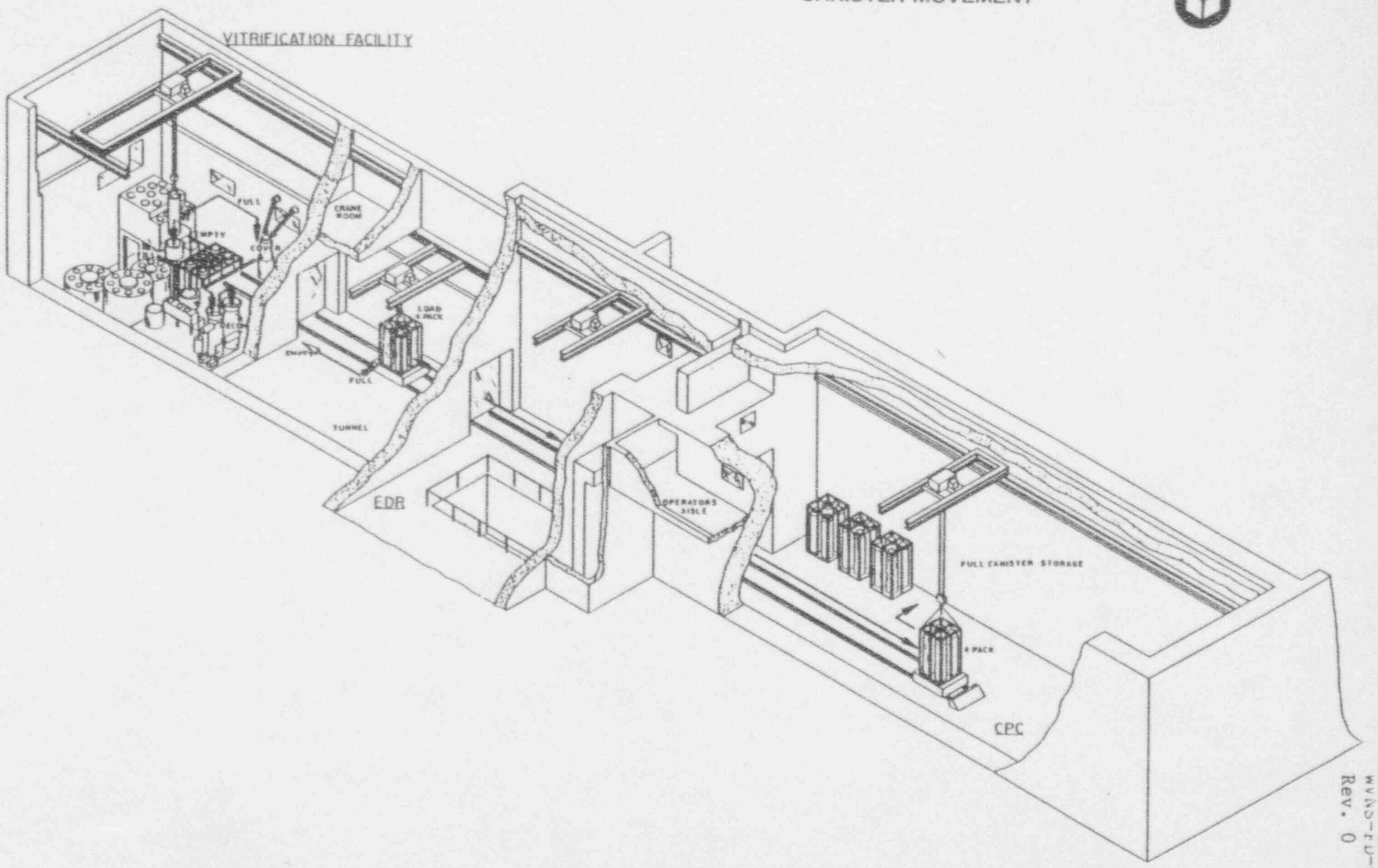


Figure 2.16

The EDR and the EDR operating aisle (EOA) will also be used to complete the interfaces between the Vit Cell and the HLWIS and the LL and the Vit Cell.

C. Facility Arrangement

General Arrangement Drawings 900-D-031, 900-D-033, 900-D-035 and 900-D-036 show the parts of the Main Process Building that are used in the HLWIS.

The HLWIS is located in the CPC which has interior dimensions of 28.34 m (93 feet) long by 6.70 m (22 feet) wide and 13.11 m (43 feet) high, and contains the following systems and their components:

1. System 68, "HLWIS" which contains the canister storage racks, racks for storing the archived glass shards from each canister, and space for the Vit Cell replaced equipment. The handling equipment consist of a 16 ton crane at the 138.33 ft. level and a 2 ton crane at the 133.00 ft. level and the handling fixtures. The CVA has four shielding windows, and remote CCTV for observing the operations in the CPC.

2. System 63K, "IRHV" which includes the canister transfer cart system and the CPC/EDR Door.

3. System 15, "Main Plant HVAC System" contains both the HVAC inlet and outlet ducts.

D. Chemical Crane Room

The CCR at the 127 ft. level has a personnel access lock so hands on maintenance of the cranes can be performed and includes the following systems and their components:

1. System 68 "HLWIS" and includes the following: the crane retrieval system, work platforms for decontaminating and maintaining the cranes, and space to store the cranes when not in use.

2. System 30, "EDS" and includes the junction boxes that provide the interfaces between the electrical switch gear located external to the CCR and the cranes and other electrical systems.

E. Equipment Decontamination Room

The EDR connects the Main Plant Building to the Vit Cell through the Vitrification Transfer Tunnel, connects to the CPC through a shielded door and provides access to the LL for bringing new equipment and canister into the Vit Cell. The EDR contains the following system and their components:

1. System 63K, "IRHV" which contains the Canister Cart Transfer System, two 10 ton cranes, and three confinement and/or shielding doors. The EDR doors connect as follows: one to the CPC, one to the Vitrification Transfer Tunnel and one to the LL. The shielding window and crane controls are in the EOA.

2. System 63M "LL" which will contain part of the Load-In System for moving the canisters from the LL to the Vit Cell.

3.0 OPERATIONS

3.1 Vitrification Operating Plan

3.1.1 General

The Vitrification Operating Logic, as shown on Figure 3.1 "Operating Logic Diagram", (Sketch No. CGS 042992, rev. D) provides a basis for integrating and describing how the vitrification systems function together. The logic covers the flow and processing of the HLW from the mixed and homogenized slurry in HLW Tank 8D-2, through the primary process, to the vitrified glass in welded and decontaminated canisters delivered to the HLWIS System.

3.1.2 Vitrification Operating Logic

The "Operating Logic Diagram" represents one "Feed Preparation Cycle" and one "Canister/Turntable Cycle extracted from an on-going series of repeated operations during the Vitrification Campaign.

A. The chosen "Feed Preparation Cycle" begins when the following occurs:

1. Activity (ACT) 27, space is provided in the CFMT by transferring the melter feed to the MFHT.

2. ACT 8, the transfer of the liquid in the SBS receiver to the CFMT is started.

3. ACT 99, the mixed wastes in HLW Tank 8D-2 are being mixed and made ready for transfer to the CFMT.

B. The "Feed Preparation Cycle" ends when:

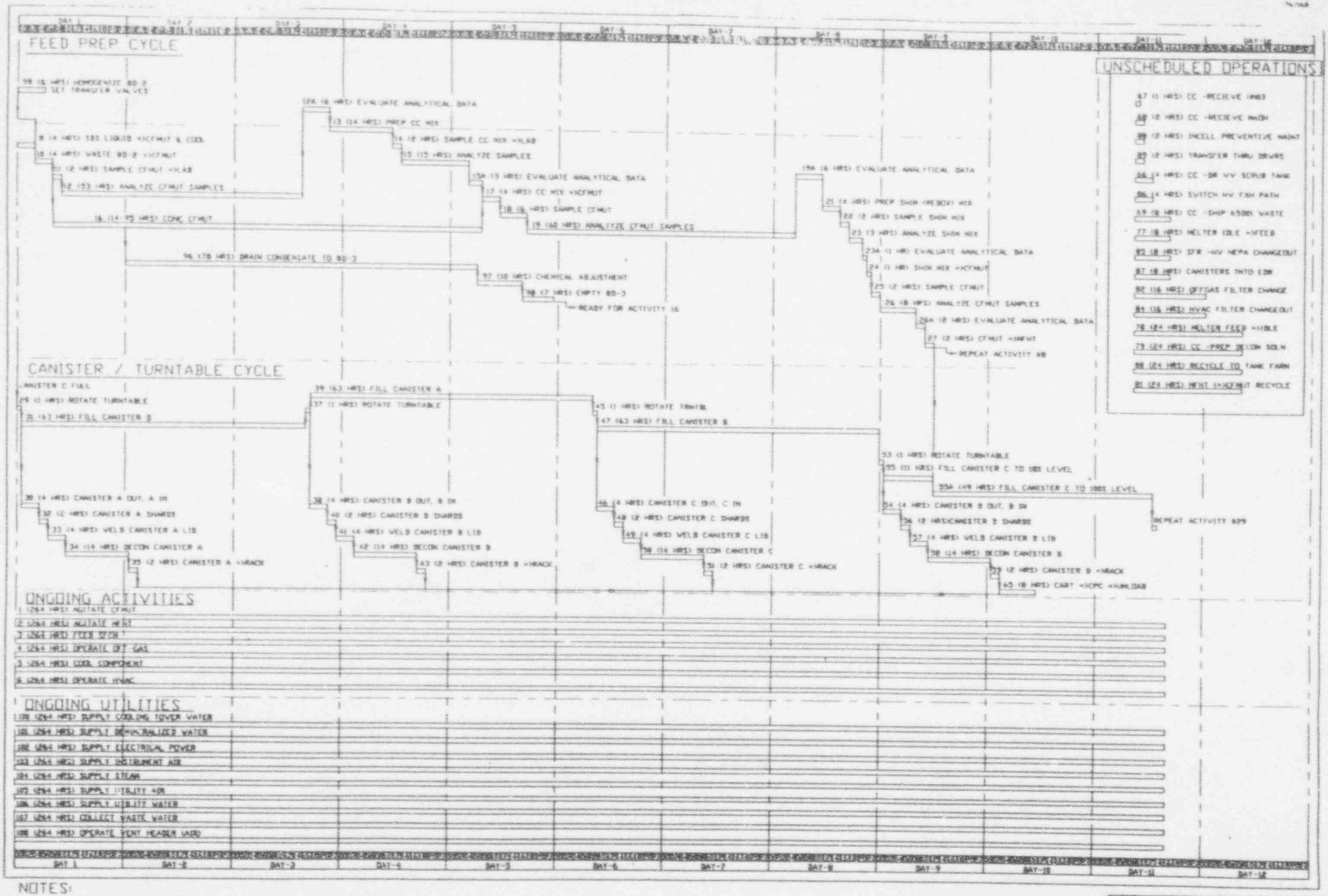
1. ACT 26A, the melter feed batch is verified acceptable and

2. ACT 27. the melter feed batch is transferred from the CFMT to the MFHT, to feed the SFCM.

C. The chosen Canister/Turntable Cycle begins with:

1. ACT 29 - when the turntable rotates the empty canister under the SFCM pour spout and

2. ACT 31 - the SFCM is in the melter feed mode ready to start the next pour.



NOTES:

1. FIGURE 3-1 IS NOT TO BE USED AS A STAND ALONE DOCUMENT.
2. GLASS POUR RATE 30 KILOGRAMS/HR
3. CANISTER FILL WEIGHT 1890 KILOGRAMS
4. CANISTERS/FEED CYCLE 3.18

PRELIMINARY

VITRIFICATION
FD-001 FIGURE 3-1
OPERATING LOGIC DIAGRAM

WVDP-FD-001 Rev. 0

3. There are three prerequisites for rotating the turntable;

   a. The canister under the SFCM pour spout is verified filled;

   b. an empty canister is in the position to be rotated under the melter pour spout and

   c. the pour from the SFCM to the canister is terminated.

The "Canister/Turntable Cycle" is identified as a continuous pour cycle and ends when the last canister of the Vitrification Campaign is filled, welded, decontaminated and transferred to the HLWIS. The SFCM is scheduled to remain hot 24 hours per day, seven days a week until the last canister is finished or an abnormal event occurs stopping the process.

The SFCM operates on a continuous basis and will maintain an average pour rate (kilograms/hour), into the canisters even if the actual pour is on an intermittent basis. Brief stops in the melter pour cycle are anticipated to replace various melter components, but during these intrusions the melter will maintain the glass in the molten state.

3.1.3 Basis for Operating Cycle

Using the Functional and Check Out Testing of Systems (FACTS) data as the basis, a 30 kilograms/hour (kg/hr) melter to canister glass pour rate is used in the Canister/Turntable logic.

Reference 5 requires that a minimum of 80 percent of the canister total volume is to contain glass. The canister/turntable logic uses an eighty seven (87) percent or 1890 kilogram (4190 pounds) plus or minus five (5) percent glass fill volume per canister.

One approach used to determine the size of feed batch to be prepared for each Feed Preparation Cycle is the usable volume of the MFHT. This volume is approximately 6,125 kilograms of glass.

In the "Canister/Turntable Cycle" at 1890 kg per canister the 6125 kg produces three full canisters and one canister eighteen percent full or 3.18 canisters per cycle. Pouring glass at 30 kg/hr would result in a 204 hour canister/turntable cycle.

Another approach was considered to determine the size of the feed batch and is based on the chemical reaction time. The best estimate, using a 175 hour cycle, is that there should be little or no change in the chemical composition of the melter feed when in the MFHT. The 175 hour cycle at 30 kg/hr requires 5250 kilograms of glass to be prepared for each Feed Preparation Cycle. Using 5250 kg the Canister/Turntable Cycle would produce two and three quarters (2.75) canisters per Feed Preparation Cycle.

The 6125 kilogram batch size is used in the "Operating Logic Diagram", since the chemical reaction times have not been verified and capabilities exist in the MFHT for chemical adjustment. Also, there would be fewer batches, and less sampling and testing. The "Operating Logic Diagram", is based on the above and uses the following:

• SFCM glass pour rate	30 kilograms/hour
• Canister fill volume	87 % +/- 5 %
• Canister glass weight	1890 kilograms +/- 5 %
• Glass per cycle	6125 kilograms
• Time per Cycle	204 hours

3.2 Types of Activities

There are four types of activities on the "Operating Logic Diagram"; ongoing, scheduled, and unscheduled.

3.2.1 Ongoing activities run during the entire cycle such as; process activities; ACT 4, Operate Off-Gas and ACT 6, Operate HVAC.

3.2.2 Ongoing utilities which are available during the entire cycle, but are only used as required by the process or facilities as need, such as: ACT-100 "Cooling Tower Water" and ACT-102 "Supply Electrical Power"

3.2.3 Scheduled activities are performed in a definite sequence in each cycle such as; ACT 8, SBS Liquid to CFMT and Cool, ACT 10, Waste Tank 8D-2 to CFMT, or ACT 12, Analyze Samples.

3.2.4 Unscheduled activities are not steps in the cycle but may be imposed occasionally during the cycle such as; ACT 77, Melter Idle to Feed, ACT 84, HVAC Filter Change Out, and ACT 88, In-Cell Preventive Maintenance.

Each ongoing and scheduled activity is described; defining when each activity begins and ends, its function, its interfaces with other activities and the primary systems impacting the activity. The unscheduled activities are addressed in subsequent sections of this document.

3.3 Ongoing Activities

NOTE: AN - The activity number shown on sketch CGS-042992
AT - Time to complete activity
CT - Time in total feed preparation cycle

The process ongoing activities are numbered 1 thru 7 and the utilities ongoing activities are numbered 100 thru 108.

3.3.1 Agitate CFMT AN-1 AT-204 hrs

The CFMT's agitator runs continuously during the cycle to keep the contents of the CFMT well mixed.

See SD-63I, for the CFMT operations.

3.3.2 Agitate MFHT AN-2 AT-204 hrs

The MFHT's agitator runs continuously during the cycle to keep the contents of the MFHT well mixed.

See SD-63I for the MFHT operations.

3.3.3 Feed SFCM AN-3 AT-204 hrs

A minimum working feed level is maintained in the MFHT to provide a continuous feed from the MFHT to the SFCM.

See SD-63I for the working levels and how they are maintained.

3.3.4 Operate the Off Gas System AN-4 AT-204 hrs

The melter off-gas system runs continuously during the cycle to remove gases and maintain a negative pressure in the SFCM, CFMT, MFHT, and SBS and the off-gas train to the Off-Gas Blowers.

See SD-63H, and 64, for the Off-Gas System operations.

3.3.5 Cool Components AN-5 AT-204 hrs

The CLCWS runs continuously during the cycle to provide cooling water to the PPS components, as needed. The heat is removed from the CLCWS through the CLCWS Heat Exchanger by the CTW. The CLCWS is monitored for radioactivity and provides isolation between the PPS and the CTW.

See SD-66, "CLCWS" for the Cooling operation. See SD-63I, 63H and 63J for the components the CLCWS cools.

3.3.6 Operate HVAC AN-6 AT-204 hrs

The HVAC Systems for the; VF, SMS, OGS and HLWIS Systems, run continuously during the cycle. The primary functions of the HVAC systems is to maintain: environmental conditions, differential pressures to assure the air flow from areas of lowest potential contamination to areas of highest potential and negative atmospheric pressure in the cells required for confinement.

See SD-67, "HVAC" for the system operations. The SMS and HLWIS Systems are tied into the Main Plant Exhaust and Main Stack System. The OGS is tied into the 01-14 Building HVAC System (47).

3.3.7 Supply Cooling Tower Water AN-100 AT-204 hrs

The CTW System runs continuously during the Feed Preparation Cycle supplying cooling water to the CLCWS Heat Exchanger continuously and to the HVAC chiller A&B, and the CCS on an as needed basis.

See SD 63CW, 65, and 67 for the operation and uses of the Cooling Water System.

3.3.8 Supply Demineralized Water AN-101 AT-204 hrs

Demineralized water (DW) is available during the entire cycle from the Main Plant System (30) and is distributed in the VF, CCS, SMS and OGS. The DW is used for chemical make-up, process additions, line and equipment flushing and decontamination, on an as needed basis.

See SD-63DW, for the operation and SD-55, 63H, 63I, 63J, 63L, 64, 65, 67 and 69A for uses of the Demineralized Water System

3.3.9 Supply Electrical Power AN-102 AT-204 hrs

The Electrical Power is available during the entire cycle and the normal power is supplied from public utilities to the VF, CCS, SMS, OGS and HLWIS and their Facilities. Electrical power is used in all the HLWSF system for the operating equipment, lighting, instrumentation and controls, monitoring, communication, remote maintenance, and material handling.

Stand-by power is available to the above systems and facilities in case of loss of normal power and its primary functions are to place the process systems in a safe mode and monitor the process systems and to maintain confinement where required. The HLWSF stand-by power includes the Main Plant Diesel Generator, Vitrification Diesel Generator, PVS Diesel Generator, and uninterruptable power supplies.

See SD 63ED, 55, 64 and 68 for the electrical distribution and use.

3.3.10 Supply Instrument Air AN-103 AT-204 hrs

The Instrument Air (IA) is available during the entire cycle and is supplied from compressors in the Main Plant Utility Room to the VF, CCS, SMS, OGS and HLWIS. The IA is used for purging level control, valve actuation, and controlling instruments. The air pressure and flow is controlled by the individual components or systems.

The VF, CCS and SMS instrument air backup is supplied by the STS air compressor. The Vitrification System is also backed up by high pressure bottled air.

See SD-63-IA, "Vitrification Facility Instrument Air", SOP 31-1, "Plant Utility and Instrument Air", and SOP 50-25, "Operation of STS Compressed Air System" for the operation of the Instrument Air System. See each of the HLWSF SD for the and relegation and control of the various uses of the instrument air.

3.3.11 Supply Steam and Return Condensate AN-104 AT-204 hrs

Steam is available during the entire cycle and is supplied form the Main Plant, Steam Power Plant to the VF and CCS. The steam is used to heat, pump, and jet the process liquids and to purge and flush the lines and equipment.

The Condensate returns are associated with the heating systems and the steam turbine pump for the CLCW.

See SD-63SC, for the operation and users of the steam and condensate system.

3.3.12 Supply Utility Air AN-105 AT-204 hrs

Utility Air (UA) is available during the entire cycle and is supplied from the Main Plant, Plant Utility and Instrument Air System (System 31) to the VF, CCS, SMS, OGS and HLWIS. The UA is used for mixing. purging, conveying cold chemicals, cooling, sampling, sample transfer and pumping.

The UA System is a passive distribution system and regulating air pressure and flow to the individual components is the responsibility of the component or system being supplied.

The UA System is backed up by a steam driven air compressor in the Main Plant, Utility Room and an electrically driven air compressor in the PVS.

See SD-63UA, "VF Utility Air", SOP-31-1, "Plant Utility and Instrument Air" and SOP 50-25, "Operation of the STS Compressed Air System" for the operation of the Utility Air System. See SD-55, 63UA, 64 and 68 for the use and regulation and control by the components and systems.

3.3.13 Supply Utility Water AN-106 AT-204 hrs

Utility Water (UW) is available during the entire cycle and is supplied from the Main Plant to the VF, CCS, SMS, OGS and HLWIS. The UW is primary used to flush dirt, spills and contaminants from floors, tanks, and pipes to the appropriate waste disposal systems. It also serves to fill and maintain cooling water in the CLCWS and Chilled Water Systems and to provide backup cooling when required.

See SD-63-UW, " VF Utility Water System", SD-55, 64 and 68 for the operation and uses of the Utility Water System.

3.3.14 Collect Waste Water in Drain AN-107 AT-204 hrs

The Drain System is a passive system that is continuously available to collect and deliver process or wash liquids from various locations for recycle or discharge. It is comprised of floor drains, piping, sumps and instrumentation. The methods of discharge or recycle depends on the liquid being handled. The Vit Cell sump collections are sent to the Waste Header System for recycling; the VF Ex-Cell drains are discharged to the interceptors; the Secondary Filter Room and

the CMR drain to the Vit Cell sumps; and the CCS drain collections are sent to a hold tank for later disposal. The SMS pipe trench is sloped to drain back to the pits and the pit sumps are recycled to the appropriate HLW Tank. The HLWIS and OGS drain liquids are sent to the interceptors.

See SD-63WW, "Vitrification Facility Drains", SD-55, 64 and 68 for the operation and location of the various drains in the HLWSF.

3.3.15 Operate Vent Header AN-108 AT-204 hrs

The Vent Header (VH) is a passive system that is continuously available during the cycle and is located on all levels of the VF EX-CELL. The VH is used to exhaust the upstream air side of the solenoid valves and jets that could come in contact with the process. The VH is vented to the Vit Cell.

See SD-63VH for the Vent Header operation.

3.4 SFCM Feed Preparation Cycle

3.4.1 SBS Liquid to CFMT and Cool AN-8 AT-4 hrs CT-4 hrs

After the transfer of the melter feed from the CFMT to the MFHT is completed, the new Feed Preparation Cycle begins with the transfer of the SBS liquid to the CFMT.

The transfer of the SBS liquid begins when the SBS Transfer Jet starts transferring the SBS receiver liquid to the CFMT and ends when the SBS receiver's level indicator shows the receiver to be empty and the transfer jet is shut-off.

The rate of transfer, temperature, quantity transferred and the nominal composition of the SBS liquid are covered in SD 63H. See SD-63SC, and 63H for the SBS transfer jet operation.

The temperature of the CFMT content is controlled by the flow of the closed looped cooling water through the CFMT cooling water jackets. See SD-66, and SD 63I for the CFMT cooling operations and requirements.

The instrumentation and controls, program control logic and control interfaces for the above systems are covered in SD-200 A&B and its associated documents.

3.4.2 8D-2 Waste to CFMT AN-10 CT-4 hrs AT-8 hrs

After the SBS transfer to the CFMT is complete and the HLW in Tank 8D-2 is mixed, the mixed wastes are ready for transfer from Tank 8D-2 to the CFMT.

In preparation for the transfer, five sludge mobilization pumps are running to maintain a uniform waste mixture in Tank 8D-2.

The transfer starts when the 8D-2 sludge transfer pump is started with the HLW valves aligned in the transfer mode. The transfer pump's speed is increased until the proper flow is obtained, and the transfer to the CFMT is continued.

The quantity to be transferred to the CFMT is entered into a flow totalizer and when this quantity is obtained the flow is stopped, by shutting off the 8D-2 sludge transfer pump.

The activity ends when the HLW valve alignment is changed to isolate systems 55 and 63I from each other and the process lines to both the CFMT and Tank 8D-2 are flushed.

The amount of HLW to be transferred to the CFMT is covered in SD 63I.

The mixing of the HLW, HLW valve alignments, transfer rate, totalizer setting and flushing are covered in SD-55.

Instrumentation and controls, program control logic and control interfaces for this activity are covered in SD 200 A&B and its associated documents.

3.4.3 Sample CFMT => to Lab. AN-11 AT-2 hrs CT-10 hrs

After the SBS and 8D-2 wastes are transferred to the CFMT, mixed and cooled, samples are taken and transferred to the Analytical Laboratory.

The samples are taken using remote sampling and handling equipment. Sampling starts with aligning the sampler's valves and starting the ADS Pump. The sample is taken when an identified sample bottle is placed in the sampler.

The sampling process ends after all the sample bottles have been filled; the sampling system is flushed and isolated from the process and the sample bottles are transferred outside the Vit Cell to the PSTS.

How to take and handle the samples is covered in SD-69A, and 63K.

The CFMT temperature, number of samples and the amount per sample are covered in SD-63I and 63P.

The activity is completed in the PSTS when the samples are placed in transfer containers and pneumatically transferred through an overhead system to the Sample Storage Cell (SSC) in the Analytical Laboratory.

How to prepare and transfer the samples from the transfer station to the laboratory is covered in SD-69B.

3.4.4 Analyze Samples AN-12 AT-53 hrs CT-63 hrs

After the samples are received in the Analytical Laboratory chemical analyses are performed.

The analyses start when the samples are removed from the SSC to be prepared for the various analyses. The samples are analyzed to determine the CFMT constituents and thus the CC Mixture to be added to the CFMT to produce a melter feed that meets the SD 63P melter feed recipe requirements. The amount of concentration, to provide the required weight percent solids (w%) and space in the CFMT for the CC mixture, is also determined.

The analysis ends when the analytical data from the various analyses is compiled and the results are transmitted for evaluation.

The analytical techniques and methods and the equipment and facilities to be used in the analyses are covered in the SD-90, "Analytical and Environmental Equipment."

3.4.5 Evaluate Analytical Data AN-12A AT-6 hrs CT-69 hrs

After the analytical results are received they are evaluated to determine the CC mixture and the amount of CFMT concentration required.

Based on the analytical results and SD 63P melter feed requirements the CC Mixture requirements and tolerances are statistically determined and this information is sent to the CC Facility for preparation of CC mixture.

The concentration required in the CFMT to obtain the proper w% solids and space for the CC mixture is determined and sent to the Vitrification CR.

These evaluations methods, tolerances and requirements for specifying the CC mixture and CFMT concentration are covered in SD-63I and 63P.

3.4.6 Prepare CC Mix AN-13 AT-14 hrs CT-83 hrs

After the CC Mixture requirements are received at the CC facility, the CC Mixture is prepared.

The preparation starts with the metering of demineralized water, concentrated nitric acid and concentrated caustic soda: the weighing and vacuuming of powdered ingredient chemicals, and the weighing and steam jet-transfer of liquid ingredient chemicals to the CC main mix tank. The mix is continuously agitated during the mixing to assure a uniform mixture.

Two mixtures will be made; a glass former slurry mixture in the main mix tank and a sugar in water mixture in the shim tank. The separate mixtures are intentionally made to preclude forming of NOx in the Cold Chemical Facility.

The cycle ends when all the chemical and glass formers have been added and the mixture is uniform and ready for sampling.

See SD-65, for preparing the CC mixture.

3.4.7 Sample CC Mix Tank AN-14 AT-2 hrs CT-85 hrs

After the CC Mixture has been prepared, samples of the mixture are taken.

The sampling cycle starts when the cold chemical transfer pump is started, recirculating the mixture through the pump, grinder, sample station and back to the mix tank. The grinder is used to break up any clumps and the recirculation is continued to assure a uniform mixture. The samples are taken at one to two minute intervals to provide representative samples.

The activity ends when the samples are transferred to the analytical laboratory.

Methods for taking the samples, the amount per sample, the number of samples and the transfer of the samples to the laboratory are covered in SD-65 and 63P.

3.4.8 Analyze CC Samples AN-15 AT-15 hrs CT-100 hrs

After the CC samples are received in the analytical laboratory chemical analyses are performed.

The analysis starts when the samples are prepared for the various analyses to be performed. The analyses are to provide analytical data to verify the prepared CC mixture meets the requirements of the specified CC Mixture.

The analysis ends when the analytical data from the analyses is compiled and the results are sent for evaluation.

The required analyses and analytical techniques are covered in SD-63P, and 90.

3.4.9 Evaluate Analytical Data AN-15A AT-3 hrs CT-103 hrs

After the analytical results are received for evaluation they are statistically reviewed for two items:

A. Variations between the CC mixture specification and the prepared CC mixture.

B. Final Determination that the prepared CC Mixture will produce an acceptable melter feed when mixed with the contents of the CFMT.

The evaluation ends, when the CC mixture is determined acceptable and released for transfer to the CFMT.

The melter feed requirement and the CC mixture specification as well as the methods of evaluations are covered in SD-63I, 63P and 65.

3.4.10 Concentrate CFMT AN-16 AT-14 to 95 hrs CT-NA

After the SBS liquid and 8D-2 waste in the CFMT are mixed and sampled, the CFMT liquids are concentrated. The CFMT liquids are evaporated to provide the right w% solids and space in the CFMT to add the CC mixture.

The concentration starts when steam is supplied to the heating jackets on the CFMT. The change in the CFMT liquid level indicates both the rate and amount of concentration.

The concentration activity ends when the predetermined level in the CFMT is reached.

The steam flow rate to the CFMT is regulated to control the amount and rate of evaporation and is covered in SD-63SC, 63I, 200 A&B.

The Evaporated overheads from the CFMT flow through the vessel vent header to the vessel vent condenser. The non-condensables and residual steam continues to the melter off-gas systems 63H and 64. The condensate drains directly to Tank 8D-3 in the HLW Tank Farm. This operation is covered in SD-63H.

Concentrating the wastes in the CFMT is performed in parallel with Activities 12, 12A, 13, 14 15 and 15A.

The condensate in Tank 8D-3 is analyzed and chemically adjusted, depending on where the vessel content is to be sent. Depending on the level of radioactivity the condensate is sent to the Low Level Waste Treatment System (LWTS) for processing (LWTS Evaporator bottoms are to be returned to 8D-2) or sent to Tank 8D-1 or 8D-2 for return to the Vitrification System.

The acceptable levels of radioactivity and where to transfer the condensate is covered in SD-63I.

3.4.11 CC Mix to CFMT AN-17 AT-4 hrs CT-107 hrs

After the CC Mixture has been verified as correct and the concentration of the CFMT waste is completed providing space in the CFMT, the CC Mixture is transferred to the CFMT.

The transfer is ready when the proper flow rate is obtained and the vitrification control room gives permission to transfer. The transfer is started with the diverter valve being changed from the recirculation position to the transfer position. The total volume of the CC mixture is pumped to the CFMT and the mix tank and system is flushed to the CFMT to assure all of the CC mixture has been transferred.

The transfer ends when the diverter valve is switched back to the recirculation position. This will occur after the transfer and flush are complete or on high level in the CFMT.

Controlling the transfer of the CC Mixture to the CFMT is covered in SD-63I, and 65.

The instrumentation and controls, program controls logic and control interfaces for the above systems are covered in SD-200A and its associated documents.

3.4.12 Sample CFMT AN-18 AT-6 hrs CT-113 hrs

After the CC Mixture has been transferred to the CFMT, the CC transfer valve is closed and the sampling temperature reached, samples are taken from the CFMT and transferred to the laboratory.

The activity starts when the sampling valves are aligned and the ADS pump is started to recirculate the process liquid through the sampling system. The sampling starts when an identified sampling bottle is placed in the sampler and a sample is taken from the CFMT. Remote sampling and handling equipment is used to take the samples.

The sampling ends when all the samples bottles are filled and transferred to the PSTS and the sampling system is flushed and isolated from the process.

The CFMT temperature, number of samples and method for taking and moving the samples to the PSTS are covered in SD 63I, 69A and 63K.

The sampling activity ends after the samples are in the PSTS and each sample is placed in a transfer container and pneumatically transferred to the SSC in the Analytical Laboratory.

The PSTS is covered in SD-69B.

3.4.13 Analyze Samples AN-19 AT-60 hrs CT-173 hrs

After the samples are received in the analytical laboratory chemical analyses are performed.

The analysis starts when the samples are removed from the SSC for preparation for the various analyses to be performed. The analytical plan and techniques are developed to perform analyses that will verify the CFMT formulation meet the SFCM feed recipe requirements using the equipment available in the analytical laboratory.

The analysis ends when the analytical data from the various analyses are compiled and the results are sent for evaluation.

The above plan and techniques and equipment to be used are covered in SD-90.

3.4.14 Evaluate Analytical Data AN-19A AT-6 hrs CT-179 hrs

After the analytical results are received a statistical evaluation is made to verify the CFMT formulation meets the SFCM feed recipe requirements specified in SD 63P.

The evaluations methods and requirements are covered in SD-63I and 63P.

A shim mix is specified, if required. If not proceed to Section 3.4.23 Activity 27.

3.4.15 Prepare Shim Mix AN-21 AT-4 hrs CT-183 hrs

After the shim mixture specification is received in the CC Facility the shim mixture is prepared.

The activity starts with the weighing and metering of the chemicals into the shim mix tank to prepare the specified mixture.

The activity ends when the mixture is uniformly mixed and is ready for samples to be taken and sent to the laboratory.

For the system operation see SD-65.

3.4.16 Sample Shim Mix AN-22 AT-2 hrs CT-185 hrs

After the shim mixture is prepared and uniformly mixed samples are taken and transferred to the laboratory.

Sampling starts when the cold chemical transfer pump recirculates the mixture through the pump, grinder, sampler and back to the mix tank. The grinder is used to break up any clumps that may have formed and the recirculation is used to maintain a uniform and representative mixture.

The samples are taken at one to two minute intervals to obtain representative samples of the shim mixture.

The activity ends when the samples are packaged and transferred to the laboratory for analysis.

Methods for taking the samples, the amount per sample, the number of samples and the transfer of the samples to the laboratory are covered in SD-65 and 63P.

3.4.17 Analyze Shim Mix AN-23 AT-3 hrs CT-188 hrs

After the shim mixture samples are received in the laboratory they are analyzed.

The analysis starts with preparing the samples for the various analyses. The analyses performed are to verify the prepared shim mixture meets the requirement of the specified shim mixture.

The activity ends when the analytical data is compiled and the results transmitted for evaluation.

The analytical methods are covered in SD-90.

3.4.18 Evaluate Analytical Data AN-23A AT-1 hr CT-189 hrs

After the analytical results are received an evaluation is performed.

Two types of statistical evaluations are made: one to determine if the prepared mixture meets the requirements of the specified mixture, and two to assure the prepared shim mixture, when mixed with the contents of the CFMT, provides an acceptable melter feed mixture.

See SD-63I, 63P and 65 for evaluation techniques.

3.4.19 Shim Mix to CFMT AN-24 AT-1 hr CT-190 hrs

After the shim mixture is evaluated and verified acceptable, the shim mixture is transferred to the CFMT.

The activity starts with the proper flow rate being established in the recirculation mode. When the Vitrification CR gives permission to transfer the shim mixture to the CFMT the diverter valve is switched from the recirculation position to the transfer position and the transfer starts.

The activity ends when the entire volume of the shim mix is transferred, the shim tank and transfer system is flushed to the CFMT and the diverter valve is changed back to the recirculation position.

See SD-63I and 65 for transferring the shim mixture.

3.4.20 Sample CFMT AN-25 AT-2 hrs CT-192 hrs

After the shim mixture transfer is complete, the CFMT content is mixed and the sampling temperature is obtained; samples are taken from the CFMT and transferred to the laboratory.

The activity starts when the sampling valves are aligned and the ADS pump is started to recirculate the process liquid through the sampling system. The sampling starts when an identified sampling bottle is placed in the sampler and a sample is taken from the CFMT. Remote sampling and handling equipment is used to take the samples.

The sampling process ends when all the filled sample bottles have been transferred outside the VC to the PSTS and the sampling system has been flushed and isolated from the process.

How to take and handle the samples is covered in SD-69A, and 63K. The CFMT temperature, number of samples and the amount per sample are covered in SD-63I and 63P.

The sampling activity ends when the filled sample bottles are placed in transfer containers and pneumatically transferred to the SSC in the Analytical Laboratory.

How to prepare and transfer the samples from the transfer station to the laboratory is covered in SD-69B.

3.4.21 Analyze CFMT Samples AN-26 AT-8 hrs CT-200 hrs

After the samples are received in the analytical laboratory a chemical analysis is performed.

The analysis is started when the samples are removed from the SSC and are prepared for the analyses.

The chemical analysis plan for the CFMT samples is to verify the CFMT formulation does or does not meet the SD-63P, SFCM feed recipe requirements. The analytical methods are designed to produce data for the above requirements using the laboratory equipment available.

The analyses end when analytical data is compiled and the results are sent for evaluation.

For the analyses to be performed see SD-63P and 63I. For analytical techniques and procedures see SD-90.

3.4.22 Evaluate Analytical Data AN-26A AT-2 hrs CT-202 hrs

After the analytical results are received a statistical evaluation is made to verify that the CFMT formulation meets the SD 63P SFCM feed recipe requirements.

The methods for evaluating the data are covered in SD-63I and 63P.

3.4.23 Transfer CFMT to MFHT AN-27 AT-2 hrs CT-204 hrs

After the CFMT formulation is verified as meeting the SD 63P SFCM feed recipe requirements the content of the CFMT is transferred to the MFHT.

The transfer starts with supplying steam to the transfer jet. The steam to the jet is stopped at a predetermined level in the MFHT or low level in the CFMT.

The activity ends when the jet is blown out with air.

The control logic for the jet operation, controls for the rate of transfer, the CFMT and MFHT levels see SD-63I, 63SC, 200 A&B.

3.5 Canister/Turntable Cycle

NOTE: For describing the Canister/Turntable Cycle the canisters are designated A, B, C and D. Prior to Activity 29, "Rotate Turntable" the canisters are located as follows:

Canister A - is in the cooling position adjacent to load/unload position (next canister to be unloaded).

Canister B - is in the cooling position and was the last canister to be filled.

Canister C - is under the SFCM pour spout and has just been filled.

Canister D - is in the load/unload position and is empty

3.5.1 Canister C Full AN-55 AT-NA CT-NA

Canister C is under the melter pour spout and is verified filled by the canister level detection and weighing systems.

See SD-63I, for the above canister/turntable operations.

3.5.2 Rotate AN-29 AT-1 hr CT-1 hr

After canister C is verified filled, and the SFCM pour to the canister is stopped, rotate the turntable.

After the rotation the canisters are positioned as follows: empty canister D is positioned under the SFCM pour spout; filled canisters B and C are positioned in the cooling positions; and filled canister A is positioned in the load/unload station.

See SD-63I, for the above canister/turntable operations.

3.5.3 Canister A Out, A In AN-30 AT-4 hrs CT-NA

After the rotation canister A is in the turntable's load/unload position.

The load/unload position cover is removed and the filled canister A is unloaded from the turntable and placed in either the In-Cell Canister Storage Rack or the Canister Weld Station. An empty canister is loaded into position A and the cover is replaced.

See SD-63I and 63K for loading/unloading the turntable and remotely handling the canisters in the cell.

3.5.4 Fill Canister D AN-31 AT-63 hrs CT-64 hrs

After empty canister D has been rotated under the SFCM pour spout and the SFCM is in the feed mode, the canister is filled.

The SFCM pour is not one continuous pour, but several intermittent pours. The pour is controlled by the airlift in the melter pour spout and an average pour rate of 30 kg/hr is maintained.

The canister targeted fill level is eighty seven (87) percent of its total volume (1890 kg) plus or minus five (5) percent. The canister level is tracked by the ILDS and the canister is weighed by a scale consisting of four load cells.

The canister fill level, weight, level tracking, and the weighing systems are covered in SD-63I.

3.5.5 Canister A Shards AN-32 AT-2 hrs CT-NA

After canister A has been placed in the weld station, samples (glass shards) are removed from the canister.

Remote vacuuming and handling equipment is used remove the samples from the canister and place them in sample bottles for archiving or analyzing. These samples verify the glass as solidified in the canisters meets the specified glass requirements.

WVNS is required to randomly select shards from 10% of the canister for analysis. The present plan calls for the shards from every tenth canister to be analyzed. Glass shards from every canister will be taken and archived.

For determining the size, number of samples and analytical requirements see SD-63I, 63P and 90.

For the sampling technique and transferring the samples to either the laboratory or to the HLWIS see SD-63L, 63K, and 69B.

For archiving the samples in the HLWIS see SD-63K and 68.

3.5.6 Weld Canister A AN-33 AT-4 hrs CT-NA

After the shards have been removed from canister A the canister lid is welded to the canister and the weld verified.

The lid is remotely placed and aligned on the canister. A remotely operated shielded gas tungsten-arc system is used to weld the lid to the canister.

The weld verification is by remote visual inspection of the weld and verification of the welding parameters.

See SD-63L, for aligning the canister lid, remote welding and verification of the weld.

3.5.7 Decontaminate Canister A AN-34 AT-14 hrs CT-NA

After canister A's lid weld has been verified, it is transferred from the weld station to the decontamination station using the remote overhead crane and special canister handling equipment.

The remote handling is covered in SD-63K.

Canister A is decontaminated by soaking the canister in a solution containing Cerium IV. The spent Cerium IV solution is neutralized sampled and analyzed by the laboratory and transferred to the SBS.

TBD The canister will under go a nitric acid rinse after decontamination and it is being reviewed to determine if the nitric acid rinse solution can be sent to the SBS.

The canister is rinsed using demineralized water and the rinse solution is transferred to Tank 8D-4 through the Vitrification Waste Header and the HLW Trench.

Canister decontamination is verified using swabs to swipe the canister surface and then analyzing the swabs.

For canister decontamination, verification of decontamination, decontamination solution neutralization and removal and rinse and rinse solutions removal see SD-63J, 63K, 63G, and 63H.

3.5.8 Canister A to Storage Rack AN-35 AT 2 hrs CT-NA

After canister A decontamination has been verified, it is moved from the decontamination station to the canister in-cell storage rack or to the canister transfer cart for transfer to the HLWIS.

See SD-63K for remote handling and transfer to the HLWIS.

3.5.9 Rotate Turntable AN-37 AT-1 hrs CT-65 hrs

After canister D is verified filled by the canister ILDS and weighing systems, and the pour from the SFCM has been stopped, activity AN-29 is repeated.

The position of the canisters is as follows: canister A is under the SFCM pour spout; canisters C and D are in the cooling position and canister B is in the load/unload position.

3.5.10 Canister B Out and B IN AN-38 AT-4 hrs CT-NA

After canister B is located in the load/unload position AN-30 is repeated for canister B.

3.5.11 Fill Canister A AN-39 AT-63 hrs CT-128 hrs

After canister A is in the SFCM pour position and the SFCM is in the feed mode AN-31 is repeated for canister A.

3.5.12 Canister B Shards AN-40 AT-2 hrs CT-NA

After canister B has been placed in the weld station, AN-32 is repeated for canister B.

3.5.13 Weld Canister B lid AN-41 AT-4 hrs CT-NA

After the shards have been removed from canister B at the weld station, AN-33 is repeated for canister B.

3.5.14 Decontaminate Canister B AN-42 AT-14 hrs CT-NA

After the canister lid weld has been verified, AN-34 is repeated for canister B.

3.5.15 Canister B to Rack AN-43 AT-2 hrs CT-NA

After canister B decontamination is verified, AN-35 is repeated for canister B.

3.5.16 Rotate the Turntable AN-45 AT-1 hr CT-129 hrs

After canister A is verified filled by the canister ILDS and weighing systems, and the SFCM pour is stopped, the turntable is rotated.

The canisters are positioned as follows: canister B is under the SFCM pour spout; canisters A and D are in the cooling positions; and canister C is in the load/unload position.

3.5.17 Canister C Out and C In AN-46 AT-4 hrs CT-NA

After canister C is in the load/unload position, AN-30 is repeated for canister C.

3.5.18 Fill Canister B AN-47 AT-63 hrs CT-192 hrs

After canister B is under the SFCM pour spout, and the SFCM is in the fill mode, AN-31 is repeated for canister B.

3.5.19 Canister C Shards AN-48 AT-2 hrs CT-NA

After canister C is placed in the weld station repeat AN-32 for canister C.

3.5.20 Weld Canister C AN-49 AT-4 hrs CT-NA

After the shards are removed AN-33 is repeated for canister C.

3.5.21 Decontaminate Canister C AN-50 AT-14 hrs CT-NA

After canister C weld is verified canister C is moved from the Weld Station to the decontamination station and AN-34 is repeated for canister C.

3.5.22 Canister C to Rack AN-51 AT-2 hrs CT-NA

After canister C decontamination is verified, AN-35 is repeated for canister C.

3.5.23 Rotate Turntable AN-53 AT-1 hr CT-193 hrs

After canister B is filled and verified by the ILDS and weighing systems and the SFCM pour is stopped, the turntable is rotated.

The canisters are positioned as follows: canister C is under the SFCM pour spout; canisters A and B are in the cooling positions; and canister D is in the load/unload station.

3.5.24 Canister D Out and D In AN-54 AT-4 hrs CT-NA

After canister D is placed under the load/unload station, AN-30 is repeated for canister D.

3.5.25 Fill Canister C AN-55 AT-11 hrs CT-204 hrs

After canister C is positioned under the SFCM pour spout and the SFCM is in the feed mode AN-31 is repeated for canister C.

This pour is shown as two (2) pours even if it is one continuous pour. The difference is canister C is filled to 18 percent of the fill level from one feed batch and is finished to the fill level from the next feed batch.

3.5.26 Canister D Shards AN-56 AT-2 hrs CT-NA

After canister D is positioned in the Weld Station and AN-32 is repeated for canister D.

3.5.27 Weld Canister D AN-57 AT-4 hrs CT-NA

After the shards are removed from canister D, AN-33 is repeated for canister D.

3.5.28 Decontaminate Canister D AN-58 AT-14 hrs CT-NA

After the canister D weld is verified canister D is moved from the Weld Station to the Decontamination Station and AN-34 is repeated for canister D.

3.5.29 Canister D to Rack AN-59 AT-2 hrs CT-NA

After canister D decontamination is verified, canister D is transferred from the Decontamination Station to the Canister In-Cell Storage Rack.

3.5.30 Canister Transfer Cart to HLWIS, Unload
AN-65 AT-8 hrs CT-NA

Canisters A, B, C, and D are transferred from the Canister In-Cell Storage Rack to the Transfer Cart for moving the canisters to the HLWIS.

The loaded Transfer Cart is moved from the Vit Cell, to the VF transfer tunnel, to the EDR and to the HLWIS. Shield Doors no. 1, 8 and the shield door to the HLWIS will be operated.

Loading the canisters, operating the doors, and operating the transfer cart are covered in SD 63K.

HVAC Systems are impacted during the transfer of the canisters since VF-HVAC and the Main Plant HVAC are interacting when Door No. 8 is opened.

See SD-67 for operations of the HVAC Systems.

The sixteen ton crane and special handling equipment is used in the HLWIS to unload and place the canisters in the two tier canister storage racks.

The handling and placing of the canister in the HLWIS is covered in System Description 68,"High Level Waste Interim Storage" and SD-63K.

This transfer is performed when it is necessary to provide space in the Canister In-Cell Storage Rack for either full or empty canisters and will be performed in parallel with the Feed Preparation Cycle and the Canister/Turntable cycle.

3.6 Simultaneous Activities

The HLWSF is both a batch and continuous operation, as well as a step operation and as a result has many activities and systems operate simultaneously.

3.6.1 The Feed Preparation Cycle is a batch operation in which HLW, chemicals and glass former are sent in batches to the CFMT to be mixed, shimmed and analyzed in a defined sequence to produce the melter feed.

3.6.2 After the melter feed is verified as correct it is transferred to the MFHT. The MFHT continuously feeds the SFCM which operates continuously to maintain: the content in a molten state, a cold cap on top the molten glass, and the glass pour rate to the canisters.

3.6.3 Processing the filled canisters is a step operation in which one canister at a time is: moved from the turntable to the weld station where the shard samples are taken and the canister lid is welded to the canister; then transfer to the decontamination station where the canister is decontaminated and then moved to the in cell storage rack. The canisters are then transferred in units of four to the interim storage.

3.6.4 The tables showing the simultaneous activities are in appendix D.

- Table D-1, "High Level Waste Solidification Facilities, Systems" identifies the systems used in the HLWSF.

- Table D-2, "High Level Waste Solidification Facilities, Activities" identifies the activities shown on Sketch CGS-042992 and used in the Feed Preparation and Canister/Turntable cycles.

- Table D-3, "Summary of Simultaneous Process Activities" list the sequential Feed Preparation Cycle activities across the top and the simultaneous activities for these activities are listed vertically.

Each ongoing process and utilities, as well as each sequential activity is detailed on separate tables, which are also part of Table D-3. Its simultaneous activities are listed across the top of the table and the systems used by each activity are listed vertically. The code for these tables is as follow:

L - This is the lead system for the activity.

O - The lead system makes an output to this system.

I - The lead system receives an input from this system.

Continuous Standby - The system is normally not being used, but is available if an abnormal operating event occurs.

Continuous Operation - The system operates during the entire cycle and is supplying the activities as required.

APPENDIX A

Referenced Documents

1. "Cognizant Responsibility List for Systems and Facilities at WVDP," Revision 10, dated 05/1993
2. Design Criteria DC-046, "Sludge Mobilization Waste Removal", Revision 0, dated 07/24/92.
3. Design Criteria DC-022, "Vitrification High Level Wastes", Revision 3, dated 01/20/92.
4. Design Criteria DC-048, "High-Level Waste Interim Storage System," Revision 2, dated 08/25/93.
5. "Waste Acceptance Product Specification for Vitrified High Level Waste Form," (WAPS), dated Feb., 1993.
6. West Valley Demonstration Project Document WVDP-185, "Waste Form Compliance Plan", (WCP) Rev. 7, Jan. 13, 1994.
7. West Valley Demonstration Project Document WVDP-186, "Waste Form Qualification Report", (WQR)
8. West Valley Demonstration Project Document WVDP-187, "Vitrification Process Control Plan", (PCP) (in progress)
9. High-Level Waste QA Program RW-0333P
10. "Quality Management Manual-3, Design Control", Revision 7, dated 11/03/92.
11. Department of Energy Order 5480.1B, "Environment, Safety, Health Program for DOE Operation", dated 05/10/93.
12. Occupational Safety and Health Act Document "29-CFR-1910", dated 04/12/1988.
13. "WVDP Emergency Plan" WVDP-022, Revision 7, dated 04/16/93.

APPENDIX B

Reference Drawing List

No.	Title
900 D 2860	GA, SMS Utilities Distribution
900 J 1363	Interconnecting Flow Diagram for STS, SMS, LWTS, CSS, HLWSF and utilities
905 D 030	GA - VF, Plan at Elevation 100 Ft.
905 D 031	GA - EDR, CPC at Elevation 100 Ft.
905 D 032	GA - VF, Plan at Elevation 110 Ft.
905 D 033	GA - EDR, CPC at Elevation 117 Ft.
905 D 034	GA - VF, Plan at Elevation 124 Ft.
905 D 035	GA - EDR, CPC at Elevation 131 Ft.
905 D 036	GA - VF, Sections
905 D 037	GA - VF, Sections
905 D 038	GA - VF, Sections
905 D 039	GA - VF, Sections
905 D 041	GA - CC, Plan at Elevation 98.5 and 100 Ft.
905 D 042	GA - CC, Plan at Elevation 115 Ft and above
905 D 043	GA - CC, Sections
906 D 030	GA - 01-14 at Elevation 98 Ft.
906 D 031	GA - 01-14 at Elevation 116 Ft.
906 D 032	GA - 01-14 at Elevation 130 Ft.
906 D 033	GA - 01-14 at Elevation 144 Ft.
906 D 034	GA - 01-14 Sections
906 D 035	GA - 01-14 Sections
906 D 037	GA - 01-14 at Elevation

ATTACHMENT C

HIGH LEVEL WASTE SOLIDIFICATION FACILITIES
SYSTEM AND SYSTEM DESCRIPTION NUMBERS

	System No.	SD No.	System Name
1	55	WVNS-SD-55	Sludge Mobilization & Transfer
2	63 A	NONE	In-Cell
3	63 B	NONE	Ex-Cell
4	63 C	NONE	Scale Vitrification System
5	63 D	NONE	Vitrification Test Engineering
6	63 F	WVNS-SD-63F	Cell Walls & Ex-Cell Arrangement
7	63 G	WVNS-SD-63G	Waste Header
8	63 H	WVNS-SD-63H	Off-Gas & Vessel Vent
9	63 I	WVNS-SD-63I	Primary Process
10	63 J	WVNS-SD-63J	Canister Decontamination
11	63 K	WVNS-SD-63K	In-Cell Remote Handling, Maintenance and Viewing
12	63 L	WVNS-SD-63L	Canister Welding
13	63 M	WVNS-SD-63M	VF Load In & Load Out
14	63 P	WVNS-SD-63P	VF Process Chemistry
15	63 Q	NONE	Vitrification Laboratory
16	63 R	* WVNS-SD-67	VF Refrigerant
17	63 AR	* WVNS-SD-63L	VF Argon Gas
18	63 CC	* WVNS-SD-67	VF Chilled Water
19	63 CH	* WVNS-SD-65	VF Chemical
20	63 CW	WVNS-SD-63CW	VF Cooling Tower Water
21	63 DA	* WVNS-SD-63UA	VF Dry Air
22	63 DV	NONE	VF Drain, Waste, Vent
23	63 DW	WVNS-SD-63DW	Deionized Water
24	63 ED	WVNS-SD-63ED	VF Electrical Power Distribution
25	63 EH	* WVNS-SD-63FO	VF Engine Exhaust
26	63 FO	WVNS-SD-63FO	Diesel Engine Fuel Oil and Exhaust
27	63 FP	WVNS-SD-63FP	Fire Detection and Protection

ATTACHMENT C

	System No.	SD No.	System Name
28	63 HP	* WVNS-SD-63IA	VF High Pressure Air, Bottles
29	63 IA	WVNS-SD-63IA	VF Instrument Air
30	63 MU	NONE	VF Plant Nitric Acid & Caustic
31	63 NG	NONE	VF Natural Gas
32	63 PW	WVNS-SD-63PW	VF Potable Water
33	63 RW	NONE	VF Recycle Water
34	63 SC	WVNS-SD-63SC	VF Steam and Condensate
35	63 SG	* WVNS-SD-63L	VF Shield Gas
36	63 SL	* WVNS-SD-63SC	VF Steam Low
37	63 UA	WVNS-SD-63UA	VF Utility Air
38	63 UW	WVNS-SD-63UW	VF Utility Water
39	63 VE	* WVNS-SD-67	VF Ventilation Duct
40	63 VH	WVNS-SD-63VH	VF Vent Header
41	63 WW	WVNS-SD-63WW	VF Drains
42	64	WVNS-SD-64	VF Ex-Cell Off-Gas
43	65	WVNS-SD-65	VF Cold Chemical
44	66	WVNS-SD-66	VF Closed Loop Cooling Water
45	67	WVNS-SD-67	VF HVAC
46	68	WVNS-SD-68	HLW Interim Storage
47	69 A	WVNS-SD-69A	VF Sampling
48	69 B	WVNS-SD-69B	VF Sample Transfer
49	90	WVNS-SD-90	A & E Laboratory
50	200 A	WVNS-SD-200 A & B	VF Instrumentation and Control, Hardware
51	200 B	WVNS-SD-200 A & B	VF Instrumentation and Control, Software

* The system will not have its own System Description, but will be part of the identified System Description.

NONE - These systems are no longer used or are not part of the Vitrification Process.

ATTACHMENT D

Table 1
High Level Waste Solidification Systems

	System No.	Acronym	System Name
1	55	SMS	Sludge Mobilization System
2	63 F	CWEA	Cell Walls & Ex-Cell Arrangement
3	63 G	WH	Waste Header System
4	63 H	OGS	Off-Gas System
5	63 I	PPS	Primary Process System
6	63 J	CDS	Canister Decontamination System
7	63 K	IRHV	In-Cell Remote Handling, and Viewing System
8	63 L	CWS	Canister Welding System
9	63 M	LL	Load In - Load Out Room
10	63 P	PCS	Process Chemistry System
11	63 R	RS	VF Refrigerant System
12	63 AR	AR	VF Argon Gas System
13	63 CC	HVCW	VF Chilled Water System
14	63 CH	CH	VF Chemical Distribution System
15	63 CW	CTW	Cooling Tower Water System
16	63 DA	DA	Dry Air System
17	63 DW	DW	Deionized Water System
18	63 ED	EDS	Electrical Power Distribution System
19	63 FO	FO	Fuel Oil System
20	63 FP	FDP	Fire Detection and Protection System
21	63 HP	HPA	VF High Pressure Air
22	63 IA	IA	Instrument Air System
23	63 SC	SC	Steam and Condensate System
24	63 SG	SG	VF Shield Gas System
25	63 UA	UA	Utility Air System
26	63 UW	UW	Utility Water System
27	63 VH	VH	Vent Header System (air)

ATTACHMENT D

	System No.	Acronym	System Name
28	63 WW	WW	VF Drains
29	64	OGS	Off-Gas Facility System
30	65	CCS	Cold Chemical System
31	66	CLCWS	VF Closed Loop Cooling Water System
32	67	HVAC	Heating Ventilating and Air Conditioning
33	68	HLWIS	High Level Waste Interim Storage
34	69 A	VSS	VF Sampling System
35	69 B	PSTS	Pneumatic Sample Transfer System
36	90	A&EL	Analytical and Environmental Lab.
37	200 A	I&CH	VF Instrumentation and Control Hardware
38	200 B	I&CS	VF Instrumentation and Control Software

ATTACHMENT D

Table No. 2
High Level Waste Solidification Facilities Activities

ACTIVITY NO.	LEAD SYSTEM	DESCRIPTION
		ONGOING ACTIVITIES
1	63 I	CFMT Agitator operates continuously.
2	63 I	MFHT Agitator operates continuously.
3	63 I	The MFHT feeds the SFCM continuously.
4	64	The OGS (63H) and OGS (64) operates continuously.
5	66	The CLCWS runs continuously to cool the major processing components, on an as needed basis.
6	67	The HVAC System (67) operates continuously.
		UTILITIES
100	63 CW	The CTW is supplied on a continuous basis to the CLCWS XTR and is continuously available to the HVAC and CC Systems as needed.
101	63 DW	DW is available during entire cycle from the Main Plant DW System and is supplied to the VF, CC, SMS and the OGS.
102	63 ED	The Normal Electrical Power is from Public Utilities and is available for the entire cycle for all the HLWSF systems and facilities.
103	63 IA	Instrument air is available during the entire cycle and is supplied from compressors in the Main Plant, Utility Room to the VF, CCS, SMS, HLWIS, and OGS.
104	63 SC	Steam is available during the entire cycle and is supplied from the Main Plant, Steam Power Plant to the VF and CCS.
105	63 UA	Utility air is available during the entire cycle and is supplied from the Main Plant, System 31 to the VF, CCS, SMS, HLWIS and OGS.
106	63 UW	Utility water is available during the entire cycle and is supplied from the Main Plant to the VF, CCS, SMS, HLWIS, and OGS.

ATTACHMENT D

ACTIVITY NO.	LEAD SYSTEM	DESCRIPTION
107	63 WW	The Drain System is a passive system that is continuously available to collect and deliver process or wash liquids from various location for recycle or discharge.
108	63 VH	The Vent Header System is a passive system that is continuously available to exhaust the upstream air side of the solenoid valves and jets, that could be exposed to the process, to the VC.
		SEQUENCED ACTIVITIES
8	63 H	Transfer the Submerged Bed Scrubber (SBS) liquid to the CFMT.
10	55	Transfer the High Level Waste from Tank 8D2 the CFMT.
11	69 A 69 B	Sample the CFMT mixture and transfer the samples to the laboratory.
12	90	The lab will analyze the CFMT samples.
12a	63 P	Evaluate the Analytical Data.
13	65	Prepare the Cold Chemical (CC) mix.
14	65	Sample the CC Mixture and transfer it to the laboratory.
15	90	The lab will analyze the CC samples.
15A	63 P	Evaluate the analytical data.
16	63 I	Concentrate the CFMT mixture.
17	65	Transfer the CC mixture to the CFMT.
18	69 A 69 B	Sample the CFMT mixture and transfer the samples to the laboratory.
19	90	Lab. to analyze the CFMT samples.
19A	63 P	Evaluate Laboratory Results
21	65	Prepare the Shim Mixture.
22	65	Sample the Shim Mixture and transfer to the laboratory.
23	90	Lab. to analyze the Shim Mixture.
23a	63 P	Evaluate the analytical data.

ATTACHMENT D

ACTIVITY NO.	LEAD SYSTEM	DESCRIPTION
24	65	Transfer Shim Mixture to the CFMT.
25	69 A 69 B	Sample the CFMT and transfer the samples to the laboratory.
26	90	Lab. to analyze the CFMT samples.
26A	63 P & 63 I	Evaluate the analytical data.
27	63 I	Transfer CFMT mixture to the MFHT.
		TURNTABLE AND CANISTER HANDLING
29, 37, 45, 53	63 I	Rotate the empty canister under the SFCM pour spout.
30, 38, 46, 54	63 K	Remove the filled canister from the turntable and replaces with an empty.
31, 39, 47, 55	63 I	Fill canister.
32, 40, 48, 56	63 L	Take glass shard samples from each canister.
33, 41, 49, 57	63 L	Weld canister lid to canister and inspect the weld.
34, 42, 50, 58	63 J	Decontaminate the canister and verify.
35, 43, 51, 59	63 K	Move canister to canister storage rack.
65	63 K	Load the canisters into cart and move to the CPC for interim storage.
96	63 G	Drain condensate to 8D-3
97	63 I	Chemical adjustment of condensate
98	50	Empty Tank 8D-3
99	55	Homogenize 8D-2 and align transfer valves

ATTACHMENT D

Table No. 3

Summary of Simultaneous Process Activities
The simultaneous activities are listed vertically

8	10	11	12	12A	13	14	15	15A	17	18
1	1	1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6	6	6
8	10	11	12	12a	13	14	15	15a	17	18
29	30	16	16	16	16	16	16	16	39	39
30	31	31	31	31	38	39	39	39	97	97
31	32	33	34	37	39	42	42	96		98
99	33		35	38	40	96	43			
			96	39	41		96			
				96	42					
					96					

19	19a	21	22	23	23a	24	25	26	26a	27
1	1	1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6	6	6
39	47	47	47	47	47	47	47	53	55	55
45								54	57	57
46								55		58
47								56		
48								57		
49										
50										
51										
98										

Note: The details for this summary are shown on tables "Ongoing Utilities 001" through "Activity 27", "Transfer CFMT TO MFHT" (pages AP-D-7 through AP-D-30) and are considered as part of Table No. 3.

ATTACHMENT D
Table No. 3

ONGOING ACTIVITIES 001										(204 hrs)
SYSTEM NOS.		ONGOING UTILITIES								
		100	101	102	103	104	105	106	107	108
55	SMS		O	O	O	O	O	O	O	
63 F	CWEA	CELL WALL AND EX-CELL ARRANGEMENT								
63 G	WH			O	O	O	O		L	
63 H	OGS	O	O	O	O	O	O	O	O	
63 I	PPS	O	O	O	O	O	O	O	O	
63 J	CDS		O	O	O		O	O	O	
63 K	IRHV			O						
63 L	CWS			O	O					
63 M	LL			O	O		O	O	O	
63 P	PCS									
63 R	RS			O	O					
63 AR	AR			O						
63 CC	HVCW	O		O	O			O		
63 CH	CH			O	O					
63 CW	CTW	L		O	O			O		
63 DA	DA			O	O	O	O			
63 DW	DW		L	O	O					
63 ED	EDS	I	I	L	I	I	I	I		I
63 FO	FO	CONTINUOUS STANDBY								
63 FP	FDP	CONTINUOUS STANDBY								
63 HP	HPA	CONTINUOUS STANDBY								
63 IA	IA	I	I	O	L	I	I	I	I	I
63 SC	SC			O	O	L	O			
63 SG	SG			O						
63 UA	UA		I	O		I	L			I
63 UW	UW		I	O	O			L	I	
63 VH	VH	O	O	O	O	O	O	O		L
63 WW	WW				O	O	O	O	L	
64	OGS	O	O	O	O	O	O	O	I	
65	CCS		O	O	O	O	O	C	I	
66	CLCWS	O		O	O	O		O		
67	HVAC			O	O	O	O	O	I	
68	HLWIS			O	O		O	O	I	
69 A	VSS		O	O	O		O			
69 B	PSTS			O	O		O			
90	A&EL			O						
200 A	ICH	OI	OI	OI	OI	OI	OI	OI		
200 B	ICS	OI	OI	OI	OI	OI	OI	OI		

ATTACHMENT D
Table No. 3

CONTINUOUS ACTIVITIES								(204 hrs)
SYSTEM NOS.		ONGOING ACTIVITIES						
		1	2	3	4	5	6	
55	SMS				O			
63 F	CWEA				CELL WALL AND EX-CELL ARRANGEMENT			
63 G	WHS							
63 H	OGS				CONTINUOUS OPERATION			
63 I	PPS	L	L	L	O	O		
63 J	CDS					O		
63 K	IRHV							
63 L	CWS							
63 M	LL				LOAD-IN AND LOAD OUT FOR THE VC			
63 P	PCS							
63 R	R						I	
63 AR	RS							
63 CC	HVCW					O	I	
63 CH	CH							
63 CW	CTW				CONTINUOUS OPERATION			
63 DA	DA							
63 DW	DW				I		I	
63 ED	EDS				CONTINUOUS OPERATION			
63 FO	FO				CONTINUOUS STANDBY			
63 FP	FDP				CONTINUOUS STANDBY			
63 HP	HPA				CONTINUOUS STANDBY			
63 IA	IA			I	I	I	I	
63 SC	SC							
63 SG	SG							
63 UA	UA			I	I	I	I	
63 UW	UW					I	I	
63 VH	VH				CONTINUOUS OPERATION			
63 WW	WW							
64	OGS				CONTINUOUS OPERATION			
65	CCS					O		
66	CLCWS			I	I	L		
67	HVAC				CONTINUOUS OPERATION			
68	HLWIS							
69 A	VSS							
69 B	PSTS							
90	A&EL							
200 A	ICH	OI	OI	OI	OI	O	OI	
200 B	ICS	OI	OI	OI	OI	O	OI	

ATTACHMENT D
Table No. 3

ACTIVITY 8 "TRANSFER SBS LIQUIDS => CFMT" (4 hrs)							
SYSTEM NOS.		ACTIVITY 8 AND SIMULTANEOUS ACTIVITIES					
		8	29	30	31	99	*
55	SMS					L	O
63 F	CWEA	CELL WALL AND EX-CELL ARRANGEMENT					
63 G	WH						O
63 H	OGS	L	CONTINUOUS OPERATION				
63 I	PPS	O	L		L		O
63 J	CDS						O
63 K	IRHV			L			O
63 L	CWS			O			O
63 M	CLS	LOAD-IN AND LOAD OUT FOR THE VC					
63 P	PCS	OI					
63 R	RS						O
63 AR	AR						O
63 CC	HVCW						O
63 CH	CH						O
63 CW	CTW	CONTINUOUS OPERATION					
63 DA	DA						O
63 DW	DWV	I			I		OI
63 ED	EDS	CONTINUOUS OPERATIONS					
63 FO	FO	CONTINUOUS STANDBY					
63 FP	FDP	CONTINUOUS STANDBY					
63 HP	HPA	CONTINUOUS STANDBY					
63 IA	IA	I			I		I
63 SC	SC	I					O
63 SG	SG						O
63 UA	UA	I	I	I	I		OI
63 UW	UW						OI
63 VH	VH	CONTINUOUS OPERATION					
63 WW	WW						O
64	OGS	CONTINUOUS OPERATIONS					
65	CCS						I
66	CLCWS	I			I		OI
67	HVAC	CONTINUOUS OPERATIONS					
68	HLWIS						O
69 A	VSS						O
69 B	PSTS						O
90	A&EL						O
200 A	ICH	OI		OI			OI
200 B	ICS	OI		OI			OI
* CONTINUOUS ACTIVITIES							

ATTACHMENT D
Table No. 3

ACTIVITY 10 "TRANSFER 8D2 WASTE TO CFMT" (4 hrs)							
SYSTEM NOS.		ACTIVITY 10 AND SIMULTANEOUS ACTIVITIES					
		10	30	31	32	33	*
55	SMS	L					O
63 F	CWEA	CELL WALL AND EX-CELL ARRANGEMENT					
63 G	WH						O
63 H	OGS	CONTINUOUS OPERATION					
63 I	PPS	O		L	OI		O
63 J	CDS						O
63 K	IRHV		L		I	I	O
63 L	CWS		O		L	L	O
63 M	LL	LOAD-IN AND LOAD OUT FOR THE VC					
63 P	PCS	OI					
63 R	RS						O
63 AR	ARS					I	O
63 CC	HVCW						O
63 CH	CH						O
63 CW	CTW	CONTINUOUS OPERATION					
63 DA	DA						O
63 DW	DW			I			OI
63 ED	EDS	CONTINUOUS OPERATIONS					
63 FO	FO	CONTINUOUS STANDBY					
63 FP	FDP	CONTINUOUS STANDBY					
63 HP	HPA	CONTINUOUS STANDBY					
63 IA	IA	I		I	I	I	OI
63 SC	SC						O
63 SG	SG					I	O
63 UA	UA	I	I	I	I	I	OI
63 UW	UW						OI
63 VH	VH	CONTINUOUS OPERATIONS					
63 WW	WW						O
64	OGS	CONTINUOUS OPERATIONS					
65	CCS						O
66	CLCWS	I		I			OI
67	HVAC	CONTINUOUS OPERATIONS					
68	HLWIS				I		O
69 A	VSS						O
69 B	PSTS						O
90	A&EL						O
200 A	ICH	OI		OI			OI
200 B	ICS	OI		OI			OI
* CONTINUOUS ACTIVITIES							

ATTACHMENT D
Table No. 3

ACTIVITY 11 "SAMPLE CFMT"					(4 hrs)
SYSTEM NOS.		ACTIVITY 11 AND SIMULTANEOUS ACTIVITIES			
		11	16	33	*
55	SMS		O		O
63 F	CWEA		CELL WALL AND EX-CELL ARRANGEMENT		
63 G	WH				
63 H	OGS		CONTINUOUS OPERATION		
63 I	PPS	OI	L		O
63 J	CDS				O
63 K	IRHV	I		I	O
63 L	CWS		L		O
63 M	LL		LOAD-IN AND LOAD OUT FOR THE VC		
63 P	PCS	OI	OI		
63 R	RS				O
63 AR	AR			I	O
63 CC	HVCW				O
63 CH	CH				O
63 CW	CTW		CONTINUOUS OPERATION		
63 DA	DA				O
63 DW	DW	I			OI
63 ED	EDS		CONTINUOUS OPERATIONS		
63 FO	FO		CONTINUOUS STANDBY		
63 FP	FDP		CONTINUOUS STANDBY		
63 HP	HPA		CONTINUOUS STANDBY		
63 IA	IA	I	I	I	OI
63 SC	SC		I		O
63 SG	SG			I	O
63 UA	UA	I	I	I	OI
63 UW	UW				OI
63 VH	VH		CONTINUOUS OPERATIONS		
63 WW	WW				O
64	OGS		CONTINUOUS OPERATIONS		
65	CCS				O
66	CLCWS		I		OI
67	HVAC		CONTINUOUS OPERATIONS		
68	HLWIS				O
69 A	VSS	L			O
69 B	PSTS	O			O
90	A&EL	O			O
200 A	ICH		OI		OI
200 B	ICS		OI		OI
* CONTINUOUS ACTIVITIES					

ATTACHMENT D
Table No. 3

ACTIVITY 12 "ANALYZE CFMT SAMPLES" (53 hrs)								
SYSTEM NOS.		ACTIVITY 12 AND SIMULTANEOUS ACTIVITIES						
		12	16	31	34	35	96	*
55	SMS		O	O	O		O	O
63 F	CWEA	CELL WALL AND EX-CELL ARRANGEMENT						
63 G	WH				O			O
63 H	OGS	CONTINUOUS OPERATIONS						
63 I	PPS	OI	L	L			I	O
63 J	CDS				L			O
63 K	IRHV				I	L		O
63 L	CWS							O
63 M	LL	LOAD-IN AND LOAD OUT FOR THE VC						
63 P	PCS	OI	OI	OI				
63 R	RS							O
63 AR	AR							O
63 CC	HVCW							O
63 CH	CH							O
63 CW	CTW	CONTINUOUS OPERATIONS						
63 DA	DA							O
63 DW	DW				I		I	O
63 ED	EDS	CONTINUOUS OPERATIONS						
63 FO	FO	CONTINUOUS STANDBY						
63 FP	FDP	CONTINUOUS STANDBY						
63 HP	HPA	CONTINUOUS STANDBY						
63 IA	IA		I	I	I		I	I
63 SC	SC		I					O
63 SG	SG							O
63 UA	UA		I	I	I		I	OI
63 UW	UW							OI
63 VH	VH	CONTINUOUS OPERATIONS						
63 WW	WW							O
64	OSG	CONTINUOUS OPERATIONS						
65	CCS				I			O
66	CLCWS		I	I			I	OI
67	HVAC	CONTINUOUS OPERATIONS						
68	HLWIS							O
69 A	VSS							O
69 B	PSTS	I						O
90	A&EL	L						O
200 A	ICH		OI	OI			OI	OI
200 B	ICS		OI	OI			OI	OI
* CONTINUOUS ACTIVITIES								

ATTACHMENT D
Table No. 3

ACTIVITY 12A "EVALUATE ANALYTICAL DATA"									(6 hrs)
SYSTEM NOS.		ACTIVITY 12A AND SIMULTANEOUS ACTIVITIES							
		12A	16	31	37	38	39	96	*
55	SMS		O	O			O	O	O
63 F	CWEA	CELL WALL AND EX-CELL ARRANGEMENT							
63 G	WH								O
63 H	OGS	CONTINUOUS OPERATIONS							
63 I	PPS	L	L	L	L		L	I	O
63 J	CDS								O
63 K	IRHV					L			O
63 L	CWS					O			O
63 M	LL	LOAD-IN AND LOAD OUT FOR THE VC							
63 P	PCS	OI	OI	OI			OI		
63 R	RS								O
63 AR	AR								O
63 CC	HVCW								O
63 CH	CH								O
63 CW	CTW	CONTINUOUS OPERATIONS							
63 DA	DA								O
63 DW	DW							I	OI
63 ED	EDS	CONTINUOUS OPERATIONS							
63 FO	FO	CONTINUOUS STANDBY							
63 FP	FDP	CONTINUOUS STANDBY							
63 HP	HPA	CONTINUOUS STANDBY							
63 IA	IA		I	I			I	I	OI
63 SC	SC		I						O
63 SG	SG								O
63 UA	UA		I	I	I	I	I	I	OI
63 UW	UW								OI
63 VH	VH	CONTINUOUS OPERATIONS							
63 WW	WW								O
64	OGS	CONTINUOUS OPERATIONS							
65	CCS	OI							O
66	CLCWS		I	I			I	I	OI
67	HVAC	CONTINUOUS OPERATIONS							
68	HLWIS								O
69 A	VSS								O
69 B	PSTS								O
90	A&EL	OI							O
200 A	ICH		OI	OI	OI		OI	OI	OI
200 B	ICS		OI	OI	OI		OI	OI	OI
* CONTINUOUS ACTIVITIES									

ATTACHMENT D
Table No. 3

ACTIVITY 13 "PREPARE COLD CHEMICAL MIX"										(14 hrs)
SYSTEM NOS.		ACTIVITY 13 AND SIMULTANEOUS ACTIVITIES								
		13	16	38	39	40	41	42	96	*
55	SMS		O		O			O	O	O
63 F	CWEA	CELL WALL AND EX-CELL ARRANGEMENT								
63 G	WH									O
63 H	OGS	CONTINUOUS OPERATIONS								
63 I	PPS	OI	L		L	OI	OI		L	O
63 J	CDS							L		O
63 K	IRHV			L		I	I	I		O
63 L	CWS			O		L	L			O
63 M	LL	LOAD-IN AND LOAD OUT FOR THE VC								
63 P	PCS	OI	OI		OI	OI				
63 R	RS									O
63 AR	AR						I			O
63 CC	HVCW									O
63 CH	VFCD							I		O
63 CW	CTW	CONTINUOUS OPERATIONS								
63 DA	DA									O
63 DW	DW	I	I		I			I	I	OI
63 ED	EDS	CONTINUOUS OPERATIONS								
63 FO	FO	CONTINUOUS STANDBY								
63 FP	FDP	CONTINUOUS STANDBY								
63 HP	HPA	CONTINUOUS STANDBY								
63 IA	IA	I	I		I	I	I	I	I	OI
63 SC	SC		I				I			O
63 SG	SG									O
63 UA	UA	I	I		I	I	I	I	I	OI
63 UW	UW	I								OI
63 VH	VH	CONTINUOUS OPERATIONS								
63 WW	WW									O
64	OSG	CONTINUOUS OPERATIONS								
65	CCS	L						I		O
66	CLCWS		I		I				I	OI
67	HVAC	CONTINUOUS OPERATIONS								
68	HLWIS									O
69 A	VSS									O
69 B	PSTS									O
90	A&EL									O
200 A	ICH		OI		OI			O	OI	OI
200 B	ICS		OI		OI			O	OI	OI
*	CONTINUOUS ACTIVITIES									

ATTACHMENT D
Table No. 3

ACTIVITY 14 "SAMPLE COLD CHEMICAL MIXTURE"							(2 hrs)
SYSTEM NOS.		ACTIVITY 14 AND SIMULTANEOUS ACTIVITIES					
		14	16	39	42	96	*
55	SMS		0	0	0	0	0
63 F	CWEA	CELL WALL AND EX-CELL ARRANGEMENT					
63 G	WH				0		0
63 H	OGS	CONTINUOUS OPERATIONS					
63 I	PPS	OI	L	L		I	0
63 J	CDS				L		0
63 K	IRHV				I		0
63 L	CWS						0
63 M	LL	LOAD-IN AND LOAD OUT FOR THE VC					
63 P	PCS	OI	OI	OI			
63 R	RS						0
63 AR	AR						0
63 CC	HVCW						0
63 CH	CH				I		0
63 CW	CTW	CONTINUOUS OPERATIONS					
63 DA	DA						0
63 DW	DW	I		I	I	I	OI
63 ED	EDS	CONTINUOUS OPERATIONS					
63 FO	FO	CONTINUOUS STANDBY					
63 FP	FDP	CONTINUOUS STANDBY					
63 HP	HPA	CONTINUOUS STANDBY					
63 IA	IA	I	I	I	I	I	OI
63 SC	SC		I				OI
63 SG	SG						0
63 UA	UA	I	I	I	I	I	OI
63 UW	UW						OI
63 VH	VH	CONTINUOUS OPERATIONS					
63 WW	WW						0
64	OGS	CONTINUOUS OPERATIONS					
65	CCS	L			I		0
66	CLCWS		I	I		I	OI
67	HVAC	CONTINUOUS OPERATIONS					
68	HLWIS						0
69 A	VSS						0
69 B	PSTS						0
90	A&EL	0					0
200 A	ICH		OI	OI	0	OI	OI
200 B	ICS		OI	OI	0	OI	OI
* CONTINUOUS ACTIVITIES							

ATTACHMENT D
Table No. 3

ACTIVITY 15 "ANALYZE COLD CHEMICAL SAMPLES" (15 hrs)								
SYSTEM NOS.		ACTIVITY 15 AND SIMULTANEOUS ACTIVITIES						
		15	16	39	42	43	96	*
55	SMS		O	O	O		O	O
63 F	CWEA	CELL WALL AND EX-CELL ARRANGEMENT						
63 G	WH				O			O
63 H	OGS	CONTINUOUS OPERATIONS						
63 I	PPS	OI	L	L			I	O
63 J	CDS				L			O
63 K	IRHV				I	L		O
63 L	CWS							O
63 M	LL	LOAD-IN AND LOAD OUT FOR THE VC						
63 P	PCS	OI	OI	OI				
63 R	RS							O
63 AR	AR							O
63 CC	HVCW							O
63 CH	CH				I			O
63 CW	CTW	CONTINUOUS OPERATIONS						
63 DA	DA							O
63 DW	DW		I	I	I			OI
63 ED	EDS	CONTINUOUS OPERATIONS						
63 FO	FO	CONTINUOUS STANDBY						
63 FP	FDP	CONTINUOUS STANDBY						
63 HP	HPA	CONTINUOUS STANDBY						
63 IA	IA		I	I	I		I	OI
63 SC	SC		I					
63 SG	SG							O
63 UA	UA		I	I	I		I	OI
63 UW	UW							OI
63 VH	VH	CONTINUOUS OPERATIONS						
63 WW	WW							O
64	OGS	CONTINUOUS OPERATIONS						
65	CCS	OI			I			O
66	CLCWS		I	I			I	OI
67	HVAC	CONTINUOUS OPERATIONS						
68	HLWIS							O
69 A	VSS							O
69 B	PSTS							O
90	A&EL							O
200 A	ICH		OI	OI	O		OI	OI
200 B	ICS		OI	OI	O		OI	OI
* CONTINUOUS ACTIVITIES								

ATTACHMENT D
Table No. 3

ACTIVITY 15A "EVALUATE ANALYTICAL DATA" (3 hrs)						
SYSTEM NOS.		ACTIVITY 15A AND SIMULTANEOUS ACTIVITIES				
		15A	16	39	96	*
55	SMS		0	0	0	0
63 F	CWEA	CELL WALL AND EX-CELL ARRANGEMENT				
63 G	WH					0
63 H	OGS	CONTINUOUS OPERATIONS				
63 I	PPS	OI	L	L	I	0
63 J	CDS					0
63 K	IRHV					0
63 L	CWS					0
63 M	LL	LOAD-IN AND LOAD OUT FOR THE VC				
63 P	PCS	OI	OI			
63 R	RS					0
63 AR	AR					0
63 CC	HVCW					0
63 CH	CH					0
63 CW	CTW	CONTINUOUS OPERATIONS				
63 DA	DA					0
63 DW	DW		I	I		OI
63 ED	EDS	CONTINUOUS OPERATIONS				
63 FO	FO	CONTINUOUS STANDBY				
63 FP	FDP	CONTINUOUS STANDBY				
63 HP	HPA	CONTINUOUS STANDBY				
63 IA	IA		I	I	I	OI
63 SC	SC		I			0
63 SG	SG					0
63 UA	UA		I	I	I	I
63 UW	UW					OI
63 VH	VH	CONTINUOUS OPERATIONS				
63 WW	WW					0
64	OGS	CONTINUOUS OPERATIONS				
65	CCS	OI				
66	CLCWS		I	I	I	I
67	HVAC	CONTINUOUS OPERATIONS				
68	HLWIS					0
69 A	VSS					0
69 B	PSTS					0
90	A&EL	OI				0
200 A	ICH		OI	OI	OI	OI
200 B	ICS		OI	OI	OI	OI
* CONTINUOUS ACTIVITIES						

ATTACHMENT D
Table No. 3

ACTIVITY 17 "TRANSFER CC MIX TO CFMT"					(4 hrs)
SYSTEM NOS.		ACTIVITY 17 AND SIMULTANEOUS ACTIVITIES			
		17	39	97	*
55	SMS		O	O	O
63 F	CWEA	CELL WALL AND EX-CELL ARRANGEMENT			
63 G	WH				O
63 H	OGS	CONTINUOUS OPERATIONS			
63 I	PPS	O	L	OI	O
63 J	CDS				O
63 K	IRHV				O
63 L	CWS				O
63 M	LL	LOAD-IN AND LOAD OUT FOR THE VC			
63 P	PCS		OI	OI	
63 R	RS				O
63 AR	AR				O
63 CC	HVCW				O
63 CH	CH				O
63 CW	CTW	CONTINUOUS OPERATIONS			
63 DA	DA				
63 DW	DW	I	I		OI
63 ED	EDS	CONTINUOUS OPERATIONS			
63 FO	FO	CONTINUOUS STANDBY			
63 FP	FDP	CONTINUOUS STANDBY			
63 HP	HPA	CONTINUOUS STANDBY			
63 IA	IA	I	I	I	OI
63 SC	SC				O
63 SG	SG				O
63 UA	UA	I	I	I	OI
63 UW	UW				OI
63 VH	VH	CONTINUOUS OPERATIONS			
63 WW	WW				O
64	OGS	CONTINUOUS OPERATIONS			
65	CCS	L			O
66	CLCWS		I		OI
67	HVAC	CONTINUOUS OPERATIONS			
68	HLWIS				O
69 A	VSS				O
69 B	PSTS				O
90	A&EL			OI	O
200 A	ICH	OI	OI		OI
200 B	ICS	OI	OI		OI
* CONTINUOUS ACTIVITIES					

ATTACHMENT D
Table No. 3

ACTIVITY 18 "SAMPLE CFMT"						(6 hrs)
SYSTEM NOS.		ACTIVITY 18 AND SIMULTANEOUS ACTIVITIES				
		18	39	97	98	*
55	SMS	O	O	O	L	O
63 F	CWEA	CELL WALL AND EX-CELL ARRANGEMENT				
63 G	WH	O				O
63 H	OGS	CONTINUOUS OPERATIONS				
63 I	PPS	I	L	OI	OI	O
63 J	CDS					O
63 K	IRHV					O
63 L	CWS					O
63 M	LL	LOAD-IN AND LOAD OUT FOR THE VC				
63 P	PCS	OI		OI		
63 R	RS					O
63 AR	AR					O
63 CC	HVCW					O
63 CH	CH					O
63 CW	CTW	CONTINUOUS OPERATIONS				
63 DA	DA					O
63 DW	DW	I	I	I		OI
63 ED	EDS	CONTINUOUS OPERATIONS				
63 FO	FO	CONTINUOUS STANDBY				
63 FP	FDP	CONTINUOUS STANDBY				
63 HP	HPA	CONTINUOUS STANDBY				
63 IA	IA	I	I	I		OI
63 SC	SC					O
63 SG	SG					O
63 UA	UA	I	I	I		OI
63 UW	UW					OI
63 VH	VH	CONTINUOUS OPERATIONS				
63 WW	WW					O
64	OGS	CONTINUOUS OPERATIONS				
65	CCS					O
66	CLCWS		I	I		OI
67	HVAC	CONTINUOUS OPERATIONS				
68	HLWIS					O
69 A	VSS	L				O
69 B	PSTS	O				O
90	A&EL					O
200 A	ICH		OI		OI	OI
200 B	ICS		OI		OI	OI
* CONTINUOUS ACTIVITIES						

ATTACHMENT D
Table No. 3

ACTIVITY 19 "ANALYZE CFMT SAMPLE"											(60 hrs)
SYSTEM NOS.		ACTIVITY 19 AND SIMULTANEOUS ACTIVITIES									
		19	45	46	47	48	49	50	51	98	*
55	SMS				O			O		L	O
63 F	CWEA	CELL WALL AND EX-CELL ARRANGEMENT									
63 G	WH	O						O			O
63 H	OGS	CONTINUOUS OPERATIONS									
63 I	PPS	OI	L		L	OI				OI	O
63 J	CDS							L			O
63 K	IRHV			L		I	I	I	L		O
63 L	CWS			I		L	L				O
63 M	LL	LOAD-IN AND LOAD OUT FOR THE VC									
63 P	PCS	OI			OI	OI					O
63 R	RS										O
63 AR	AR						I				O
63 CC	HVCW										O
63 CH	CH							I			
63 CW	CTW	CONTINUOUS OPERATIONS									
63 DA	DA										O
63 DW	DW				I			I			OI
63 ED	EDS	CONTINUOUS OPERATIONS									
63 FO	FO	CONTINUOUS STANDBY									
63 FP	FDP	CONTINUOUS STANDBY									
63 HP	HPA	CONTINUOUS STANDBY									
63 IA	IA				I	I	I	I			OI
63 SC	SC										O
63 SG	SG						I				O
63 UA	UA		I		I	I	I	I			OI
63 UW	UW										OI
63 VH	VH	CONTINUOUS OPERATIONS									
63 WW	WW										O
64	OGS	CONTINUOUS OPERATIONS									
65	CCS							I			O
66	CLCWS				I						OI
67	HVAC	CONTINUOUS OPERATIONS									
68	HLWIS					O					O
69 A	VSS										O
69 B	PSTS					O					O
90	A&EL	OI									O
200 A	ICH		OI		OI					OI	OI
200 B	ICS		OI		OI					OI	OI
* CONTINUOUS ACTIVITIES											

ATTACHMENT D
Table No. 3

ACTIVITY 19A "EVALUATE ANALYTICAL DATA"					(6 hrs)
SYSTEM NOS.		ACTIVITY 19A AND SIMULTANEOUS ACTIVITIES			
		19A	47	*	
55	SMS		O	O	
63 F	CWEA	CELL WALL AND EX-CELL ARRANGEMENT			
63 G	WH			O	
63 H	OGS	CONTINUOUS OPERATIONS			
63 I	PPS	OI	L	O	
63 J	CDS			O	
63 K	IRHV			O	
63 L	CWS			O	
63 M	LL	LOAD-IN AND LOAD OUT FOR THE VC			
63 P	PCS	OI	OI		
63 R	RS			O	
63 AR	AR			O	
63 CC	HVCW			O	
63 CH	CH			O	
63 CW	CTW	CONTINUOUS OPERATIONS			
63 DA	DA			O	
63 DW	DW		I	OI	
63 ED	EDS	CONTINUOUS OPERATIONS			
63 FO	FO	CONTINUOUS STANDBY			
63 FP	FDP	CONTINUOUS STANDBY			
63 HP	HPA	CONTINUOUS STANDBY			
63 IA	IA		I	OI	
63 SC	SC			O	
63 SG	SG			O	
63 UA	UA		I	OI	
63 UW	UW			OI	
63 VH	VH	CONTINUOUS OPERATIONS			
63 WW	WW			O	
64	OGS	CONTINUOUS OPERATIONS			
65	CCS			O	
66	CLCWS		I	OI	
67	HVAC	CONTINUOUS OPERATIONS			
68	HLWIS			O	
69 A	VSS			O	
69 B	PSTS			O	
90	A&EL	OI		O	
200 A	ICH		OI	OI	
200 B	ICS		OI	OI	
* CONTINUOUS ACTIVITIES					

ATTACHMENT D
Table No. 3

ACTIVITY 21 "PREPARE SHIM MIX"					(4 hrs)
SYSTEM NOS.		ACTIVITY 21 AND SIMULTANEOUS ACTIVITIES			
		21	47	*	
55	SMS		O	O	
63 F	CWEA	CELL WALL AND EX-CELL ARRANGEMENT			
63 G	WH			O	
63 H	OGS	CONTINUOUS OPERATIONS			
63 I	PPS	OI	L	O	
63 J	CDS			O	
63 K	IRHV			O	
63 L	CWS			O	
63 M	LL	LOAD-IN AND LOAD OUT FOR THE VC			
63 P	PCS	OI	OI		
63 R	RS			O	
63 AR	AR			O	
63 CC	HVCW			O	
63 CH	CH			O	
63 CW	CTW	CONTINUOUS OPERATIONS			
63 DA	DA			O	
63 DW	DW	I	I	OI	
63 ED	EDS	CONTINUOUS OPERATIONS			
63 FO	FO	CONTINUOUS STANDBY			
63 FP	FDP	CONTINUOUS STANDBY			
63 HP	HPA	CONTINUOUS STANDBY			
63 IA	IA	I	I	OI	
63 SC	SC			O	
63 SG	SG			O	
63 UA	UA	I	I	OI	
63 UW	UW			OI	
63 VH	VH	CONTINUOUS OPERATIONS			
63 WW	WW			O	
64	OGS	CONTINUOUS OPERATIONS			
65	CCS	L		O	
66	CLCWS		I	OI	
67	HVAC	CONTINUOUS OPERATIONS			
68	HLWIS			O	
69 A	VSS			O	
69 B	PSTS			O	
90	A&EL	OI		O	
200 A	ICH		OI	OI	
200 B	ICS		OI	OI	
* CONTINUOUS ACTIVITIES					

ATTACHMENT D
Table No. 3

ACTIVITY 22 "SAMPLE SHIM MIX"				(2 hrs)
SYSTEM NOS.		ACTIVITY 22 AND SIMULTANEOUS ACTIVITIES		
		22	47	*
55	SMS		O	O
63 F	CWEA	CELL WALL AND EX-CELL ARRANGEMENT		
63 G	WH			O
63 H	OGS	CONTINUOUS OPERATIONS		
63 I	PPS	OI	L	O
63 J	CDS			O
63 K	IRHV			O
63 L	CWS			O
63 M	LL	LOAD-IN AND LOAD OUT FOR THE VC		
63 P	PCS	OI	OI	
63 R	RS			O
63 AR	AR			O
63 CC	HVCW			O
63 CH	CH			O
63 CW	CTW	CONTINUOUS OPERATIONS		
63 DA	DA			
63 DW	DW	I	I	OI
63 ED	EDS	CONTINUOUS OPERATIONS		
63 FO	FO	CONTINUOUS STANDBY		
63 FP	FDP	CONTINUOUS STANDBY		
63 HP	HPA	CONTINUOUS STANDBY		
63 IA	IA	I	I	OI
63 SC	SC			O
63 SG	SG			O
63 UA	UA	I	I	OI
63 UW	UW			OI
63 VH	VH	CONTINUOUS OPERATIONS		
63 WW	WW			O
64	OGS	CONTINUOUS OPERATIONS		
65	CCS	L		O
66	CLCWS		I	OI
67	HVAC	CONTINUOUS OPERATIONS		
68	HLWIS			O
69 A	VSS			O
69 B	PSTS			O
90	A&EL	O		O
200 A	ICH		OI	OI
200 B	ICS		OI	OI
* CONTINUOUS ACTIVITIES				

ATTACHMENT D
Table No. 3

ACTIVITY 23 "ANALYZE SHIM MIX SAMPLES" (4 hrs)				
SYSTEM NOS.		ACTIVITY 23 AND SIMULTANEOUS ACTIVITIES		
		23	47	*
55	SMS		O	O
63 F	CWEA	CELL WALL AND EX-CELL ARRANGEMENT		
63 G	WH			O
63 H	OGS	CONTINUOUS OPERATIONS		
63 I	PPS	OI	L	O
63 J	CDS			O
63 K	IRHV			O
63 L	CWS			O
63 M	LL	LOAD-IN AND LOAD OUT FOR THE VC		
63 P	PCS	OI	OI	
63 R	RS			O
63 AR	AR			O
63 CC	HVCW			O
63 CH	CH			O
63 CW	CTW	CONTINUOUS OPERATIONS		
63 DA	DA			O
63 DW	DW		I	OI
63 ED	EDS	CONTINUOUS OPERATIONS		
63 FO	FO	CONTINUOUS STANDBY		
63 FP	FDP	CONTINUOUS STANDBY		
63 HP	HPA	CONTINUOUS STANDBY		
63 IA	IA		I	OI
63 SC	SC			O
63 SG	SG			O
63 UA	UA		I	OI
63 UW	UW			OI
63 VH	VH	CONTINUOUS OPERATIONS		
63 WW	WW			O
64	OGS	CONTINUOUS OPERATIONS		
65	CCS			O
66	CLCWS		I	OI
67	HVAC	CONTINUOUS OPERATIONS		
68	HLWIS			O
69 A	VSS			O
69 B	PSTS			O
90	A&EL	L		O
200 A	ICH		OI	OI
200 B	ICS		OI	OI
* CONTINUOUS ACTIVITIES				

ATTACHMENT D
Table No. 3

ACTIVITY 23A "EVALUATE ANALYTICAL DATA" (1 hr)				
SYSTEM NOS.		ACTIVITY 23A AND SIMULTANEOUS ACTIVITIES		
		23A	47	*
55	SMS		O	O
63 F	CWEA	CELL WALL AND EX-CELL ARRANGEMENT		
63 G	WH			O
63 H	OGS	CONTINUOUS OPERATIONS		
63 I	PPS	L	L	O
63 J	CDS			O
63 K	IRHV			O
63 L	CWS			O
63 M	LL	LOAD-IN AND LOAD OUT FOR THE VC		
63 P	PCS	OI	OI	
63 R	RS			O
63 AR	AR			O
63 CC	HVCW			O
63 CH	CH			O
63 CW	CTW	CONTINUOUS OPERATIONS		
63 DA	DA			O
63 DW	DW		I	OI
63 ED	EDS	CONTINUOUS OPERATIONS		
63 FO	FO	CONTINUOUS STANDBY		
63 FP	FDP	CONTINUOUS STANDBY		
63 HP	HPA	CONTINUOUS STANDBY		
63 IA	IA		I	OI
63 SC	SC			O
63 SG	SG			O
63 UA	UA		I	OI
63 UW	UW			OI
63 VH	VH	CONTINUOUS OPERATIONS		
63 WW	WW			O
64	OGS	CONTINUOUS OPERATIONS		
65	CCS	OI		O
66	CLCWS		I	OI
67	HVAC	CONTINUOUS OPERATIONS		
68	HLWIS			O
69 A	VSS			O
69 B	PSTS			O
90	A&EL	OI		O
200 A	ICH		OI	OI
200 B	ICS		OI	OI
* CONTINUOUS ACTIVITIES				

ATTACHMENT D
Table No. 3

ACTIVITY 24 "TRANSFER SHIM MIX TO CFMT"				(1 hr)
SYSTEM NOS.		ACTIVITY 24 AND SIMULTANEOUS ACTIVITIES		
		24	47	★
55	SMS		O	O
63 F	CWEA	CELL WALL AND EX-CELL ARRANGEMENT		
63 G	WH			O
63 H	OGS	CONTINUOUS OPERATIONS		
63 I	PPS	O	L	O
63 J	CDS			O
63 K	IRHV			O
63 L	CWS			O
63 M	LL	LOAD-IN AND LOAD OUT FOR THE VC		
63 P	PCS	OI		
63 R	RS			O
63 AR	AR			O
63 CC	HVCW			O
63 CH	CH			O
63 CW	CTW	CONTINUOUS OPERATIONS		
63 DA	DA			
63 DW	DW	I	I	OI
63 ED	EDS	CONTINUOUS OPERATIONS		
63 FO	FO	CONTINUOUS STANDBY		
63 FP	FDP	CONTINUOUS STANDBY		
63 HP	HPA	CONTINUOUS STANDBY		
63 IA	IA	I	I	OI
63 SC	SC			O
63 SG	SG			O
63 UA	UA	I	I	OI
63 UW	UW			OI
63 VH	VH	CONTINUOUS OPERATIONS		
63 WW	WW			O
64	OGS	CONTINUOUS OPERATIONS		
65	CCS	I		O
66	CLCWS	I	I	OI
67	HVAC	CONTINUOUS OPERATIONS		
68	HLWIS			O
69 A	VSS			O
69 B	PSTS			O
90	A&EL			O
200 A	ICH	OI	OI	OI
200 B	ICS	OI	OI	OI
★ CONTINUOUS ACTIVITIES				

ATTACHMENT D
Table No. 3

ACTIVITY 25 "SAMPLE CFMT"				(2 hrs)
SYSTEM NOS.		ACTIVITY 25 AND SIMULTANEOUS ACTIVITIES		
		25	47	*
55	SMS		O	O
63 F	CWEA	CELL WALL AND EX-CELL ARRANGEMENT		
63 G	WH			O
63 H	OGS	CONTINUOUS OPERATIONS		
63 I	PPS	L	L	O
63 J	CDS			O
63 K	IRHV			O
63 L	CWS			O
63 M	LL	LOAD-IN AND LOAD OUT FOR THE VC		
63 P	PCS	OI	OI	
63 R	RS			O
63 AR	AR			O
63 CC	HVCW			O
63 CH	CH			O
63 CW	CTW	CONTINUOUS OPERATIONS		
63 DA	DA			O
63 DW	DW	I	I	OI
63 ED	EDS	CONTINUOUS OPERATIONS		
63 FO	FO	CONTINUOUS STANDBY		
63 FP	FDP	CONTINUOUS STANDBY		
63 HP	HPA	CONTINUOUS STANDBY		
63 IA	IA	I	I	OI
63 SC	SC			O
63 SG	SG			O
63 UA	UA	I	I	OI
63 UW	UW			OI
63 VH	VH	CONTINUOUS OPERATIONS		
63 WW	WW			O
64	OGS	CONTINUOUS OPERATIONS		
65	CCS			O
66	CLCWS		I	OI
67	HVAC	CONTINUOUS OPERATIONS		
68	HLWIS			O
69 A	VSS	L		O
69 B	PSTS	O		O
90	A&EL			O
200 A	ICH	OI	OI	OI
200 B	ICS	OI	OI	OI
* CONTINUOUS ACTIVITIES				

ATTACHMENT D
Table No. 3

ACTIVITY 26 "ANALYZE CFMT SAMPLES" (8 hrs)								
SYSTEM NOS.		ACTIVITY 26 AND SIMULTANEOUS ACTIVITIES						
		26	53	54	55	56	57	*
55	SMS				O			O
63 F	CWEA	CELL WALL AND EX-CELL ARRANGEMENT						
63 G	WH							O
63 H	OGS	CONTINUOUS OPERATIONS						
63 I	PPS	OI	L		OI	L	OI	OI O
63 J	CDS							O
63 K	IRHV		I	L		I	I	O
63 L	CWS			I		L	L	O
63 M	LL	LOAD-IN AND LOAD OUT FOR THE VC						
63 P	PCS	OI			OI	OI		
63 R	RS							O
63 AR	AR						I	O
63 CC	HVCW							O
63 CH	CH							O
63 CW	CTW	CONTINUOUS OPERATIONS						
63 DA	DA							O
63 DW	DW				I			OI
63 ED	EDS	CONTINUOUS OPERATIONS						
63 FO	FO	CONTINUOUS STANDBY						
63 FP	FDP	CONTINUOUS STANDBY						
63 HP	HPA	CONTINUOUS STANDBY						
63 IA	IA				I	I	I	OI
63 SC	SC							O
63 SG	SG						I	O
63 UA	UA		I		I	I	I	OI
63 UW	UW							OI
63 VH	VH	CONTINUOUS OPERATIONS						
63 WW	WW							O
64	OGS	CONTINUOUS OPERATIONS						
65	CCS							O
66	CLCWS				1			OI
67	HVAC	CONTINUOUS OPERATIONS						
68	HLWIS					O		O
69 A	VSS							O
69 B	PSTS	I				O		O
90	A&EL	L						O
200 A	ICH		I		OI			OI
200 B	ICS		I		OI			OI
* CONTINUOUS ACTIVITIES								

ATTACHMENT D
Table No. 3

ACTIVITY 26A "EVALUATE ANALYTICAL DATA"					(6 hrs)
SYSTEM NOS.		ACTIVITY 26A AND SIMULTANEOUS ACTIVITIES			
		26A	55	57	*
55	SMS		O		O
63 F	CWEA		CELL WALL AND EX-CELL ARRANGEMENT		
63 G	WH				O
63 H	OGS		CONTINUOUS OPERATIONS		
63 I	PPS	OI	L		O
63 J	CDS				O
63 K	IRHV			I	O
63 L	CWS			L	O
63 M	LL		LOAD-IN AND LOAD OUT FOR THE VC		
63 P	PCS	OI	OI		
63 R	RS				O
63 AR	AR			I	O
63 CC	HVCW				O
63 CH	CH				O
63 CW	CTW		CONTINUOUS OPERATIONS		
63 DA	DA				O
63 DW	DW		I		OI
63 ED	EDS		CONTINUOUS OPERATIONS		
63 FO	FO		CONTINUOUS STANDBY		
63 FP	FDP		CONTINUOUS STANDBY		
63 HP	HPA		CONTINUOUS STANDBY		
63 IA	IA		I	I	OI
63 SC	SC				O
63 SG	SG			I	O
63 UA	UA		I	I	OI
63 UW	UW				OI
63 VH	VH		CONTINUOUS OPERATIONS		
63 WW	WW				O
64	OGS		CONTINUOUS OPERATIONS		
65	CCS				O
66	CLCWS		I		OI
67	HVAC		CONTINUOUS OPERATIONS		
68	HLWIS				O
69 A	VSS				O
69 B	PSTS				O
90	A&EL	O			O
200 A	ICH		OI		OI
200 B	ICS		OI		OI
* CONTINUOUS ACTIVITIES					

ATTACHMENT D
Table No. 3

ACTIVITY 27 "TRANSFER CFMT TO MFHT"						(2 hrs)
SYSTEM NOS.		ACTIVITY 27 AND SIMULTANEOUS ACTIVITIES				
		27	55	57	58	*
55	SMS	O	O		O	O
63 F	CWEA	CELL WALL AND EX-CELL ARRANGEMENT				
63 G	WH				O	O
63 H	OGS	CONTINUOUS OPERATIONS				
63 I	PPS	L	L			O
63 J	CDS				L	O
63 K	IRHV			I	I	O
63 L	CWS			L		O
63 M	LL	LOAD-IN AND LOAD OUT FOR THE VC				
63 P	PCS	OI				
63 R	RS					O
63 AR	AR			I		O
63 CC	HVCW					O
63 CH	CH				I	O
63 CW	CTW	CONTINUOUS OPERATIONS				
63 DA	DA					O
63 DW	DW	I	I		I	OI
63 ED	EDS	CONTINUOUS OPERATIONS				
63 FO	FO	CONTINUOUS STANDBY				
63 FP	FDP	CONTINUOUS STANDBY				
63 HP	HPA	CONTINUOUS STANDBY				
63 IA	IA	I	I	I	I	OI
63 SC	SC					O
63 SG	SG			I		O
63 UA	UA	I	I	I	I	OI
63 UW	UW					OI
63 VH	VH	CONTINUOUS OPERATIONS				
63 WW	WW					O
64	OGS	CONTINUOUS OPERATIONS				
65	CCS				I	O
66	CLCWS	I	I			OI
67	HVAC	CONTINUOUS OPERATIONS				
68	HLWIS					O
69 A	VSS					O
69 B	PSTS					O
90	A&EL					O
200 A	ICH	OI	OI			OI
200 B	ICS	OI	OI			OI
* CONTINUOUS ACTIVITIES						