182.33 0018233
2 of 2
Copy No. 13

DOE/RL-90-24
Revision 1
Volume 2 of 2

UC-630, 721

PUREX Storage Tunnels Dangerous Waste Permit Application

Date Published
December 1991

BEST AVAILABLE COPY

United States
Department of Energy
P.O. Box 550
Richland, Washington 99352

Approved for Public Release

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APPENDIX 2C

CONSTRUCTION DRAWINGS

9 2 1 2 4 1 5 6 4

APPENDIX 2C

CONSTRUCTION DRAWINGS

This appendix contains construction drawings for Tunnel Number 1 and Tunnel Number 2. This appendix also contains copies of ECNs that describe modifications that have not been incorporated into these drawings. These drawings and the ECNs listed on Page 2C-v represent the most current database for the depiction of field conditions. Actual field conditions may exhibit minor variations from that documented using the construction drawing and ECN database.

TUNNEL 1 DRAWINGS

H-2-55586	218-E-14 Disposal Tunnel Number 1 for Failed Equipment Plot Plan	Rev. 4
*H-2-55587	218-E-14 (Tunnel Number 1) Structural Floor Plan and Section	Rev. 7
H-2-55588	Structural Sections and Details	Rev. 1
H-2-55589	Structural Sections and Details	Rev. 2
H-2-55590	Failed Equipment Burial Tunnel Door	Rev. 0
H-2-55591	Tunnel Door Hoist Assembly	Rev. 0
H-2-55592	Tunnel Door Hoist Details	Rev. 0
*H-2-55593	Electrical PUREX Tunnel Extension Power and Lighting	Rev. 1
H-2-55594	Shielding Door Fill and Drain Lines Arrangement	Rev. 2
H-2-55595	Structural Alternate Tunnel Design Plan and Section Precast Concrete	Rev. 1
H-2-55596	Structural Alternate Tunnel Design Sections and Details and Vent Shift Details	Rev. 1

TUNNEL 2 DRAWINGS

H-2-58134	Burial Tunnel Number 1 Ventilation Arrangement (sheet 1 of 2)	Rev. 1
*H-2-58134	Burial Tunnel Number 1 Ventilation Arrangement (sheet 2 of 2)	Rev. 5
H-2-58191	218-E-15 Disposal Tunnel Number 2 for Failed Equipment Plot Plan	Rev. 6
H-2-58192	Plot Plan and Profile "Arch Liner"	Rev. 3
H-2-58193	Architectural Plans	Rev. 2
H-2-58194	Structural Sections and Details	Rev. 3
H-2-58195	Structural Sections and Details	Rev. 1
H-2-58196	Roof Plan Structural Sections and Details	Rev. 2

TUNNEL 2 DRAWINGS (continued)

H-2-58197	Switch Extension Details	Rev. 1
H-2-58198	Structural and Miscellaneous Details	Rev. 2
H-2-58199	Water Filled Door "C"	Rev. 3
H-2-58200	Door "C" Piping and Details	Rev. 1
H-2-58206	Piping Plan and Details	Rev. 3
H-2-58207	Condensate Plan and Profile	Rev. 2
*H-2-58208	Electrical Plans and Details (sheet 1 of 3)	Rev. 5
*H-2-58208	Electrical Plans and Details (sheet 2 of 3)	Rev. 0
*H-2-58208	Electrical Plans and Details (sheet 3 of 3)	Rev. 0
H-2-58532	PUREX Tunnel Reinforcement Plan	Rev. 1
H-2-58533	PUREX Tunnel Reinforcement Sections and Details	Rev. 1
H-2-58737	218-E-15 Disposal Tunnel Number 2 Clearance Diagram for Tunnel Section	Rev. 2
H-2-58738	Survey Controls and Data - 200E Tunnel	Rev. 1
H-2-63180	Flow Diagram-PUREX Low Radioactivity Liquid Waste Systems (sheet 1 of 2)	Rev. 2
H-2-63180	Flow Diagram-PUREX Low Radioactivity Liquid Waste Systems (sheet 2 of 2)	Rev. 1
H-2-94756	Burial Tunnel Number 2 Filter Assembly (sheet 1 of 2)	Rev. 1
H-2-94756	Burial Tunnel Number 2 Filter Assembly (sheet 2 of 2)	Rev. 1

*The ECN or engineering order affecting drawing.

Design changes affecting drawings:

Affected drawings	Design change
H-2-55587	09779
H-2-58134	18218
H-2-58208 sheets 2 and 3	41294
H-2-58208 sheet 3	42043
H-2-55593	135239
H-2-58208 sheet 1	135239

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9 2 1 2 4 1 1 5 6 9

9 2 1 2 4 5 7 0

C.C.=0

Sheet 1 of 1

Rockwell Hanford Operations
Richland, WA 99352

ENGINEERING ORDER

EO TYPE: Release / Release To File / Authorize Requirements / X Change / Supersedure / Cancellation / Obsolete / File As Drawing

QA Level: III | Change Type: 4 | Building: 202-A 21B-E | Project No.: —

Cognizant Engineer: S.D. ELLINGSON | Phone: 3-3220

Responsible Organization: J.D. McINTOSH PUREX OPER | Phone: 3-2809

EO 009779

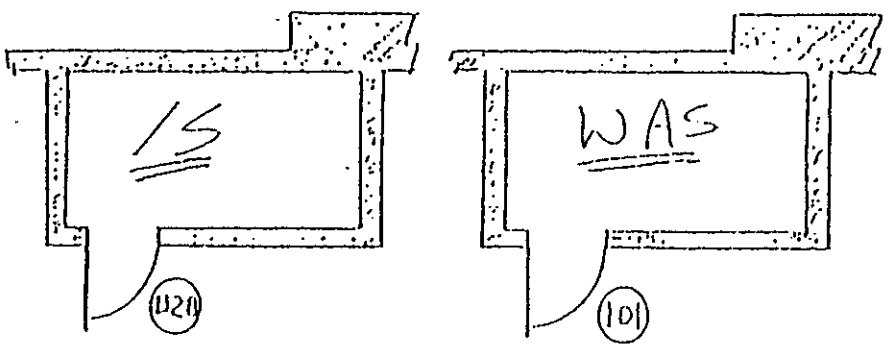
Priority: N

Is A Cross Reference To

AUTHORIZATION NO.: KAXB2

Index No.	Ctl No.	Document No.	Sheet No.	Rev.	Next Used On
0100	—	H-2-55587	1	7	—

1. IN DRAWING FIELD, CHANGE PUMP HOUSE DOOR NUMBER REFERENCE PER "IS/WAS" SHOWN BELOW:



COORDINATE WITH EO-009780

Reason & CSR No. ESR-0299 PUREX DOOR SCHEDULE DRAWING

DISTRIBUTION

A. E. Chambers Purex/MO-405
R. H. Delahunt Purex/202-A
S. D. Ellingson Purex/MO-405
K. L. Engelhardt Purex/Tra 8
A. C. Wilson Purex/202-A

Work Completed | Date 9/29/83

Prepared By: SDE | Date: 9/29/83

Cognizant Manager | Date

Checker: Scott D. Ellingson | Date: 9/28/83

Cognizant Engineer | Date

Authorizer | Date

Quality Assurance | Date

Health, Safety & Environment | Date

Criticality Engineering & Analysis | Date

Date

Date

Date

Date

Date

RELEASE STAMP

Sta #1 (11)

OFFICIALLY RELEASED

1983 SEP 29 AM 11:50

Incorporated to A. E. Chambers 9/29/83

VALNO

BD 6400 (03.1 (N-2 82)

9 2 1 2 4 1 1 1 5 7 1

PDC = 4.7

Sheet 1 of 1

Rockwell Hanford Operations
Richland, WA 99352

ENGINEERING ORDER

ITEM DISPOSITION		EO TYPE			
Rework	—	Release	—	Supersedes	—
Replace	—	Release To File	—	Cancellation	X
Use As Is	—	Authorize Requirements	—	Obsolete	—
Record Change	—	Change	—	File As Drawing	—

Impact Level: III | Change Type: 2 | Bldg.: 202A 293A | Project No.: —

Responsible Engineer: R.G. WINKELMAN | Phone: 3-4716

Responsible Organization: PUREX OPERATIONS 46700 | Phone: 3-3184

EO № 18218

Priority: N

Is A Cross Reference To

AUTHORIZATION NO.: KP82J

Index No.	CEI No./Tree	Document No.	Sheet No.	Rev.	Next Used On/Title
8900	—	H-2-57012	1	3	H-2-57011
8900	—	H-2-58134	2	5	H-2-58141

THIS EO CANCELS FCN 54857 DATED 7-29-81 IN FULL.

R.G. WINKELMAN 8-28-85

Prepared By — Date: [signature] 8/28/85

Preparer's Immediate Manager — Date

Checker — Date: Rick Winkelman 8-26-85

Cognizant Design Engineer — Date: [signature] 8/28/85

Cognizant Design Manager — Date

Quality Assurance — Date

Health, Safety & Environment — Date

Criticality Engineering & Analysis — Date

Process Engineering — Date

Date

Date

Date

Date

REASONS & ESR No.

WORK NOT COMPLETED NOR SCHEDULED TO BE COMPLETED. NO ESR, NO W.O.

Work Completed: 8-28-85 | Date

FOR DESIGN DCL ONLY | Design Manager Approval

Dwgs. TBC Yes [ ] No [ ]

DISTRIBUTION

G.H. SMITH MO-405
J.S. SPROOSE MO-047
E.A. MUELLER 202A/109
R.G. WINKELMAN MO-405
M. METCALF 202A/111

RELEASE STAMP

Sta. 1 (8)

OFFICIALLY RELEASED
1985 AUG 28 PM 3:11

DD 4400 093.1 (12 84)

9 2 1 2 4 . 1 5 7 2

PX #4/

Sheet 1 of 2

Hockwell Hanford Operations
Richland, WA 99352

ENGINEERING ORDER

ITEM DISPOSITION		EO TYPE			
Rework	–	Release	–	Supersedure	–
Replace	–	Release In File	–	Cancellation	–
Use As Is	–	Authorize Requirement	–	Deviation	–
Revised Change	–	Change	X	File As Drawing	–
—	–	—			–

Impact Level	Change Type	Area	Project No
III	4	202-A	N/A

Responsible Engineer	Phone
DW HEBERLING	3-4130
H65213	PLT ENGR
Responsible Organization	**Phone**
MP BANIGAN	3-4127
H65213	PLT ENGR

EO № 41294

Priority: E

Is A Cross Reference In

AUTHORIZATION NO: KSC 7035029

Index No	CEI No./Tree	Document No	Sheet No.	Rev.	Next Used On/Date
7301,8001	-	H-2-58209	002	-	---------
7301	-	H-2-58208	003	-	---------

DISTRIBUTION:

G.S. KUKKLER	202A /MO-023/200E
D.R. BAILEY	202A/MO405/200E
H.P. BANIGAN	202A/MO405/200E
G.T. BUKELOW	202A/100/200E
J.H. ELLIS	202A/104/200E
K.L. ENGLEHARDT	202A/MO023/200E
W.H. GIBSON	202A/8/200E
W.H. HARTY	202A/101B/200E
D.W. HEBERLING	202A/MO-405/200E
J.T. LONG	202A/102/200E
P.G. MAITELL	202A/111/200E
E.A. MUELLER	202A/109/200E
J.B. MYERS	202A/MO707/200E
J.R. RAPOZA	202A/105A/200E
R.L. ROHDE	202A/MO405/200E
R.A. VANHETER	202A/102B/200E
K.A. WILLIAMS	202A/MO405/200E
G.S. ZENO	202A/MO405/200E
ESR FILE	
S.L. BRADWAY	202A/MO-023/200E
S.L. COULTER	" " "
W.H. SEVIER	2752E/A106/200E

REASONS & ESR No.

ESR NO. 09930. (BURIAL TUNNEL NO. 2 EXHAUST FAN) THIS CEO WILL CORRECT MINOR DRAFTING ERRORS.

THIS WORK WILL BE PERFORMED BY KAISER ENGINEERS CONSTRUCTION.

Work Completed (21) Date MAY 04 1987

FOR DESIGN USE ONLY — Design Manager Approval

Dwg. No. [illegible]

Distribution: SEE ABOVE

GARY S. ZENO 4-30-87 — Prepared by / Date

Project Information Manager — Date 5/1/87

Project — Date 5/1/87

Department Design Engineer — Date 4-30-87

Department Design Manager — Date 5-1-87

Quality Assurance — Date

Human Safety & Environment — Date

Criticality Engineering & Analysis — Date

Process Engineering — Date 5-1-87

PLANT ENGINEERING — Date

Date

Date

Date

Date

Date

Release Stamp (21)

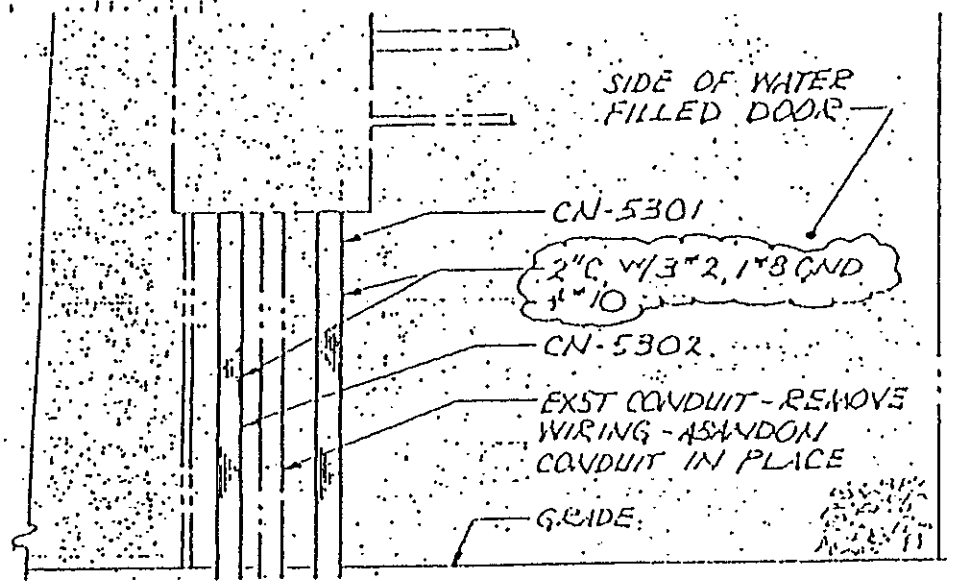
OFFICIALLY RELEASED

87 MAY -4 PM 12:42

ENGINEERING ORDER
Rockwell Hanford Operations
Richland, WA 99352

EO 41294 Sheet 2 of 2

WAS: AS SHOWN ON H-2-58208, SHEET 3 [3-6F]
IS:



WAS: AS SHOWN ON H-2-58208, SHEET 2 [2-3B]
IS:

13. DRAINAGE OF ALL DUCT RUNS MUST BE PROVIDED BY SLOPING THE DUCT AND/OR BY INSTALLING A DRAIN IN THE LOWEST POINT OF THE RUN. (SIMILAR TO HPS E-10(10)) DUCTS SHALL BE SLOPED A MINIMUM OF 3" PER 100' BETWEEN ADJACENT HANDHOLES OR FROM A HIGH POINT IN THE DUCT TO THE HANDHOLE OPENINGS.

9 2 1 2 4 . 1 5 7 4

PDC = 4

Sheet 1 of 2

Rockwell Hanford Operations
Richland, WA 99352

ENGINEERING ORDER

ITEM DISPOSITION		FO TYPE			
Rework	—	Release	—	Supersedure	—
Replace	—	Release To File	—	Cancellation	—
Use As Is	—	Authorize Requirement	—	Obsolete	—
Record Change	—	Change	X	File As Desired	—

Impact Level	Change Type	Bldg.	Project No.
III	4	202-A	N/A

Responsible Engineer	Phone
DW HEBERLING	3-4130
865213	PL1 ENGR

Responsible Engineer	Phone
MP BANIGAN	3-4127
865213	PL1 ENGR

EO № 42043

Priority: E

N.A. Cost Reference To

AUTHORIZATION NO.: KSC 7035029

Index No.	Ckt No./Tree	Document No.	Sheet No.	Rev.	Next Used On/Title
7301	—	H-2-58208	003	-	--------

GARY S. ZENO 4-7-87

[signature] 4/7/87
Project Engineer Manager Date

[X] [signature] 04/03/87
Checker Date

[X] [signature] 4-7-87
Cognizant Design Engineer Date

[X] M.P. Banigan 4-6-87
Cognizant Design Manager Date

Quality Assurance Date

[X] [signature] 4/7/87
Health Safety & Environment Date

Criticality Engineering & Analysis Date

Process Engineering Date

[X] M.P. Banigan 4-6-87
Project Engineer Date

Date

Date

Date

DISTRIBUTION:

G.S. KUNKLER	202A /MO-023/200E	W.H. SEVIER	2752E/A106/200E
D.K. BAILEY	202A/MO405/200E		
M.P. BANIGAN	202A/MO405/200E		
G.T. DUKELOW	202A/100/200E		
J.H. ELLIS	202A/104/200E		
K.L. ENGLEHARDT	202A/MO023/200E		
W.H. GIBSON	202A/8/200E		
W.M. HARTY	202A/101B/200E		
D.W. HEBERLING	202A/MO-405/200E		
J.T. LONG	202A/102/200E		
P.G. MARTELL	202A/111/200E		
E.A. MUELLER	202A/109/200E		
J.B. MYERS	202A/MO707/200E		
J.R. RAPOZA	202A/105A/200E		
R.L. ROMINE	202A/MO405/200E		
R.A. VANMETER	202A/102B/200E		
K.A. WILLIAMS	202A/MO405/200E		
G.S. ZENO	202A/MO405/200E		
ESR FILE			

REASONS & ESR No.

FSR NO. 09930. (BURIAL TUNNEL NO. 2 EXHAUST FAN) THIS CEO WILL CORRECT A MINOR DRAFTING ERROR.

Work Completed Date 4-9-87

FOR RESEARCH USE ONLY — Design Manager Approval

Dist. Tec Yes [X] No [ ] Cont

DISTRIBUTION
SEE ABOVE

RELEASE CHANGE

Sta. 1 (8)

OFFICIALLY RELEASED
1987 APR -9 AM 10:44

BD-8400 093.1 (12 84)

ENGINEERING ORDER
Rockwell Hanford Operations
Richland, WA 99352

EO 42043

Sheet 2 of 2

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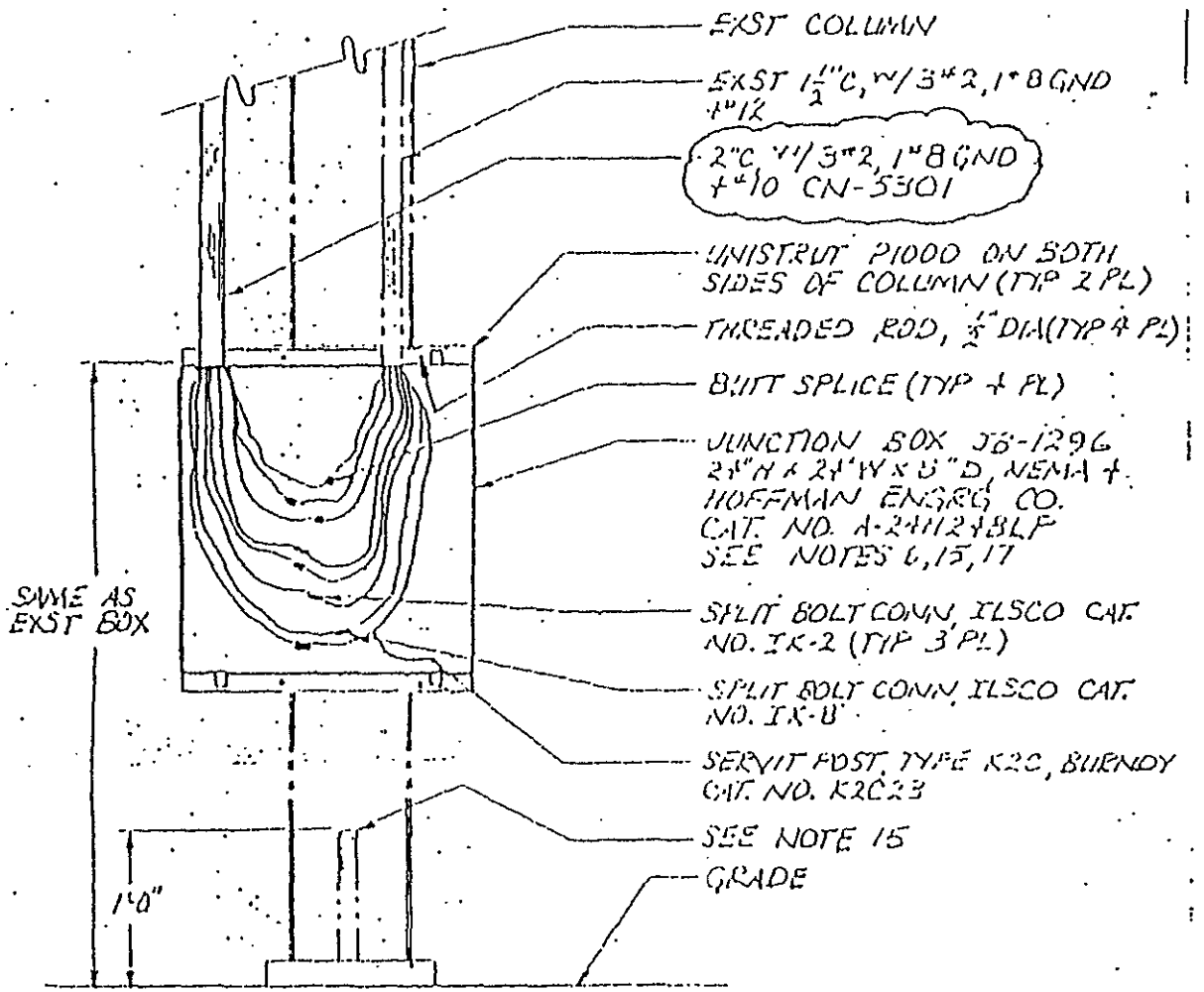


PO2-447

ENGINEERING CHANGE NOTICE

Page 1 of 78

1. ECN 134523

Proj. ECN N/A

2. ECN Category (mark one)	3. Originator's Name, Organization, MSIN, and Telephone No.		4. Date
Supplemental ☒ Direct Revision ☐ Change ECN ☐ Temporary ☐ Supersedure ☐ Discovery ☐ Cancel/Void ☐	SW WILLIS, 27210, S6-08, 3-2103		1/22/91
	5. Project Title/No./Work Order No. KP	6. Bldg./Sys./Fac. No. 202-A	7. Impact Level 3
	8. Document Number Affected (include rev. and sheet no.) H-2-58134, REV. 5, SHEET 2	9. Related ECN No(s). N/A	10. Related PO No. N/A

11a. Modification Work	11b. Work Package Doc. No.	11c. Complete Installation Work	11d. Complete Restoration (Temp. ECN only)
☒ Yes (fill out Blk. 11b) ☐ No (NA Blks. 11b, 11c, 11d)	~~N/A~~ 2A-900 2727	Cog. Engineer Signature & Date	NA Cog. Engineer Signature & Date

12. Description of Change

WORK TO BE DONE PER SHEETS 1 THRU 7 OF THIS ECN.

ADD NOTE TO DWG. 11. PREPARE AND PAINT ALL EXPOSED CARBON STEEL SURFACES OF REMOVABLE STEEL COVER WITH EPOXY OR VINYL PAINT. IF EPOXY PAINT IS USED, ONE COAT OF VALSPAR HI-SOLIDS. 76 SERIES PAINT SHALL BE APPLIED. IF VINYL PAINT IS USED, ONE COAT OF AMERCOAT 187 PRIMER FOLLOWED BY TWO TOP COATS OF AMERCOAT 33 SHALL BE APPLIED. PAINT SHALL BE APPLIED IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS. FINAL COLOR SHALL BE GRAY.

12. WELD AND INSPECT PER ANSI B31.1. VT AND PT FINAL PASS OF ALL WELDS.

13a. Justification (mark one)	13b. Justification Details
Criteria Change ☐ Design Improvement ☒ Environmental ☐ As-Found ☐ Facilitate Const. ☐ Const. Error/Omission ☐ Design Error/Omission ☐	MODIFICATION REQUIRED FOR MAINTENANCE ACCESS.

14. Distribution (include name, MSIN, and no. of copies)

RA GREGONIS S6-08
SW WILLIS S6-08
J.S. HERTZEL S6-08
D.W. HERTZ S6-08

RELEASE STAMP

OFFICIAL RELEASE BY WHC
DATE FEB 19 1991
Station #1

9212141.1576

ENGINEERING CHANGE NOTICE

134523

15. Design Verification Required	16. Cost Impact				17. Schedule Impact (days)
	ENGINEERING		CONSTRUCTION		
☒ Yes	Additional ☐ $		Additional ☐ $		Improvement ☐
☐ No	Savings ☐ $ N/A		Savings ☐ $ N/A		Delay ☐

18. Change Impact Review: Indicate the related documents (other than the engineering documents identified on Side 1) that will be affected by the change described in Block 12. Enter the affected document number in Block 19.

SDD/DD	☐	Seismic/Stress Analysis	☐	Tank Calibration Manual	☐
Functional Design Criteria	☐	Stress/Design Report	☐	Health Physics Procedure	☐
Operating Specification	☐	Interface Control Drawing	☐	Spares Multiple Unit Listing	☐
Criticality Specification	☐	Calibration Procedure	☐	Test Procedures/Specification	☐
Conceptual Design Report	☐	Installation Procedure	☐	Component Index	☐
Equipment Spec.	☐	Maintenance Procedure	☐	ASME Coded Item	☐
Const. Spec.	☐	Engineering Procedure	☐	Human Factor Consideration	☐
Procurement Spec.	☐	Operating Instruction	☐	Computer Software	☐
Vendor Information	☐	Operating Procedure	☐	Electric Circuit Schedule	☐
OM Manual	☐	Operational Safety Requirement	☐	ICRS Procedure	☐
FSAR/SAR	☐	IEFD Drawing	☐	Process Control Manual/Plan	☐
Safety Equipment List	☐	Cell Arrangement Drawing	☐	Process Flow Chart	☐
Radiation Work Permit	☐	Essential Material Specification	☐	Purchase Requisition	☐
Environmental Impact Statement	☐	Fac. Proc. Samp. Schedule	☐		☐
Environmental Report	☐	Inspection Plan	☐		☐
Environmental Permit	☐	Inventory Adjustment Request	☐		☐

N/A

19. Other Affected Documents: (NOTE: Documents listed below will not be revised by this ECN.) Signatures below indicate that the signing organization has been notified of other affected documents listed below.

Document Number/Revision	Document Number/Revision	Document Number/Revision
N/A	N/A	N/A

20. Approvals

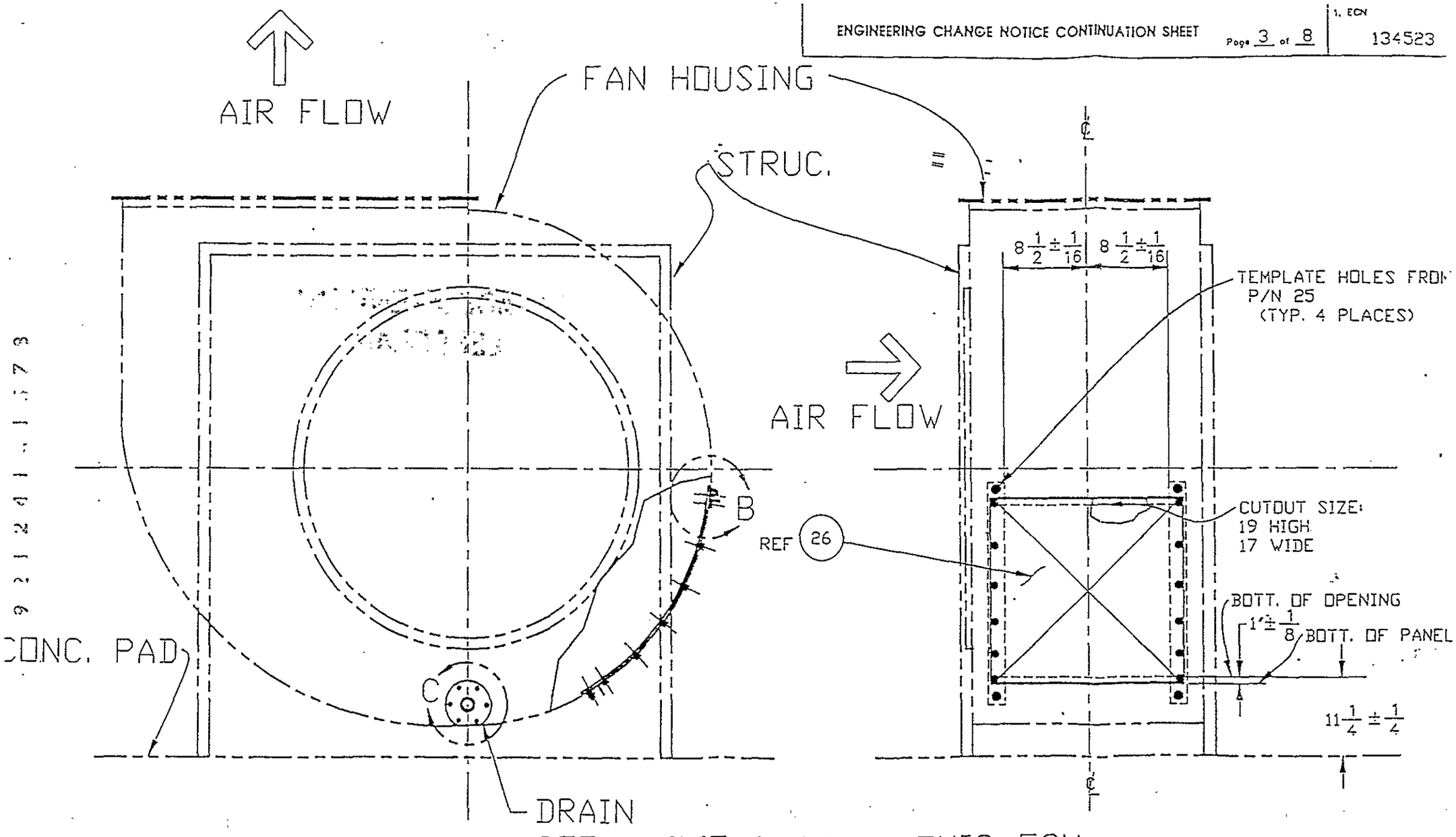
OPERATIONS AND ENGINEERING	Signature	Date
Cog./Project Engineer	[signature]	2-1-91
Cog./Project Engr. Mgr.	[signature]	2-12-91
QA	C. A. Colman	2/13/91
Safety		
Security		
Proj./Prog./Dept. Mgr.		
Def. React. Div.		
Chem. Proc. Div.		
Def Wst. Mgmt. Div.		
Adv. React. Dev. Div.		
Proj. Dept.		
Environ. Div.		
IRM Dept.		
Facility ~~Rep.~~ (Ops)		
Other	[signature]	2-11-91

ARCHITECT-ENGINEER	Signature	Date
PE		
QA		
Safety		
Design		
Other	CHK [signature]	2-8-91

DEPARTMENT OF ENERGY		

ADDITIONAL		

9 2 1 2 4 1 1 5 7 7



SEE SHEET 8 OF 8, THIS ECN

INSTALLATION

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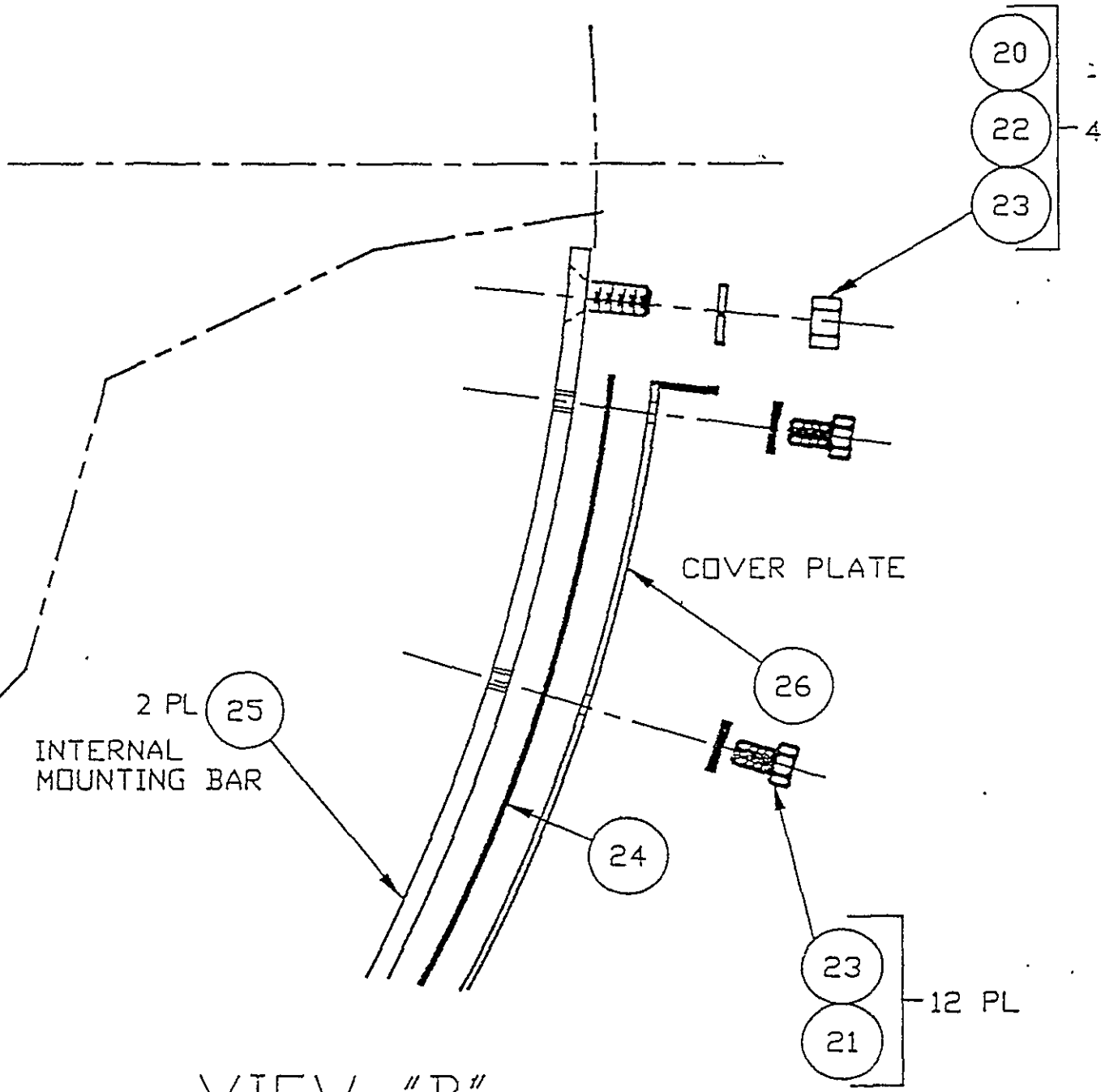
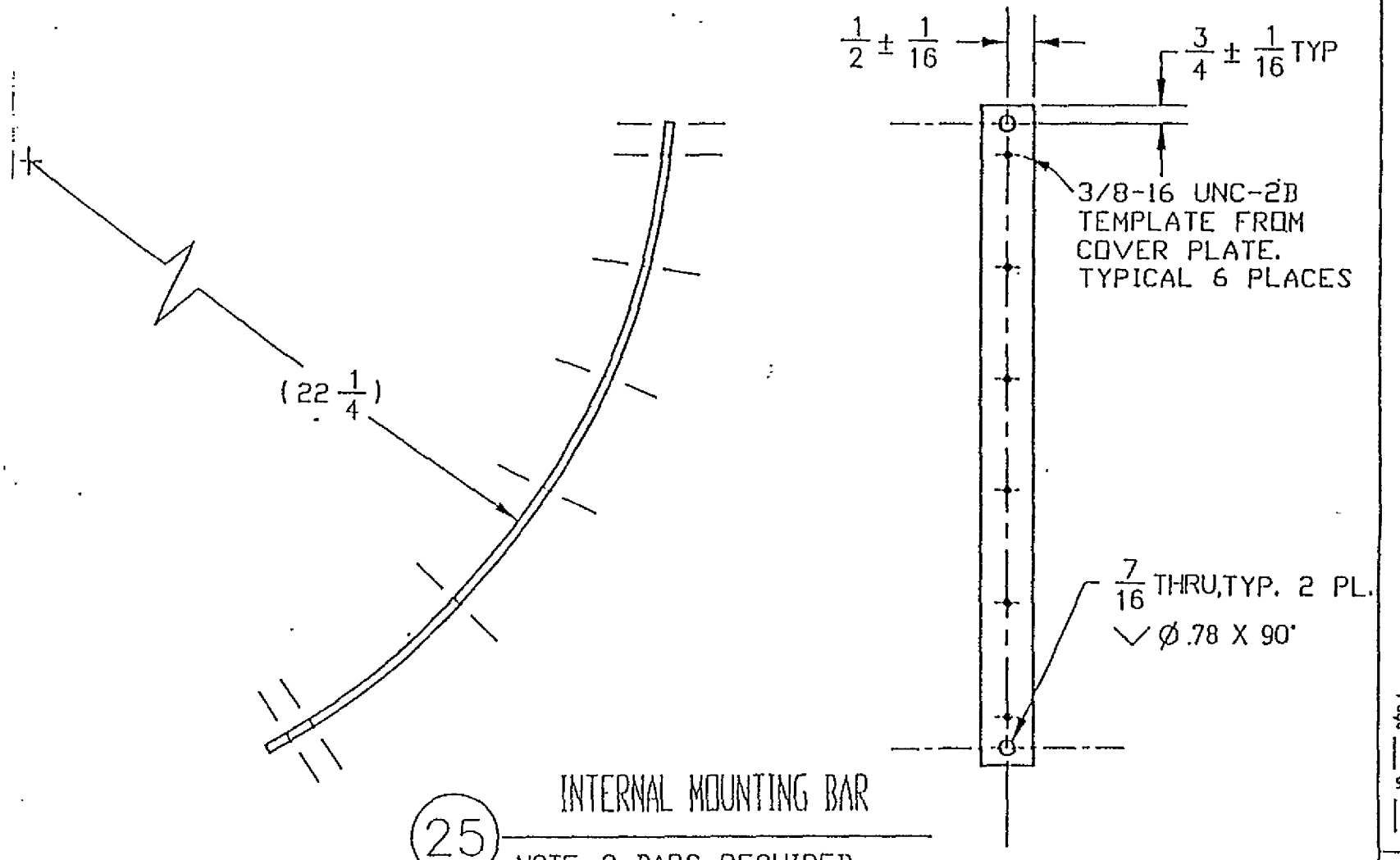


VIEW "B"

9 2 1 2 4 1 5 7 9

QTY.	PT. NO.	DESCRIPTION	MATERIAL
4	20	SCREW, SOCKET FLAT COUNTERSUNK HD CAP 3/8-16 UNC-2A X 5/8 LONG	COM'L CS
12	21	SCREW, HEX HD CAP 3/8-16 UNC-2A X 5/8 LONG	COM'L CS
4	22	NUT, HEX, REG. 3/8-16 UNC-2B	COM'L CS
16	23	WASHER,LOCK,HLCL SPG 3/8 NOM, RGLR	COM'L CS
AR	24	GASKET NEOPRENE, 1/8 THICK STRIP X 1 X LENGTH A/R	COM'L GRADE
2	25	BAR, 1 X 1/4 X 23-1/2 LONG	COM'L CS
AR	26	SHEET, 11 GAUGE (0.120) X 20 WIDE X 22 LONG	COM'L CS
1	27	PLATE 3-1/4 O.D. X 1 I.D. X .125 THK	ASTM A 36 CS
1	28	HALF CPLG 1 SCRD CLASS 150	ASTM A 105 CS
1	29	PLUG 1' NPT	COM'L CS
1	30	VALVE, BALL, 1', CLASS 150, THRD'	COM'L CS
1	31	GASKET, NEOPRENE, 3-1/4 O.D. X 1 I.D. X .125 THK.	COM'L GRADE
6	32	RIVET, MONOBOLT 1/4'	CHERRY, CCPV-86
1	33	NIPPLE, CLOSE, 1' SCHEDULE 40	COM'L CS

* ADD TO PARTS LIST ON DWG.



25 INTERNAL MOUNTING BAR

NOTE: 2 BARS REQUIRED FOR INSTALLATION

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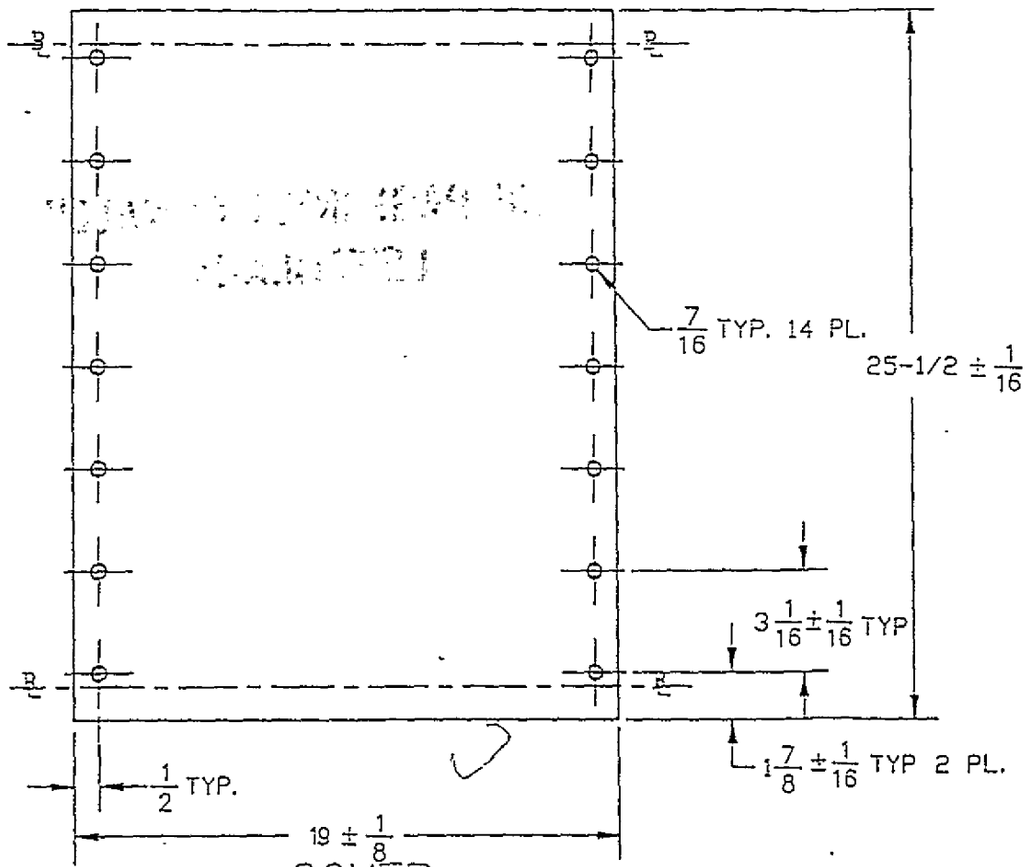
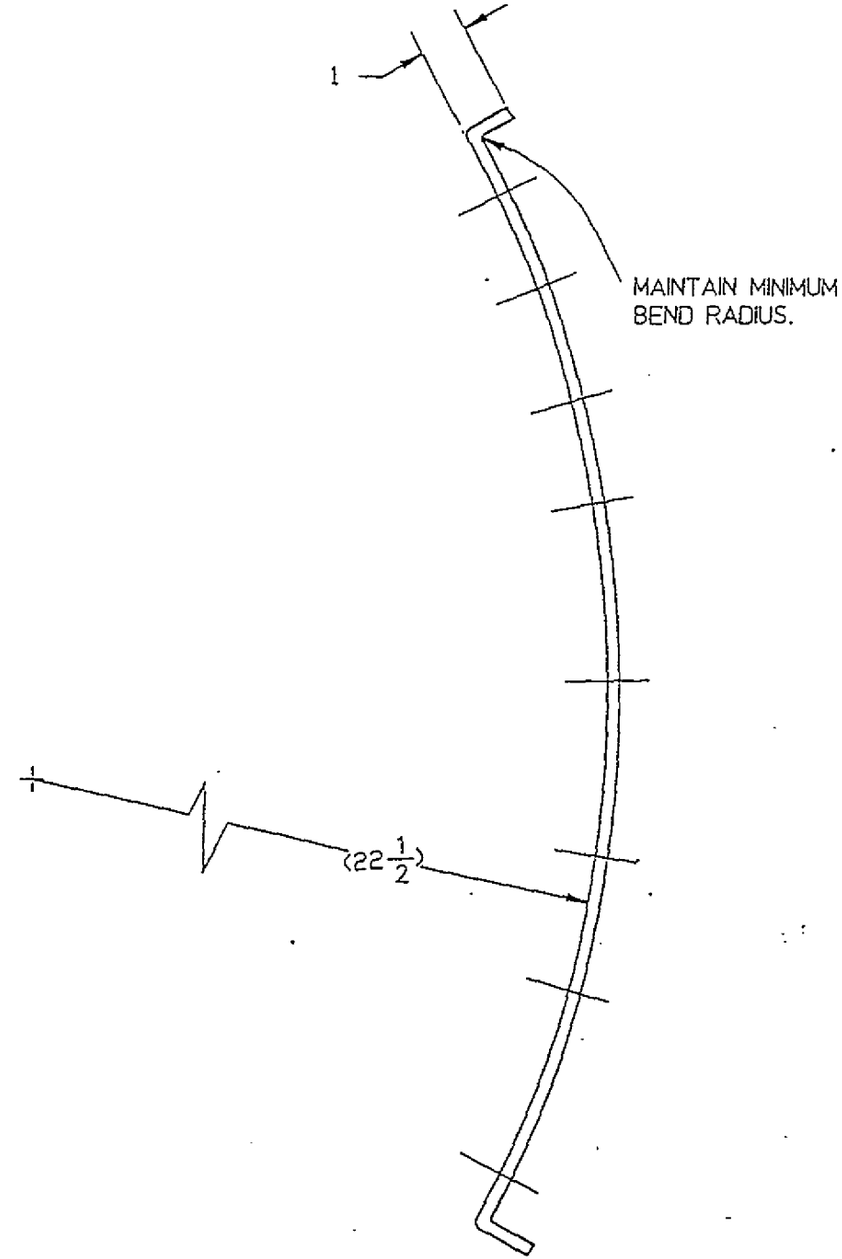


COVER

26



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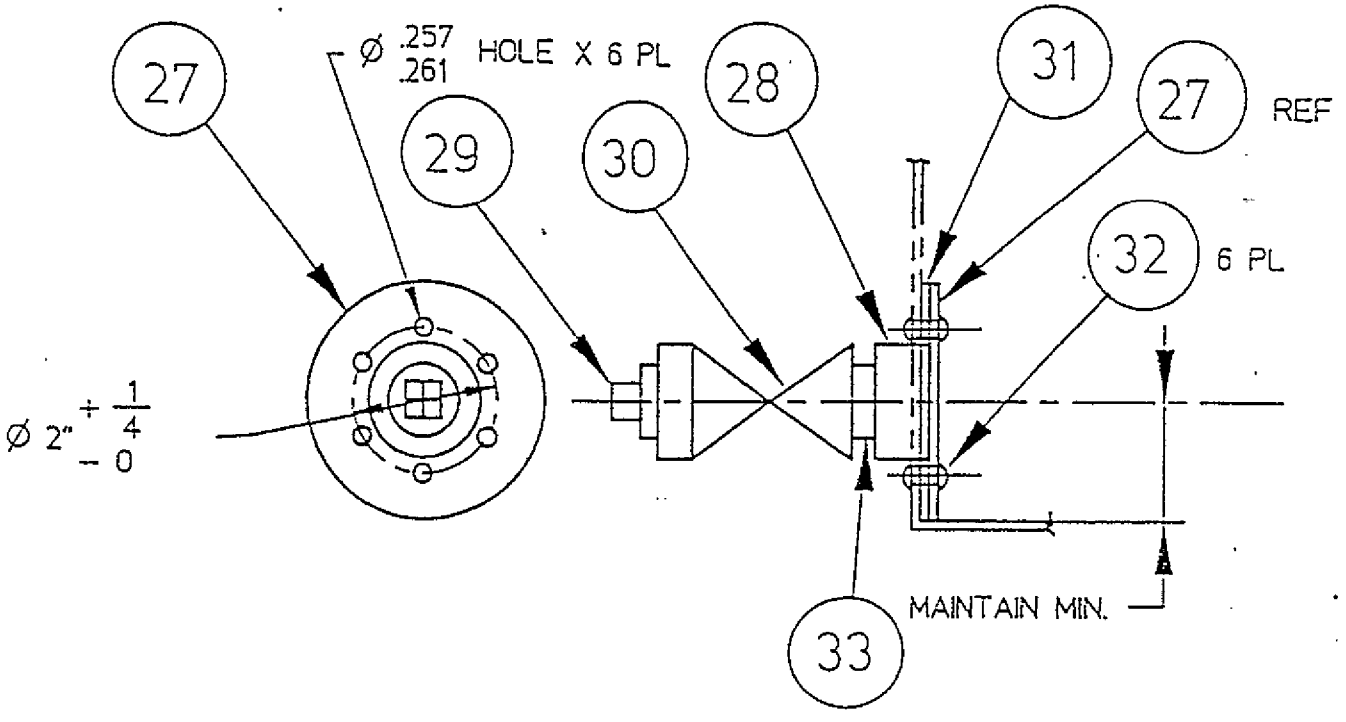
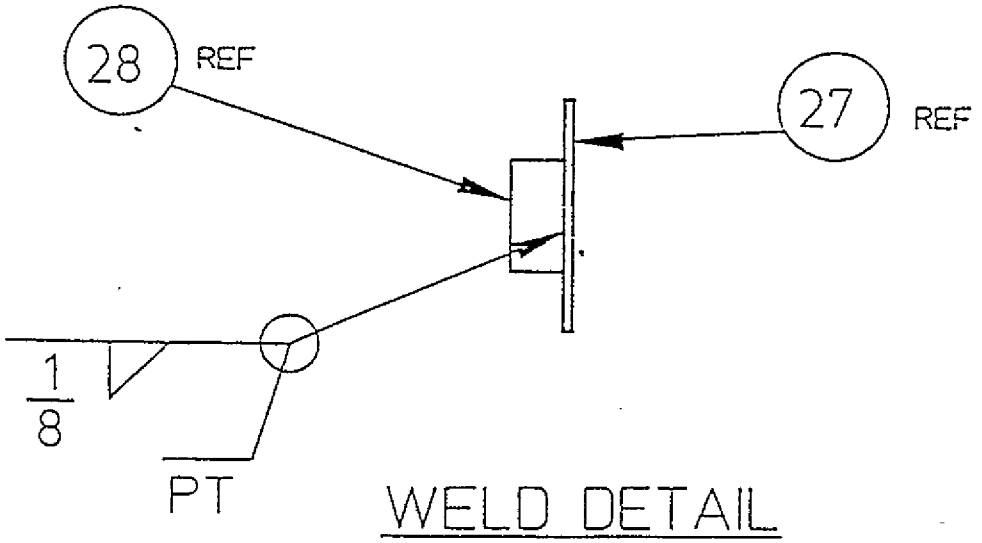


VIEW "C"

NOTE: TEMPLATE HOLE THRU P/N 27 FROM I.D. OF P/N 28. TEMPLATE HOLE THROUGH FAN HOUSING FROM O.D. OF P/N 28.



WELD DETAIL

9 2 1 2 4 1 1 5 9 3

SUPPORT

ENGINEERING CHANGE NOTICE

PDC = 4+12

Page 1 of 9

1. ECN 134604

Proj. ECN

2. ECN Category (mark one)	3. Originator's Name, Organization, MSIN, and Telephone No.		4. Date
Supplemental ☒	PAT COOPER/W17510/3-3098		2-8-91
Direct Revision ☐	5. Project Title/No./Work Order No	6. Bldg./Sys./Fac. No.	7. Impact Level
Change ECN ☐	PUREX TRANS/CHANGE/K79G2	202A	3
Temporary ☐	8. Document Number Affected (include rev. and sheet no.)	9. Related ECN No(s).	10. Related PO No.
Supersedure ☐	SEE BLOCK 12	N/A	N/A
Discovery ☐			
Cancel/Void ☐			

11a. Modification Work	11b. Work Package Doc. No.	11c. Complete Installation Work	11d. Complete Restoration (Temp. ECN only)
☒ Yes (fill out Blk. 11b) ☐ No (NA Blks. 11b, 11c, 11d)	J-90-01199	Cog. Engineer Signature & Date	N/A Cog. Engineer Signature & Date

12. Description of Change

H-2-58208, SH1, REV. 5
H-2-58208, SH3, REV. 0
H-2-76862, SH7, REV. 1
H-2-96965, SH11, REV. 1

UPGRADE POWER SUPPLY TO #2 BURIEL TUNNEL CAM UNIT AND HEAT TRACE, BY REPLACING EXISTING IKVA TRANSFORMER WITH A 5KVA TRANSFORMER/PANEL.

13a. Justification (mark one)	13b. Justification Details
Criteria Change ☐	UPGRADE POWER SUPPLY AS REQUESTED BY ESR PO 0255.
Design Improvement ☒	
Environmental ☐	
As-Found ☐	
Facilitate Const. ☐	
Const. Error/Omission ☐	
Design Error/Omission ☐	

14. Distribution (include name, MSIN, and no. of copies)

J.W. KISSEL	S5-75	M.J. RAMOS	S6-08
D. GERKEN	S6-08		
C.M. TOWNE	S6-08		
J. HERTZEL	S6-08		
R. ROMINE	S6-08		

RELEASE STAMP

OFFICIAL RELEASE BY WHC 54
DATE FEB 19 1991
Station #1

9 2 1 2 4 1 4 1 5 3 4

ENGINEERING CHANGE NOTICE

1. ECN (use no. from pg. 1) 13604

15. Design Verification Required	16. Cost Impact N/A ENGINEERING	CONSTRUCTION	17. Schedule Impact (days) N/A
☒ Yes CWT 2/19/91	Additional ☐ $	Additional ☐ $	Improvement ☐
☐ No	Savings ☐ $	Savings ☐ $	Delay ☐

18. Change Impact Review: Indicate the related documents (other than the engineering documents identified on Side 1) that will be affected by the change described in Block 12. Enter the affected document number in Block 19. N/A

SOO/DD	☐	Seismic/Stress Analysis	☐	Tank Calibration Manual	☐
Functional Design Criteria	☐	Stress/Design Report	☐	Health Physics Procedure	☐
Operating Specification	☐	Interface Control Drawing	☐	Spares Multiple Unit Listing	☐
Criticality Specification	☐	Calibration Procedure	☐	Test Procedures/Specification	☐
Conceptual Design Report	☐	Installation Procedure	☐	Component Index	☐
Equipment Spec.	☐	Maintenance Procedure	☐	ASME Coded Item	☐
Const. Spec.	☐	Engineering Procedure	☐	Human Factor Consideration	☐
Procurement Spec.	☐	Operating Instruction	☐	Computer Software	☐
Vendor Information	☐	Operating Procedure	☐	Electric Circuit Schedule	☐
OM Manual	☐	Operational Safety Requirement	☐	ICRS Procedure	☐
FSAR/SAR	☐	IEFD Drawing	☐	Process Control Manual/Plan	☐
Safety Equipment List	☐	Cell Arrangement Drawing	☐	Process Flow Chart	☐
Radiation Work Permit	☐	Essential Material Specification	☐	Purchase Requisition	☐
Environmental Impact Statement	☐	Fac. Proc. Samp. Schedule	☐		☐
Environmental Report	☐	Inspection Plan	☐		☐
Environmental Permit	☐	Inventory Adjustment Request	☐		☐

19. Other Affected Documents: (NOTE: Documents listed below will not be revised by this ECN.) Signatures below indicate that the signing organization has been notified of other affected documents listed below. N/A

Document Number/Revision	Document Number/Revision	Document Number/Revision

20. Approvals

OPERATIONS AND ENGINEERING	Signature	Date	ARCHITECT-ENGINEER	Signature	Date
Cog./Project Engineer	[signature]	2-19-91	PE		
Cog./Project Engr. Mgr	[signature]	2-19-91	QA		
QA	[signature]	2/19/91	Safety		
Safety			Design		
Security			Other		
Proj./Prog./Dept. Mgr.					
Def. React. Div.					
Chem. Proc. Div.					
Def. Wst. Mgmt. Div.			DEPARTMENT OF ENERGY		
Adv. React. Dev. Div.					
Proj. Dept.					
Environ. Div.			ADDITIONAL		
IRM Dept.	[signature]				
Facility Rep. (Ops)	[signature]				
Other (DESIGN ENGINEER)	[signature]	2-19-91			
(INDEPENDENT REVIEW)	[signature]	2-19-91			

CONSTRUCTION NOTES: (DO NOT INCORPORATE ON DRAWING)

1. CONDUIT RUNS ARE SHOWN DIAGRAMMATICALLY. FIELD ROUTE AND SUPPORT AS REQUIRED.

2. ELECTRICAL INSTALLATION SHALL BE IN ACCORDANCE WITH THE LATEST NEC EDITION.

3. CONDUCTORS SHALL BE COPPER (12) AWG (STRANDED) UNLESS NOTED, WITH TYPE THWN/THHN INSULATION.

4. REPLACE EXISTING DISCONNECT & 1KVA TRANSFORMER ON #2 BURIAL TUNNEL VENT FAN, WITH 480-240/120V, 5KVA, 1PH TRANSFORMER/PANEL BOARD, BT2. (SQUARE "D" MINI POWER ZONE, MODEL #MPZ5S40F)

5. REROUTE EXST CONDUIT FROM WP RCPT & DPT-V11-29-1 ENCLOSURE TO BURIAL TUNNEL #2 PANEL BOARD BT2.

6. REWIRE RCPTS AND DPT TO BURIAL TUNNEL #2 PANEL BOARD CRKT #2. RUN CONDUCTORS FROM CRKT #1 ON BURIAL TUNNEL #2 PANEL BOARD TO 4-PLEX RCPT LOCATED INSIDE STACK MONITOR.

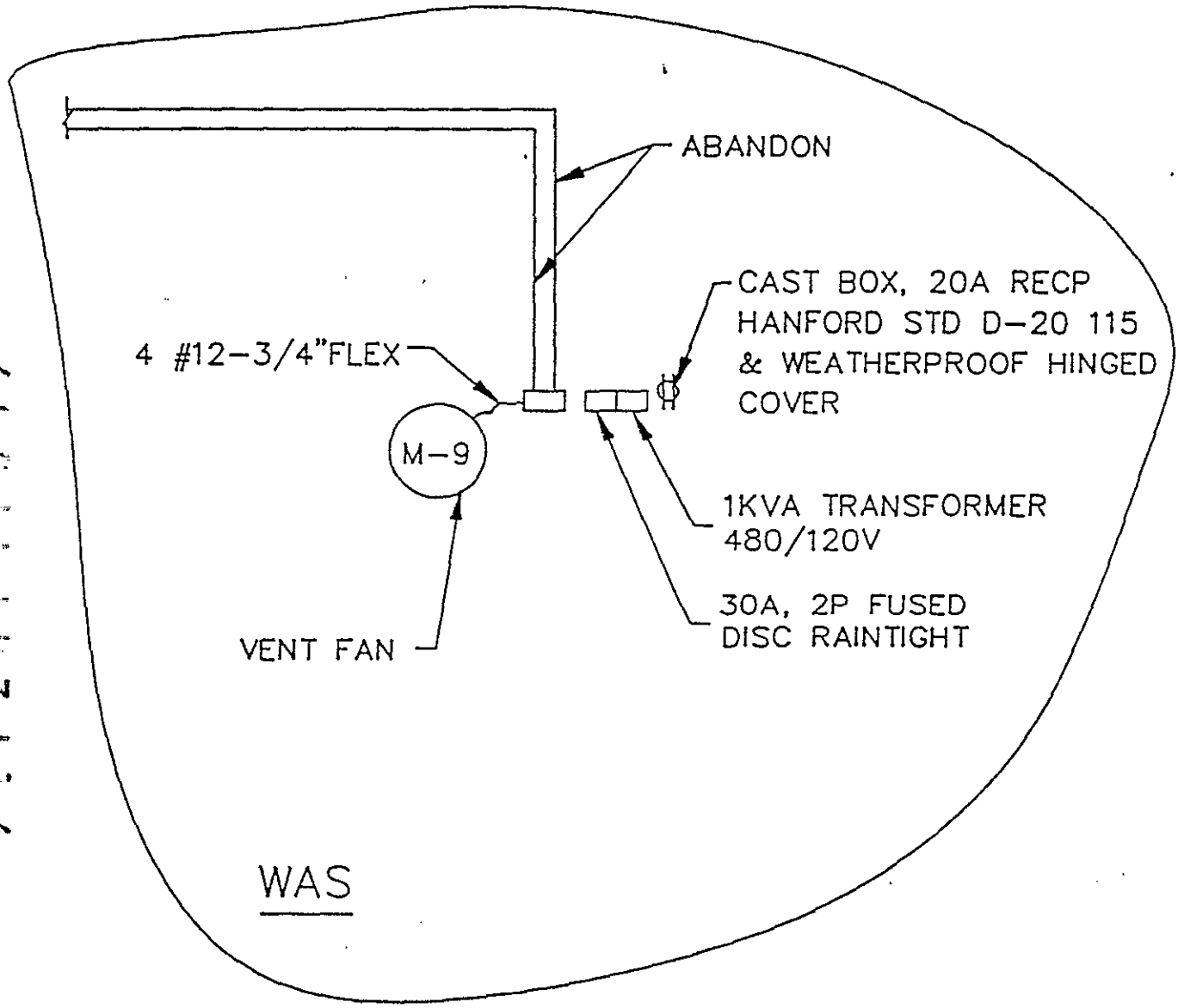
7. FIELD LABEL "TRANSFORMER/PANELBOARD BT2" PER HPS-I-2-7 WITH SCREW MOUNTED NAMEPLATE.

8. FIELD CONSTRUCT SUPPORT FOR TRANSFORMER/ PANELBOARD BT2 AS INSTALLATION REQUIRES.

9 3 1 2 4 1 1 5 3 6

1. ECN 134604

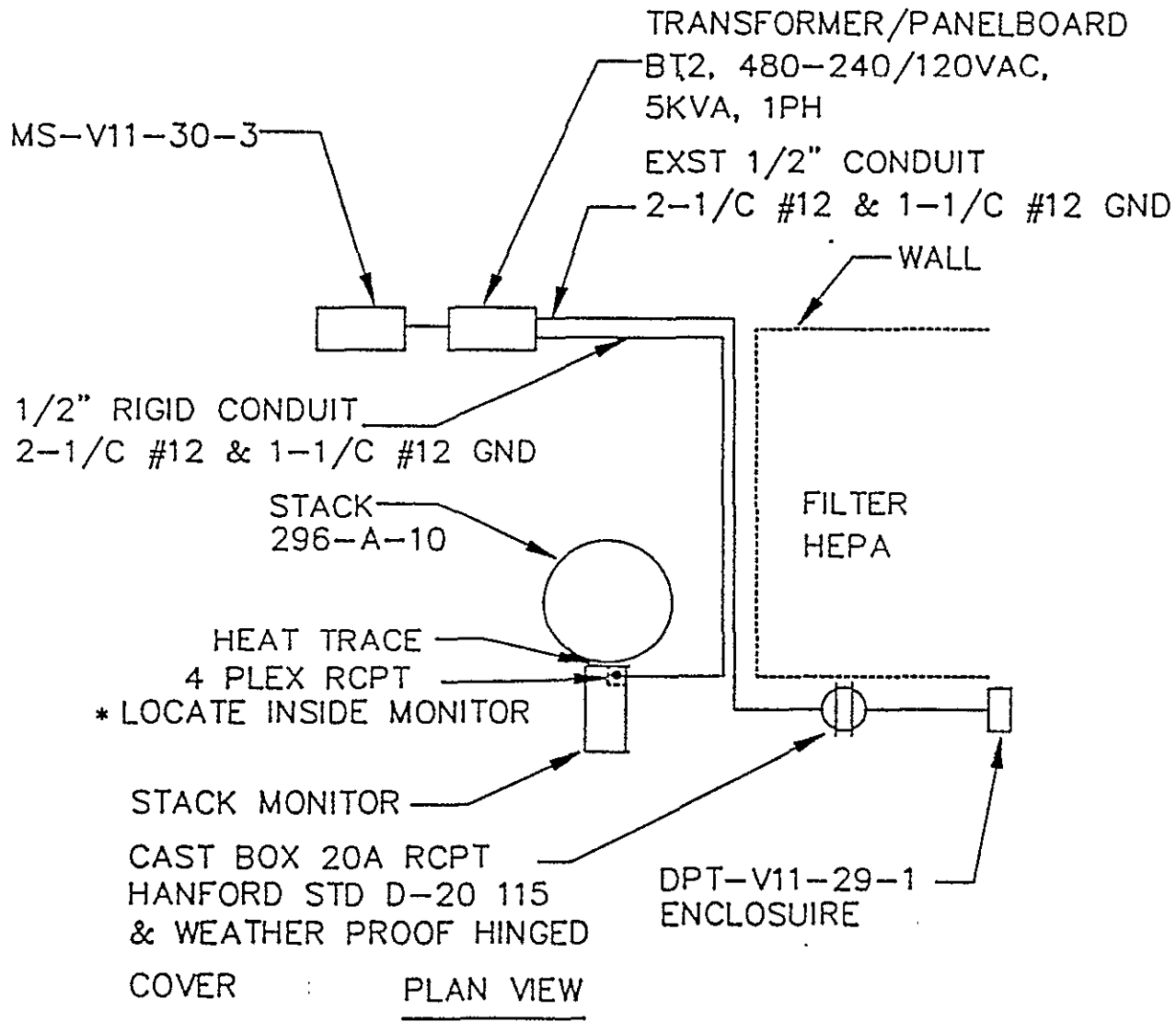
REF DWG H-2-58208, SH1
ZONE 13-B



FOR IS CONDITION, SEE SHEET 5 OF THIS ECN.

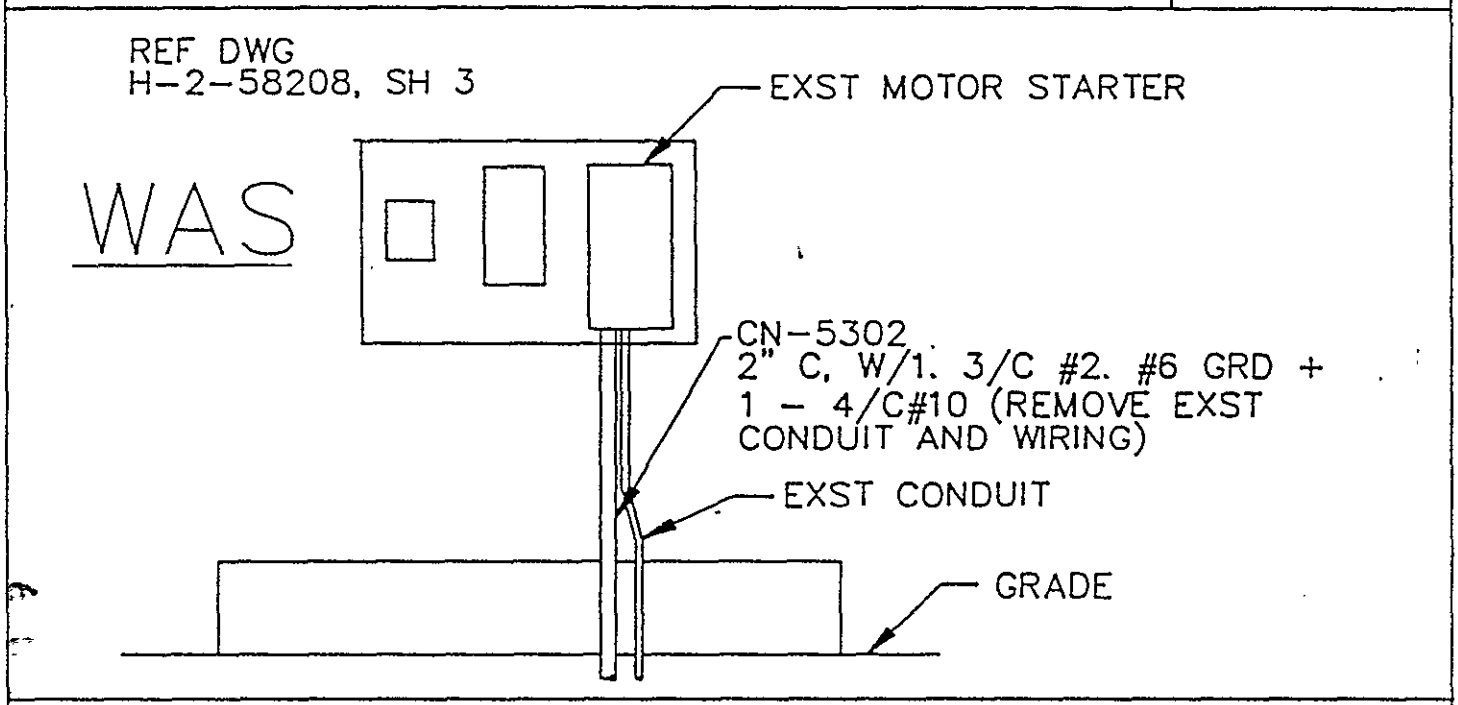
1. ECN 134604

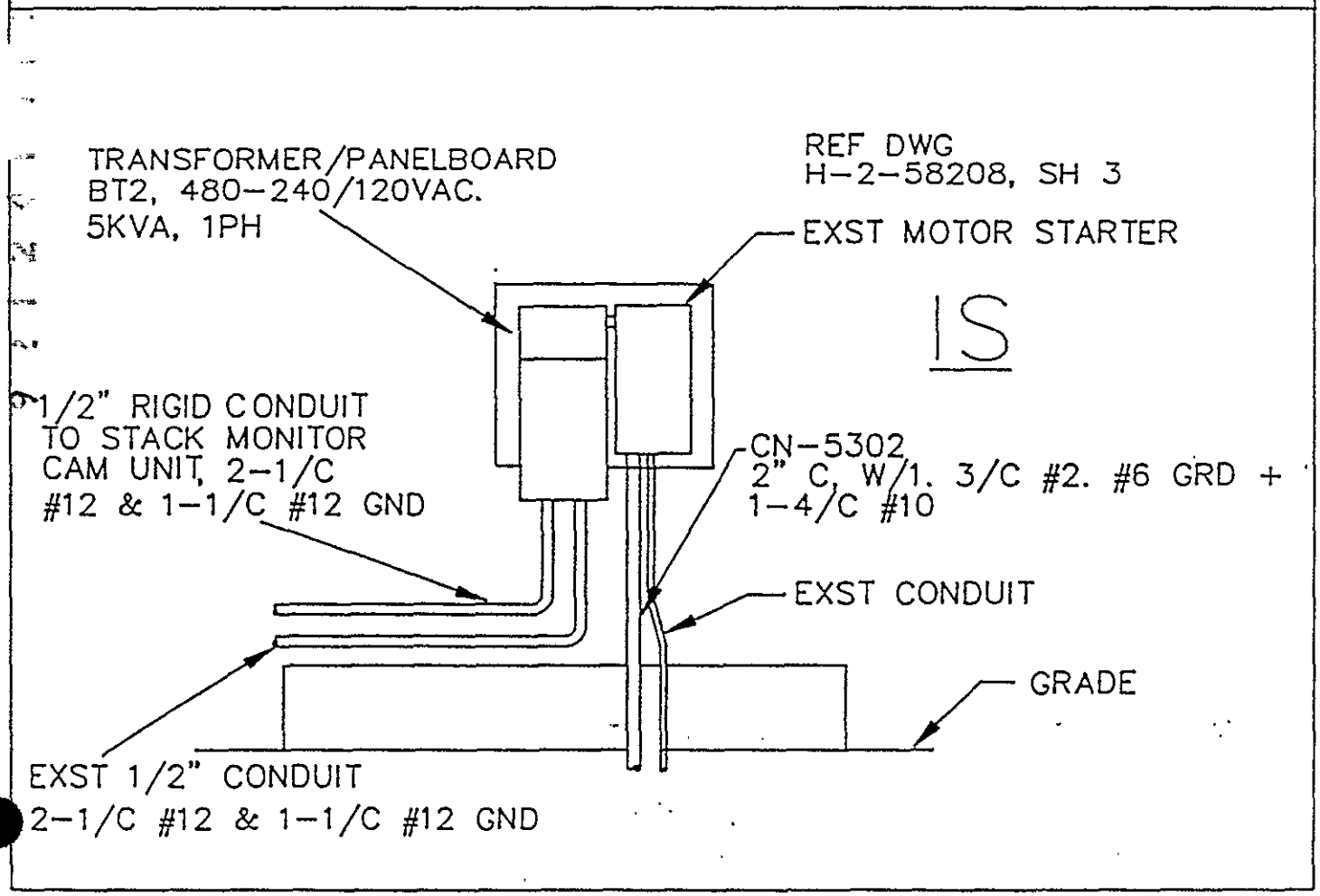
REF DWG H-2-58208, SH 1



IS CONDITION

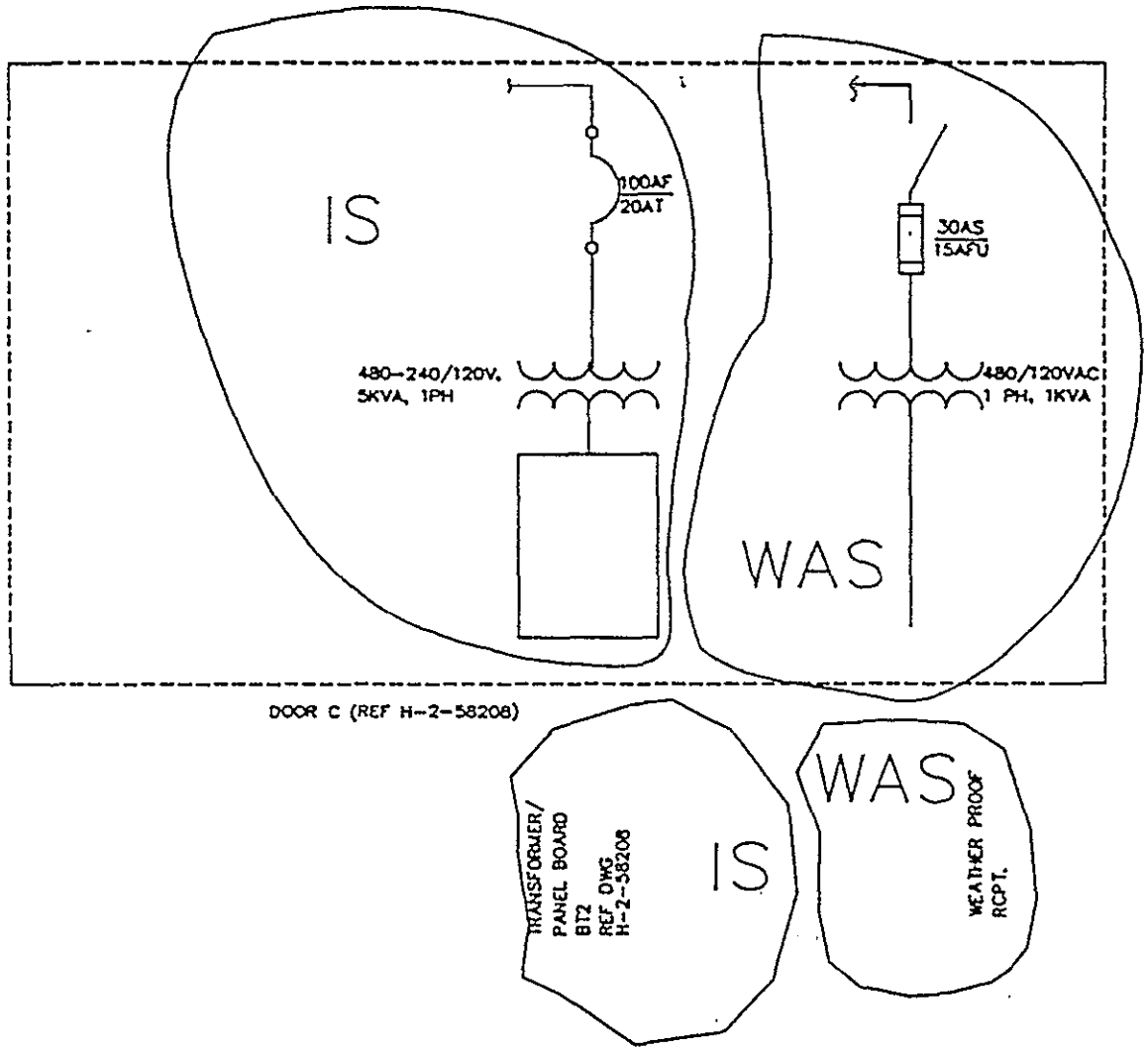
1. ECN 134604


REF DWG
H-2-58208, SH 3
EXST MOTOR STARTER
WAS
CN-5302
2" C, W/1. 3/C #2. #6 GRD +
1 - 4/C#10 (REMOVE EXST
CONDUIT AND WIRING)
EXST CONDUIT
GRADE


TRANSFORMER/PANELBOARD
BT2, 480-240/120VAC.
5KVA, 1PH
REF DWG
H-2-58208, SH 3
EXST MOTOR STARTER
IS
1/2" RIGID CONDUIT
TO STACK MONITOR
CAM UNIT, 2-1/C
#12 & 1-1/C #12 GND
CN-5302
2" C, W/1. 3/C #2. #6 GRD +
1-4/C #10
EXST CONDUIT
GRADE
EXST 1/2" CONDUIT
2-1/C #12 & 1-1/C #12 GND

ENGINEERING CHANGE NOTICE CONTINUATION SHEET Page 7 of 9 1. ECN 134604

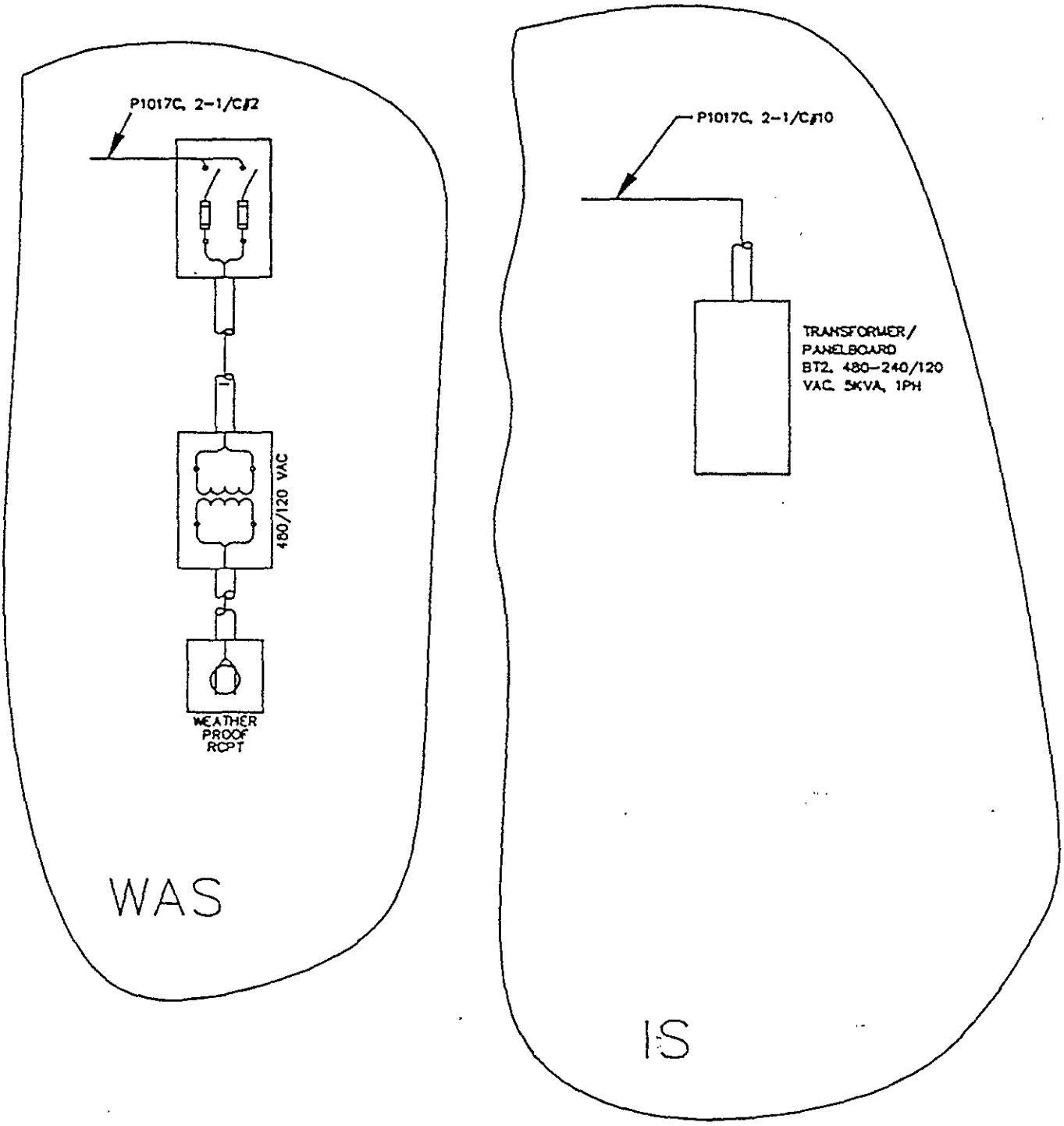
REF DWG H-2-96965, SH11
ZONE F,5



9 1 1 2 4 1 1 1 5 9 0

1. ECN 134604

REF DWG H-2-76862, SH7
ZONE F,4



9 2 1 2 4 1 1 5 9 1

1. ECN 134604

REF DWG H-2-58208, SH3

LOCATION #2 BURIAL TUNNEL VENT FAN

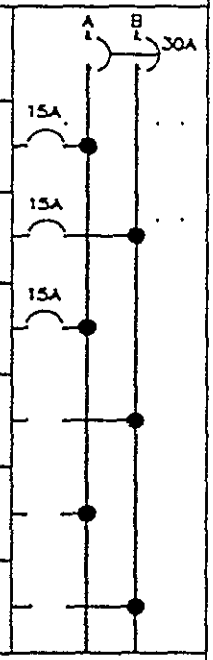
MFG & TYPE SQUARE D, MPZ5S40F TRANS, PANELBOARD POWER SUPPLIED FROM MS-V11-30-3

NEMA TYPE ENCL.

☒ SURFACE MOUNTED ☒ MAIN CKT BRKR ☒ TOP ☐ BOT ☐ PANELBOARD GROUND

☐ FLUSH MOUNTED ☐ MAIN LUGS ONLY ☒ GROUND BUS ☐ FAULT PROTECTION 30 AMP BUS

SERVICE	VA ø A	VA ø B	NO
WEATHERPROOF 4-PLEX RCPT, STACK MONITOR CAM UNIT	1200		1
WEATHERPROOF RCPT & DPT-V11-29-1		380	2
SPARE			3
SPACE			4
SPACE			5
SPACE			6
TOTAL	1200	380	



PDC=4

ENGINEERING CHANGE NOTICE

Page 1 of 6

1. ECN 135239 M

Proj. ECN

S = 143+446

2. ECN Category (mark one)	3. Originator's Name, Organization, MSIN, and Telephone No.		4. Date
Supplemental ☒	D.E.PARRISH/PUREX PROJECTS 83550/S6-01/3-4816		6/1/90
Direct Revision ☐	5. Project Title/No./Work Order No.	6. Bldg./Sys./Fac. No.	7. Impact Level
Change ECN ☐	PUREX ELECTRICAL BASELINE DWGS	PUREX/202A	4
Temporary ☐	8. Document Number Affected (include rev. and sheet no.)	9. Related ECN No(s).	10. Related PO No.
Supersedure ☐	SEE BLOCK 12 BELOW	N/A	N/A
Discovery ☐			
Cancel/Void ☐			

11a. Modification Work	11b. Work Package Doc. No.	11c. Complete Installation Work	11d. Complete Restoration (Temp. ECN only)
☐ Yes (fill out Blk. 11b)	N/A	N/A	N/A
☒ No (NA Blks. 11b, 11c, 11d)		Cog. Engineer Signature & Date	Cog. Engineer Signature & Date

12. Description of Change

DOCUMENT Nº AFFECTED	DESCRIPTION OF CHANGE
H-2-55593 SHT.1 REV.1	DELETE WIRING DIAGRAM AS SHOWN ON PAGE 3.
H-2-55599 SHT.1 REV.2	DELETE DIAGRAM AS SHOWN ON PAGE 4.
H-2-58208 SHT.1 REV.5	DELETE ELEMENTARY DIAGRAM AS SHOWN ON PAGE 5.
H-2-76864 SHT.6 REV.1	REVISE SHEET NUMBER OF DRAWING REF. AS SHOWN ON PAGE 6.

13a. Justification (mark one)	13b. Justification Details
Criteria Change ☒	WIRING DIAGRAMS FOR MCC-10 EQUIPMENT ARE NOW SHOWN ON DWG. H-2-76862. THE DELETED DIAGRAMS ARE INTENDED TO DELETE DUPLICATED AND/OR OUTDATED INFO. THE REVISION OF MCC-12 REF. DWG. INFO. IS A RESULT OF SHEET Nº CHANGES TO PNLBD LADDER DIAGRAMS. NO CONSTRUCTION WORK REQD.
Design Improvement ☐	
Environmental ☐	
As-Found ☐	
Facilitate Const. ☐	
Const. Error/Omission ☐	
Design Error/Omission ☐	

14. Distribution (include name, MSIN, and no. of copies)

D.E.PARRISH	S6-01
M.P. STORM	S6-01
M.D.GERKEN	S6-08
C.M.TOWNE	S6-08

RELEASE STAMP

OFFICIAL RELEASE BY WHC
DATE JUN 04 1990
Station #1

A-7900-013 (11/88)

9 2 1 2 4 1 5 9 3

ENGINEERING CHANGE NOTICE

Page 2 of 6

1. ECN (use no. from pg. 1) 135239

15. Design Verification Required	16. Cost Impact		17. Schedule Impact (days)
	ENGINEERING	CONSTRUCTION	
☐ Yes	Additional ☐ $ N/A	Additional ☐ $ N/A	Improvement ☐ N/A
☒ No	Savings ☐ $ N/A	Savings ☐ $ N/A	Delay ☐ N/A

18. Change Impact Review: Indicate the related documents (other than the engineering documents identified on Side 1) that will be affected by the change described in Block 12. Enter the affected document number in Block 19.

SDD/DD	☐	Seismic/Stress Analysis	☐	Tank Calibration Manual	☐
Functional Design Criteria	☐	Stress/Design Report	☐	Health Physics Procedure	☐
Operating Specification	☐	Interface Control Drawing	☐	Spares Multiple Unit Listing	☐
Criticality Specification	☐	Calibration Procedure	☐	Test Procedures/Specification	☐
Conceptual Design Report	☐	Installation Procedure	☐	Component Index	☐
Equipment Spec.	☐	Maintenance Procedure	☐	ASME Coded Item	☐
Const. Spec.	☐	Engineering Procedure	☐	Human Factor Consideration	☐
Procurement Spec.	☐	Operating Instruction	☐	Computer Software	☐
Vendor Information	☐	Operating Procedure	☐	Electric Circuit Schedule	☐
OM Manual	☐	Operational Safety Requirement	☐	ICRS Procedure	☐
FSAR/SAR	☐	IEFD Drawing	☐	Process Control Manual/Plan	☐
Safety Equipment List	☐	Cell Arrangement Drawing	☐	Process Flow Chart	☐
Radiation Work Permit	☐	Essential Material Specification	☐	Purchase Requisition	☐
Environmental Impact Statement	☐	Fac. Proc. Samp. Schedule	☐	NONE	☐
Environmental Report	☐	Inspection Plan	☐		☐
Environmental Permit	☐	Inventory Adjustment Request	☐		☐

19. Other Affected Documents: (NOTE: Documents listed below will not be revised by this ECN.) Signatures below indicate that the signing organization has been notified of other affected documents listed below.

Document Number/Revision	Document Number/Revision	Document Number/Revision
		NONE

20. Approvals

	Signature	Date		Signature	Date
OPERATIONS AND ENGINEERING			ARCHITECT-ENGINEER		
Cog./Project Engineer	D.E. Parish	6/1/90	PE		
Cog./Project Engr. Mgr.	D.E.P. for D.L. CHASE PER TELECON	6/1/90	QA		
QA			Safety		
Safety			Design		
Security			Other		
Proj.Prog./Dept. Mgr.					
Def. React. Div.					
Chem. Proc. Div.					
Def. Wst. Mgmt. Div.			DEPARTMENT OF ENERGY		
Adv. React. Dev. Div.					
Proj. Dept.					
Environ. Div.			ADDITIONAL		
IRM Dept.					
Facility Rep. (Ops)					
Other					

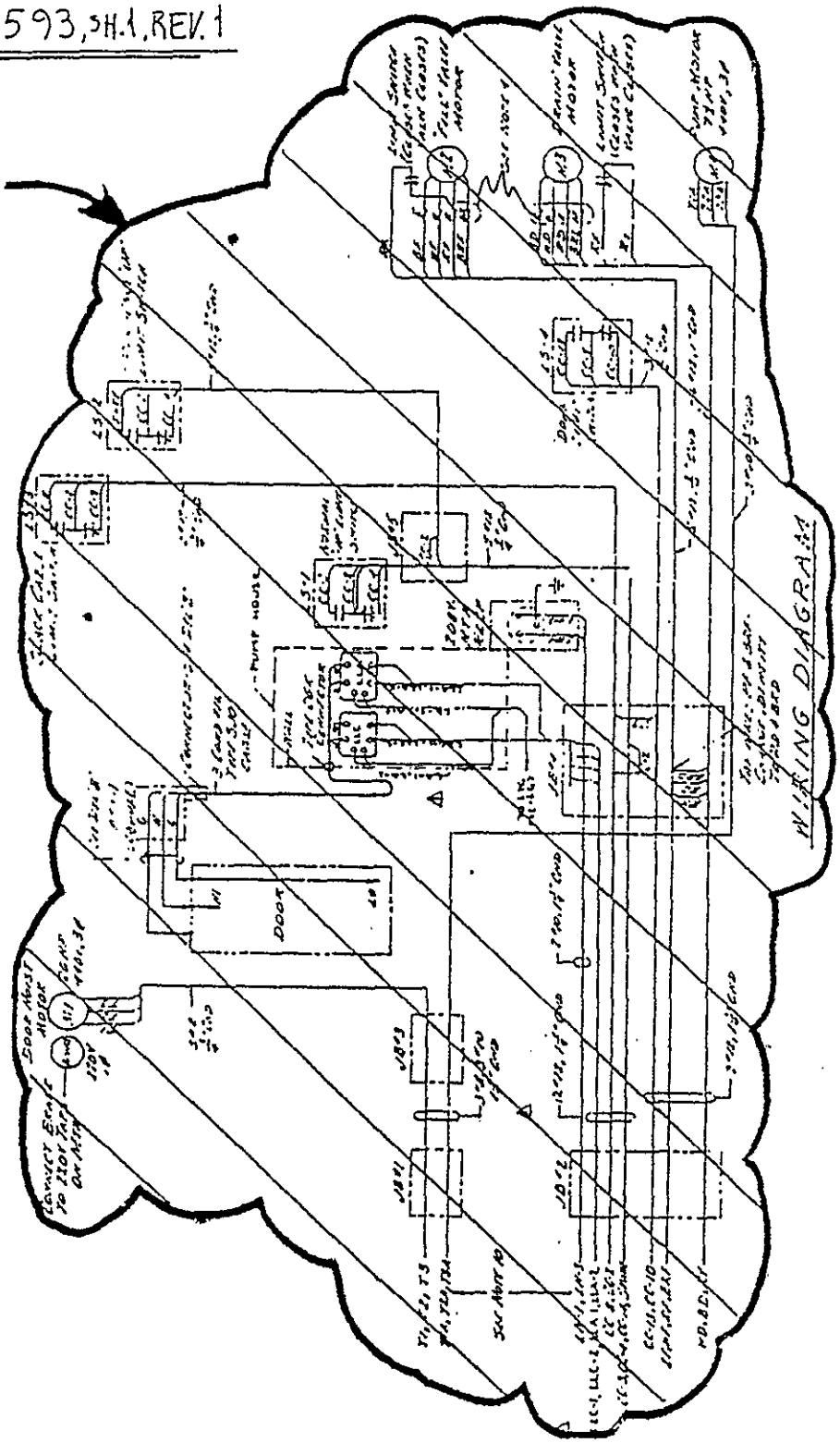
A-7900-013R (11/88)

9 2 1 2 4 1 1 5 9 4

1. ECN 135239

DRAWING H-2-55593, SH.1, REV.1

DELETE



92124 1595

1. ECN 135239

DRAWING H-2-55599 SH. 1 REV. 2

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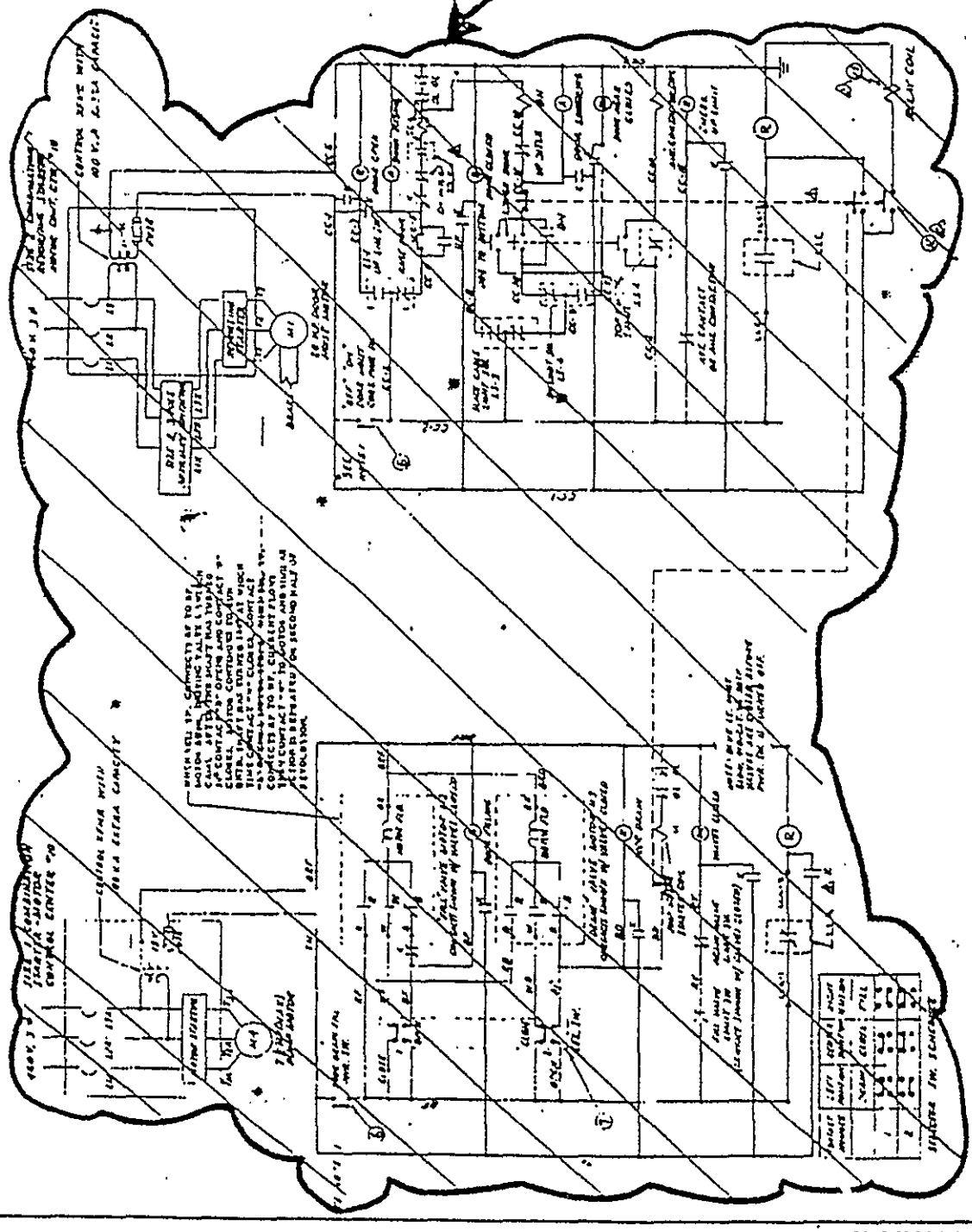

92124115 96

1. ECN 135239

DRAWING H-2-58208 SH.1 REV. 5

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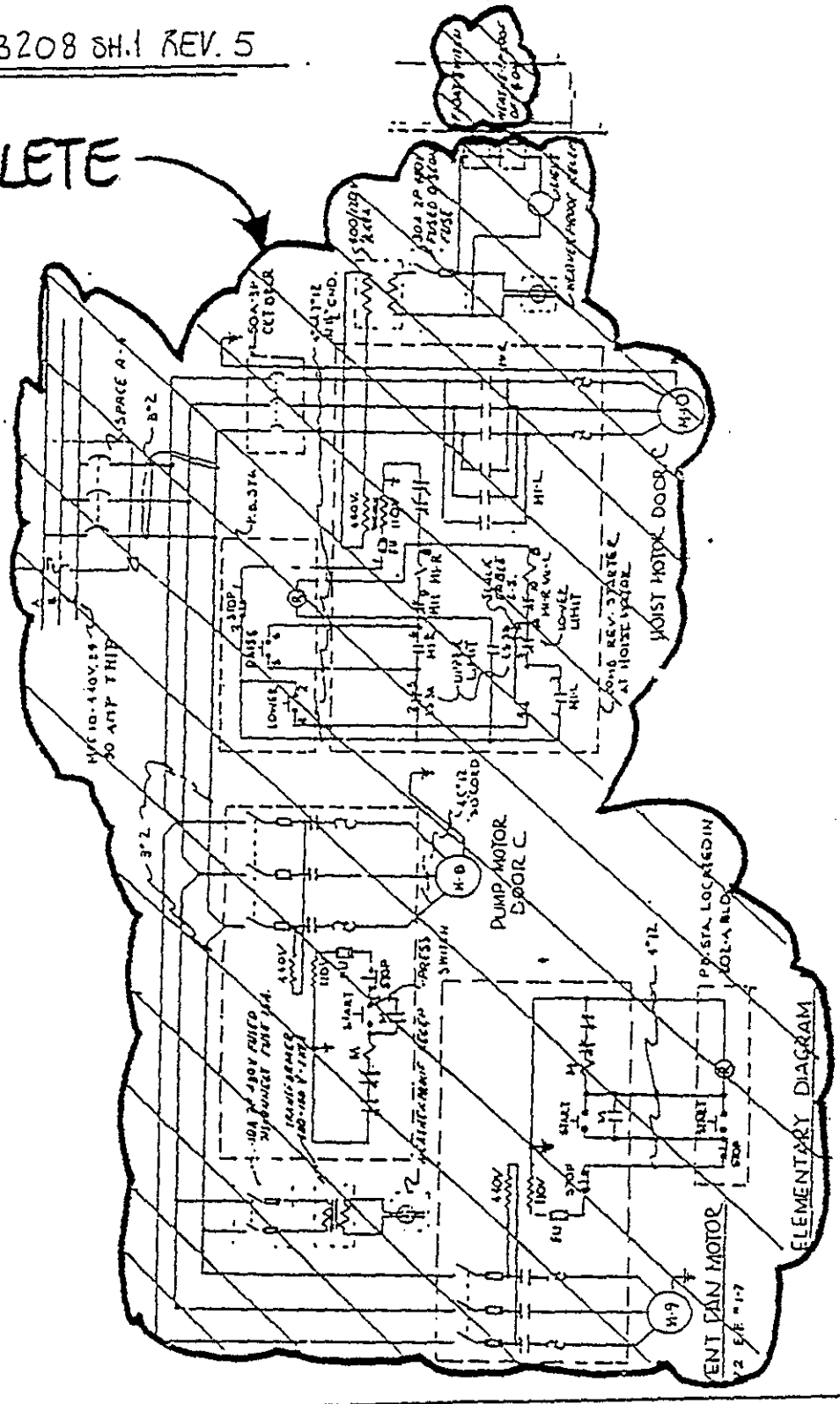
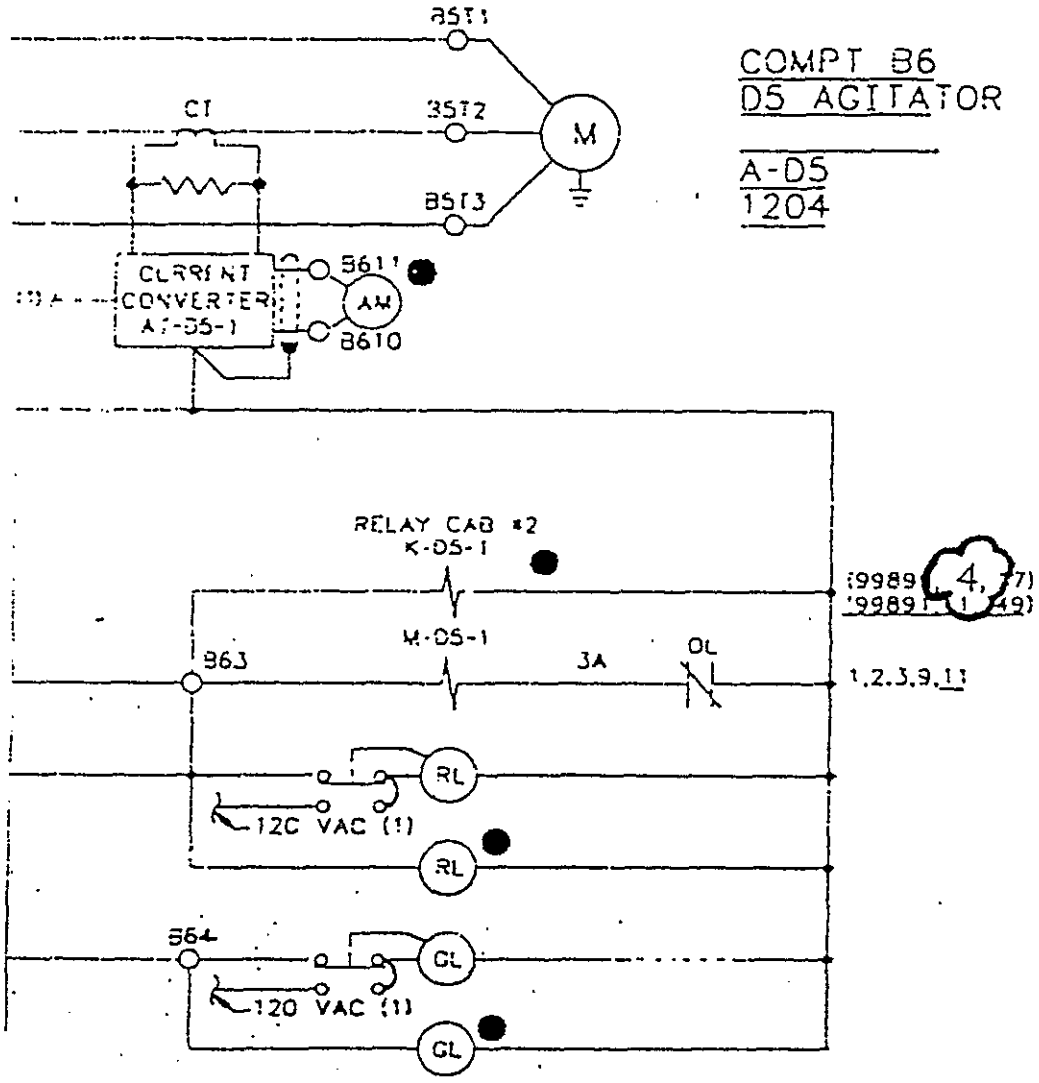


1. ECN 135239

DRAWING H-2-76864, SH. 6, REV. 1



IPF=447

ENGINEERING CHANGE NOTICE

CECN

Page 1 of 7

1. ECN 154265

Proj. ECN N/A

2. ECN Category (mark one)	3. Originator's Name, Organization, MSIN, and Telephone No.		4. Date
Supplemental ☐ Direct Revision ☐ Change ECN ☒ Temporary ☐ Supersedure ☐ Discovery ☐ Cancel/Void ☐	SW WILLIS, 27210, S6-08, 3-2103		8/8/91
	5. Project Title/No./Work Order No. KP	6. Bldg./Sys./Fac. No. 202A	7. Impact Level 4
	8. Document Number Affected (include rev. and sheet no.) H-2-58134, R.5, SH.2	9. Related ECN No(s). 134523	10. Related PO No. N/A

11a. Modification Work	11b. Work Package Doc. No.	11c. Complete Installation Work	11d. Complete Restoration (Temp. ECN only)
☒ Yes (fill out Blk. 11b) ☐ No (NA Blks. 11b, 11c, 11d)	2A-9002727	Cog. Engineer Signature & Date	N/A Cog. Engineer Signature & Date

12. Description of Change

REVISED SHEETS 3 THRU 7 OF ECN 134523 TO REFLECT 8 FASTENERS & SHOW SLOTTED HOLES IN P/N 26. CLOUDED AREAS SHOW CHANGES.

13a. Justification (mark one)	13b. Justification Details
Criteria Change ☒ Design Improvement ☐ Environmental ☐ As-Found ☐ Facilitate Const. ☐ Const. Error/Omission ☐ Design Error/Omission ☐	ESR PE-0154 CHANGES REQUIRED FOR FABRICATION IN SHOP.

14. Distribution (include name, MSIN, and no. of copies)

RA GREGONIS	S6-08
SW WILLIS	S6-08
JS HERTZEL	S6-08
DW MERTZ	S6-08
D. DENSON	T2-06

RELEASE STAMP

OFFICIAL RELEASE 54
BY WHC
DATE AUG 12 1991
Station #1

9 2 1 2 4 1 5 9 9

A-7900-013 11 88

ENGINEERING CHANGE NOTICE

1. ECN (use no. from pg. 1) 154265

15. Design Verification Required	16. Cost Impact				17. Schedule Impact (days)	
	ENGINEERING		CONSTRUCTION			
☒ Yes	Additional ☐	$ N/A	Additional ☐	$ N/A	Improvement ☐	N/A
☐ No	Savings ☐	$	Savings ☐	$	Delay ☐	

18. Change Impact Review: Indicate the related documents (other than the engineering documents identified on Side 1) that will be affected by the change described in Block 12. Enter the affected document number in Block 19.

SDD/DD	☐	Seismic/Stress Analysis	☐	Tank Calibration Manual	☐
Functional Design Criteria	☐	Stress/Design Report	☐	Health Physics Procedure	☐
Operating Specification	☐	Interface Control Drawing	☐	Spares Multiple Unit Listing	☐
Criticality Specification	☐	Calibration Procedure	☐	Test Procedures/Specification	☐
Conceptual Design Report	☐	Installation Procedure	☐	Component Index	☐
Equipment Spec.	☐	Maintenance Procedure	☐	ASME Coded Item	☐
Const. Spec.	☐	Engineering Procedure	☐	Human Factor Consideration	☐
Procurement Spec.	☐	Operating Instruction	☐	Computer Software	☐
Vendor Information	☐	Operating Procedure	☐	Electric Circuit Schedule	☐
OM Manual	☐	Operational Safety Requirement	☐	ICRS Procedure	☐
FSAR/SAR	☐	IEFD Drawing	☐	Process Control Manual/Plan	☐
Safety Equipment List	☐	Cell Arrangement Drawing	☐	Process Flow Chart	☐
Radiation Work Permit	☐	Essential Material Specification	☐	Purchase Requisition	☐
Environmental Impact Statement	☐	Fac. Proc. Samp. Schedule	☐		☐
Environmental Report	☐	Inspection Plan	☐		☐
Environmental Permit	☐	Inventory Adjustment Request	☐		☐

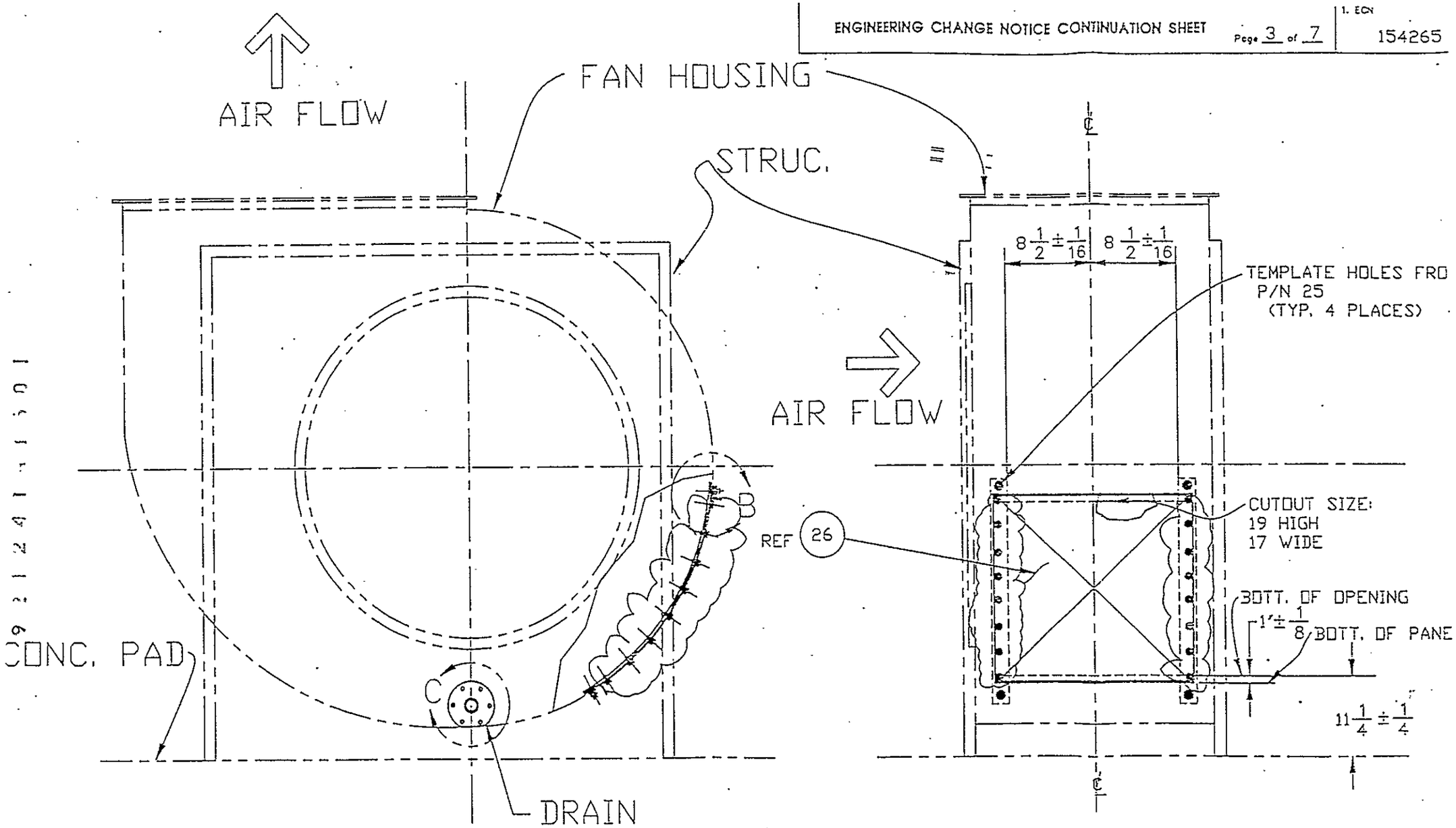
N/A N/A N/A

19. Other Affected Documents: (NOTE: Documents listed below will not be revised by this ECN.) Signatures below indicate that the signing organization has been notified of other affected documents listed below.

Document Number/Revision	Document Number/Revision	Document Number/Revision
N/A	N/A	N/A

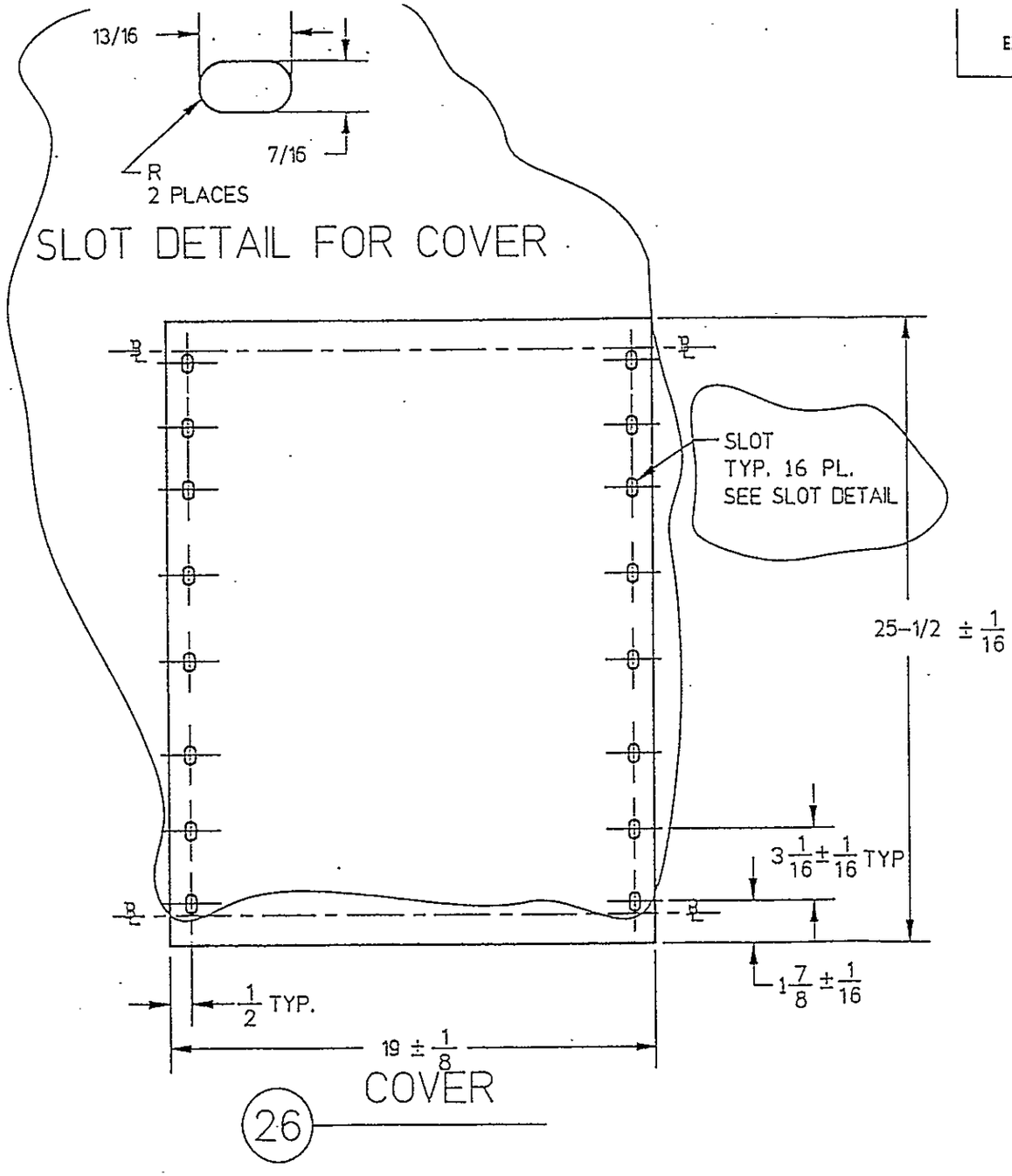
20. Approvals

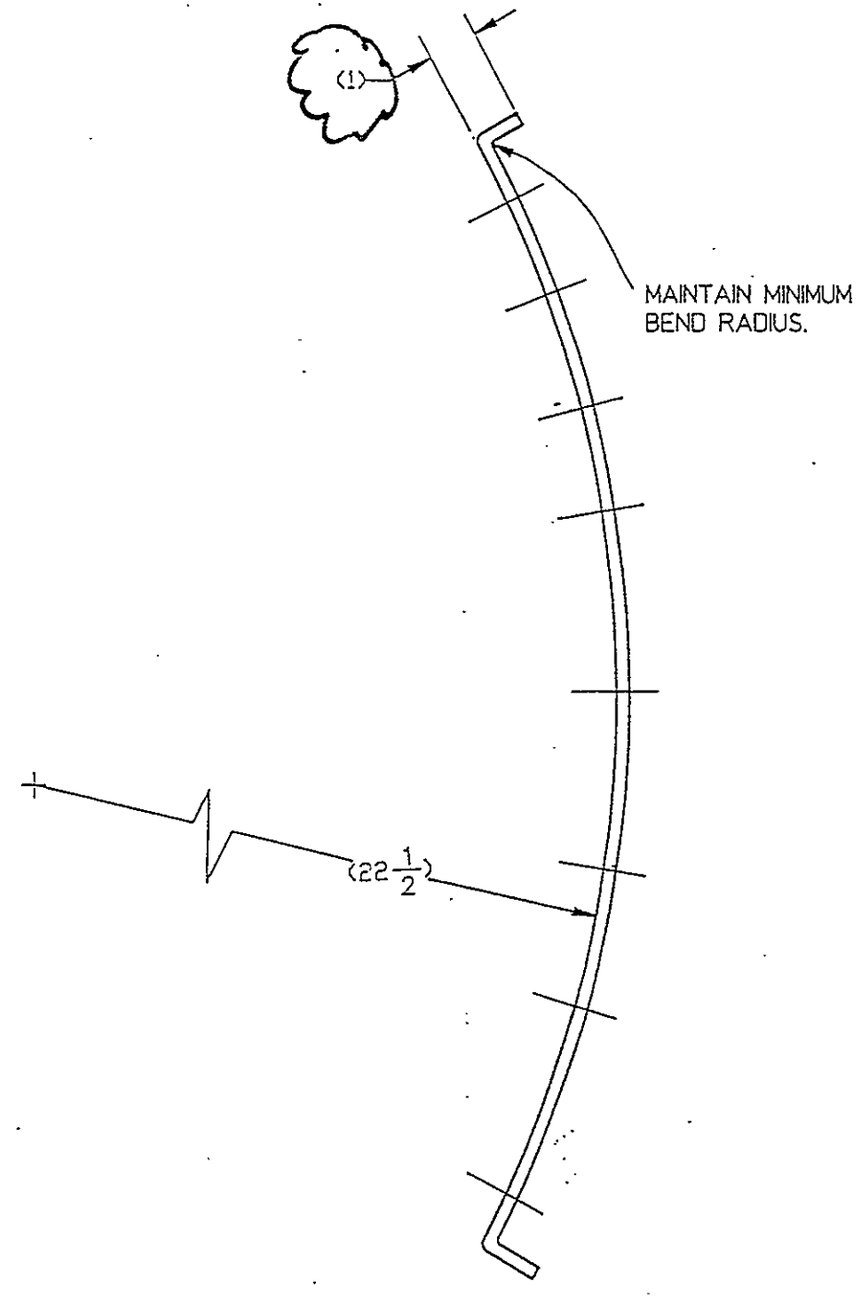
OPERATIONS AND ENGINEERING	Signature	Date	ARCHITECT-ENGINEER	Signature	Date
Cog./Project Engineer	[signature]	8-9-91	PE		
Cog./Project Engr. Mgr.	[signature]	8-9-91	QA		
QA			Safety		
Safety			Design		
Security			Other		
Proj.Prog./Dept. Mgr.					
Def. React. Div.					
Chem. Proc. Div.					
Def. Wst. Mgmt. Div.			DEPARTMENT OF ENERGY		
Adv. React. Dev. Div.					
Proj. Dept.					
Environ. Div.			ADDITIONAL		
IRM Dept.					
Facility Rep. (Ops)					
Other					



SEE SHEET 8 OF 8, THIS ECN

INSTALLATION

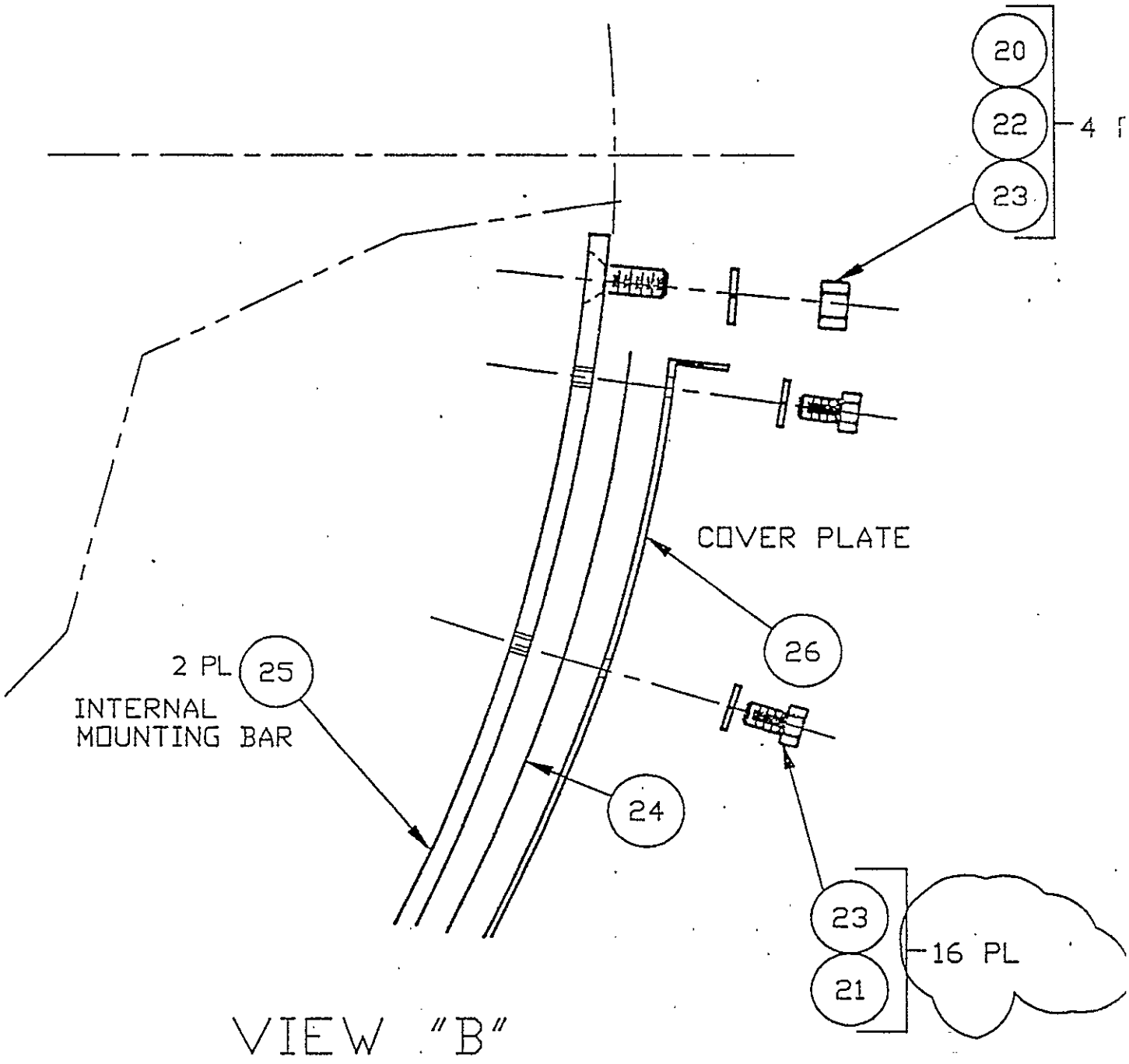




THIS DETAIL SHOWN IN FLAT PATTERN

9 2 1 2 4 1 - 1 5 0 2

1. ECN 154265



VIEW "B"

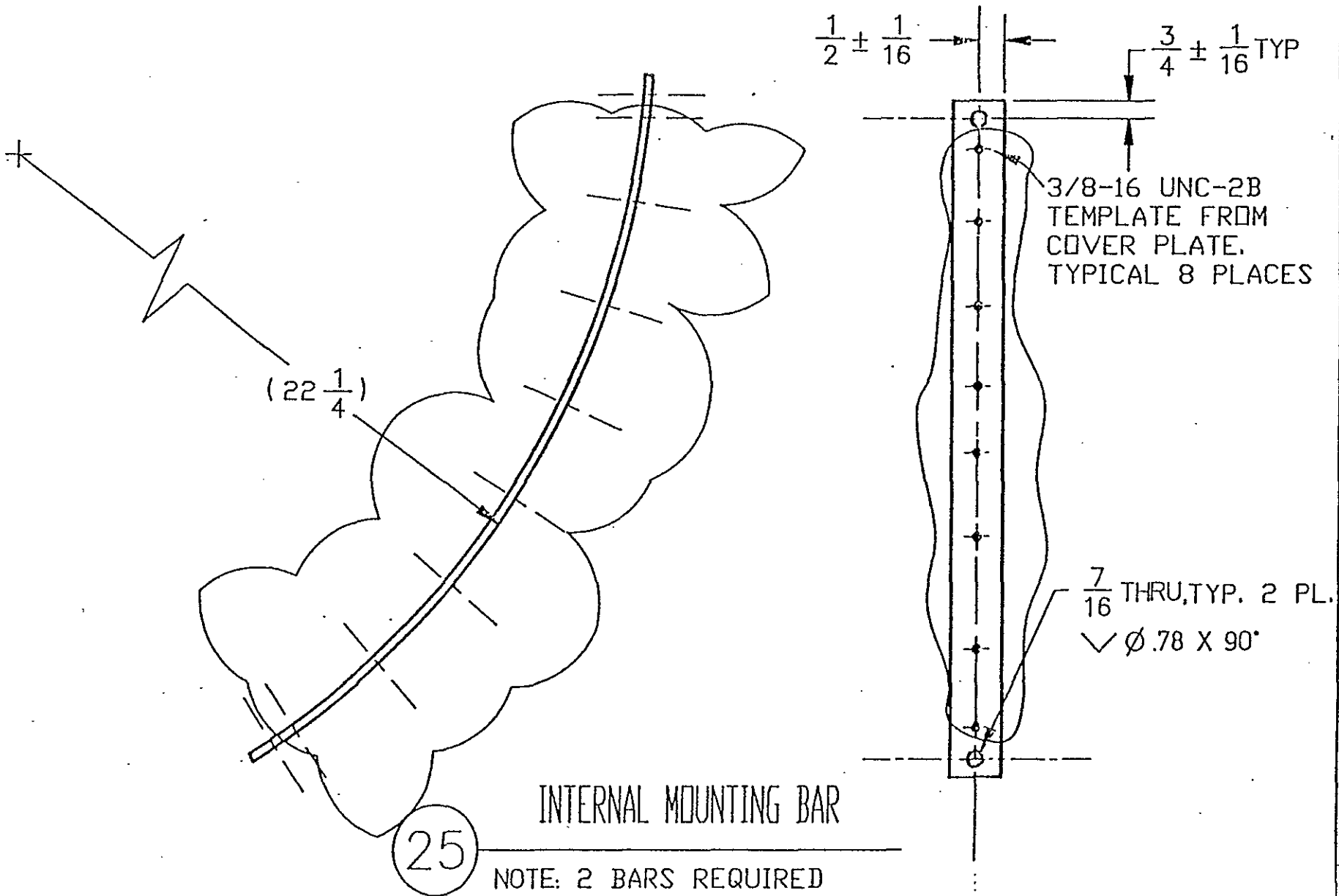
9 2 1 2 4 1 5 0 3

QTY.	PT. NO.	DESCRIPTION	MATERIAL
4	20	SCREW, SOCKET FLAT COUNTERSUNK HD CAP 3/8-16 UNC-2A X 5/8 LONG	COM'L CS
16	21	SCREW, HEX HD CAP 3/8-16 UNC-2A X 5/8 LONG	COM'L CS
4	22	NUT, HEX, REG. 3/8-16 UNC-2B	COM'L CS
20	23	WASHER,LOCK,HLCL SPG 3/8 NOM, RGLR	COM'L CS
AR	24	GASKET NEOPRENE, 1/8 THICK STRIP X 1 X LENGTH A/R	COM'L GRADE
2	25	BAR, 1 X 1/4 X 27 LONG	COM'L CS
AR	26	SHEET, 11 GAUGE (0.120) X 19 WIDE X 25 1/2 LONG	COM'L CS
1	27	PLATE 3-1/4 O.D. X 1 I.D. X .125 THK	ASTM A 36 CS
1	28	HALF CPLG 1 SCRD CLASS 150	ASTM A 105 CS
1	29	PLUG 1" NPT	COM'L CS
1	30	VALVE, BALL, 1", CLASS 150, THRD'	COM'L CS
1	31	GASKET, NEOPRENE, 3-1/4 O.D. X 1 I.D. X .125 THK.	COM'L GRADE
6	32	RIVET, MONOBOLT 1/4"	CHERRY, CCPV-86
1	33	NIPPLE, CLOSE, 1" SCHEDULE 40	COM'L CS

* ADD TO PARTS LIST ON DWG.

ENGINEERING CHANGE NOTICE CONTINUATION SHEET

1. ECN 15426



INTERNAL MOUNTING BAR

25

NOTE: 2 BARS REQUIRED
FOR INSTALLATION

ENGINEERING CHANGE NOTICE

CECN

IPF=4+7

Page 1 of 3

1. ECN 154266

Proj. ECN N/A

2. ECN Category (mark one)	3. Originator's Name, Organization, MSIN, and Telephone No.		4. Date
Supplemental ☐ Direct Revision ☐ Change ECN ☑ Temporary ☐ Supersedure ☐ Discovery ☐ Cancel/Void ☐	SW WILLIS, 27210, S6-08, 3-2103		8/5
	5. Project Title/No./Work Order No. KP	6. Bldg./Sys./Fac. No. 202A	7. Impact Level ~~3~~ 4
	8. Document Number Affected (include rev. and sheet no.) H-2-58134, R 5, SH. 2	9. Related ECN No(s). ~~N/A~~ 134523	10. Related PO No. N/A

11a. Modification Work	11b. Work Package Doc. No.	11c. Complete Installation Work	11d. Complete Restoration (Temp. ECN only)
☒ Yes (fill out Blk. 11b) ☐ No (NA Blks. 11b, 11c, 11d)	ZA-9002727	Cog. Engineer Signature & Date	N/A Cog. Engineer Signature & Date

12. Description of Change

CHANGE SIZES ON SH. 5 OF ECN ~~154266~~ 134523 IN PARTS LIST, FOR ~~ITEM~~ P/N'S 25 & 26.

CORRECTED SIZES SHOWN ON SH. 3 OF THIS ECN.

13a. Justification (mark one)	13b. Justification Details
Criteria Change ☒ Design Improvement ☐ Environmental ☐ As-Found ☐ Facilitate Const. ☐ Const. Error/Omission ☐ Design Error/Omission ☐	ESR- ~~PC-15~~ PE 0154 CHANGES REQ'D FOR WORK COMPLETION.

14. Distribution (include name, MSIN, and no. of copies)

RA GREGONIS	S6-08
SW WILLIS	S6-08
JS HERTZEL	S6-08
DW MERTZ	S6-08
D. DENSON	T2-06

RELEASE STAMP

OFFICIAL RELEASE BY WHC 54
DATE AUG 05 1991
Station #1

A-7900-013 (11/8

9 3 1 2 4 1 4 1 3 0 6

ENGINEERING CHANGE NOTICE

1. ECN (use no. from pg. 1): 154266

15. Design Verification Required	16. Cost Impact				17. Schedule Impact (days)	
	ENGINEERING		CONSTRUCTION			
☒ Yes	Additional ☐	$ N/A	Additional ☐	$ N/A	Improvement ☐	N/A
☐ No	Savings ☐	$	Savings ☐	$	Delay ☐	

18. Change Impact Review: Indicate the related documents (other than the engineering documents identified on Side 1) that will be affected by the change described in Block 12. Enter the affected document number in Block 19.

SDD/DD	☐	Seismic/Stress Analysis	☐	Tank Calibration Manual	☐
Functional Design Criteria	☐	Stress/Design Report	☐	Health Physics Procedure	☐
Operating Specification	☐	Interface Control Drawing	☐	Spares Multiple Unit Listing	☐
Criticality Specification	☐	Calibration Procedure	☐	Test Procedures/Specification	☐
Conceptual Design Report	☐	Installation Procedure	☐	Component Index	☐
Equipment Spec. N/A	☐	Maintenance Procedure N/A	☐	ASME Coded Item N/A	☐
Const. Spec.	☐	Engineering Procedure	☐	Human Factor Consideration	☐
Procurement Spec.	☐	Operating Instruction	☐	Computer Software	☐
Vendor Information	☐	Operating Procedure	☐	Electric Circuit Schedule	☐
OM Manual	☐	Operational Safety Requirement	☐	ICRS Procedure	☐
FSAR/SAR	☐	IEFD Drawing	☐	Process Control Manual/Plan	☐
Safety Equipment List	☐	Cell Arrangement Drawing	☐	Process Flow Chart	☐
Radiation Work Permit	☐	Essential Material Specification	☐	Purchase Requisition	☐
Environmental Impact Statement	☐	Fac. Proc. Samp. Schedule	☐		☐
Environmental Report	☐	Inspection Plan	☐		☐
Environmental Permit	☐	Inventory Adjustment Request	☐		☐

19. Other Affected Documents: (NOTE: Documents listed below will not be revised by this ECN.) Signatures below indicate that the signing organization has been notified of other affected documents listed below.

Document Number/Revision	Document Number/Revision	Document Number/Revision
N/A	N/A	N/A

20. Approvals

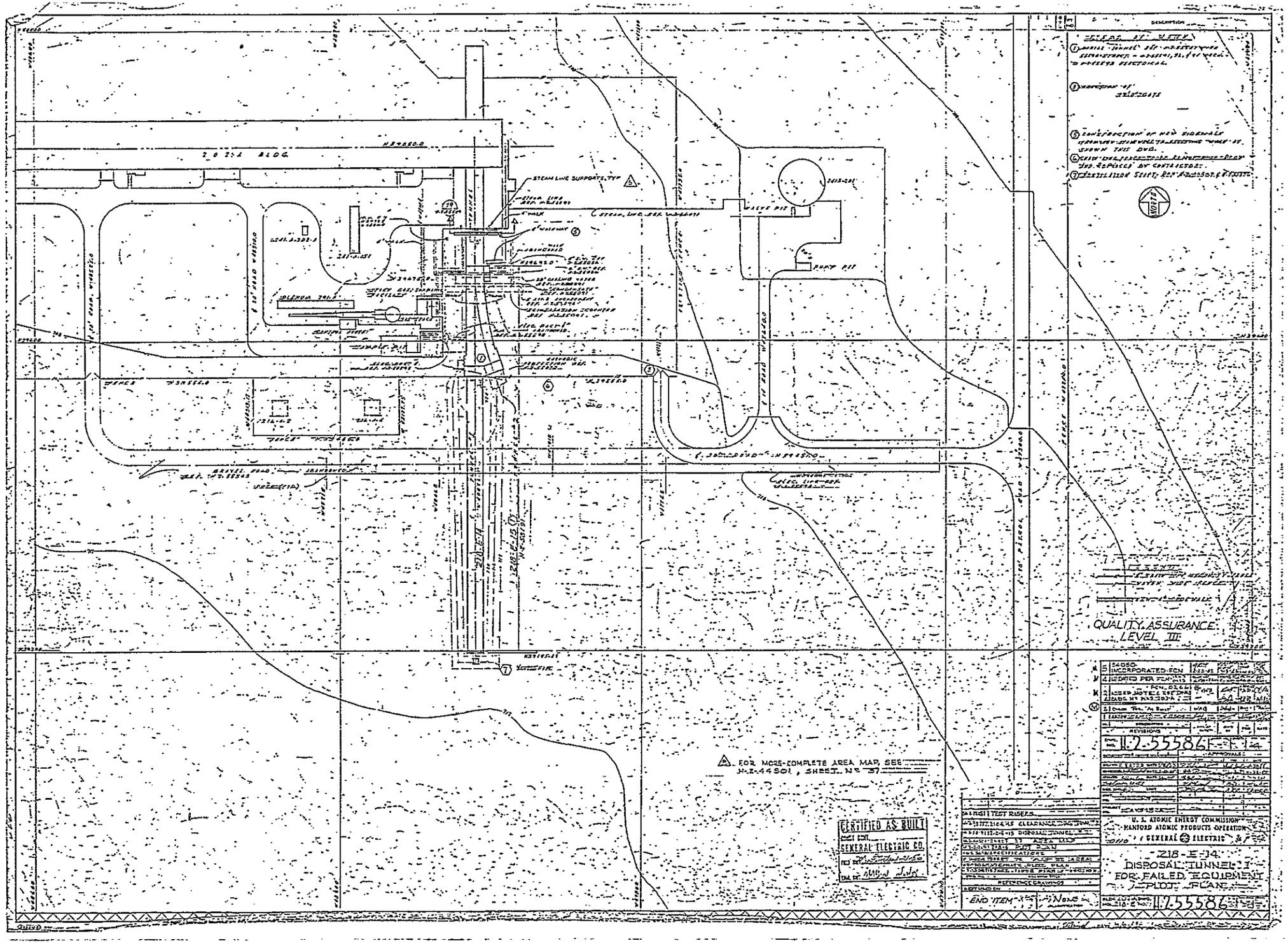
Signature	Date	Signature	Date
OPERATIONS AND ENGINEERING		ARCHITECT-ENGINEER	
Cog./Project Engineer [signature]	8-5-91	PE	
Cog./Project Engr. Mgr. [signature]	8-5-91	QA	
QA		Safety	
Safety		Design	
Security		Other	
Proj.Prog./Dept. Mgr.			
Def. React. Div.			
Chem. Proc. Div.			
Def. Wst. Mgmt. Div.		DEPARTMENT OF ENERGY	
Adv. React. Dev. Div.			
Proj. Dept.			
Environ. Div.		ADDITIONAL	
IRM Dept.			
Facility Rep. (Ops)			
Other			

QTY.	PT. NO.	DESCRIPTION	MATERIAL
4	20	SCREW, SOCKET FLAT COUNTERSUNK HD CAP 3/8-16 UNC-2A X 5/8 LONG	COM'L CS
12	21	SCREW, HEX HD CAP 3/8-16 UNC-2A X 5/8 LONG	COM'L CS
4	22	NUT, HEX, REG. 3/8-16 UNC-2B	COM'L CS
16	23	WASHER,LOCK,HLCL SPG 3/8 NOM, RGLR	COM'L CS
AR	24	GASKET NEOPRENE, 1/8 THICK STRIP X 1 X LENGTH A/R	COM'L GRADE
2	25	BAR, 1 X 1/4 X 27 LONG	COM'L CS
AR	26	SHEET, 11 GAUGE (0.120) X 19 WIDE X 25 1/2 LONG	COM'L CS
1	27	PLATE 3-1/4 O.D. X 1 I.D. X .125 THK	ASTM A 36 CS
1	28	HALF CPLG 1 SCRD CLASS 150	ASTM A 105 CS
1	29	PLUG 1" NPT	COM'L CS
1	30	VALVE, BALL, 1", CLASS 150, THRD'	COM'L CS
1	31	GASKET, NEOPRENE, 3-1/4 O.D. X 1 I.D. X .125 THK.	COM'L GRADE
6	32	RIVET, MONOBOLT 1/4"	CHERRY, CCPV-86
1	33	NIPPLE, CLOSE, 1" SCHEDULE 40	COM'L CS

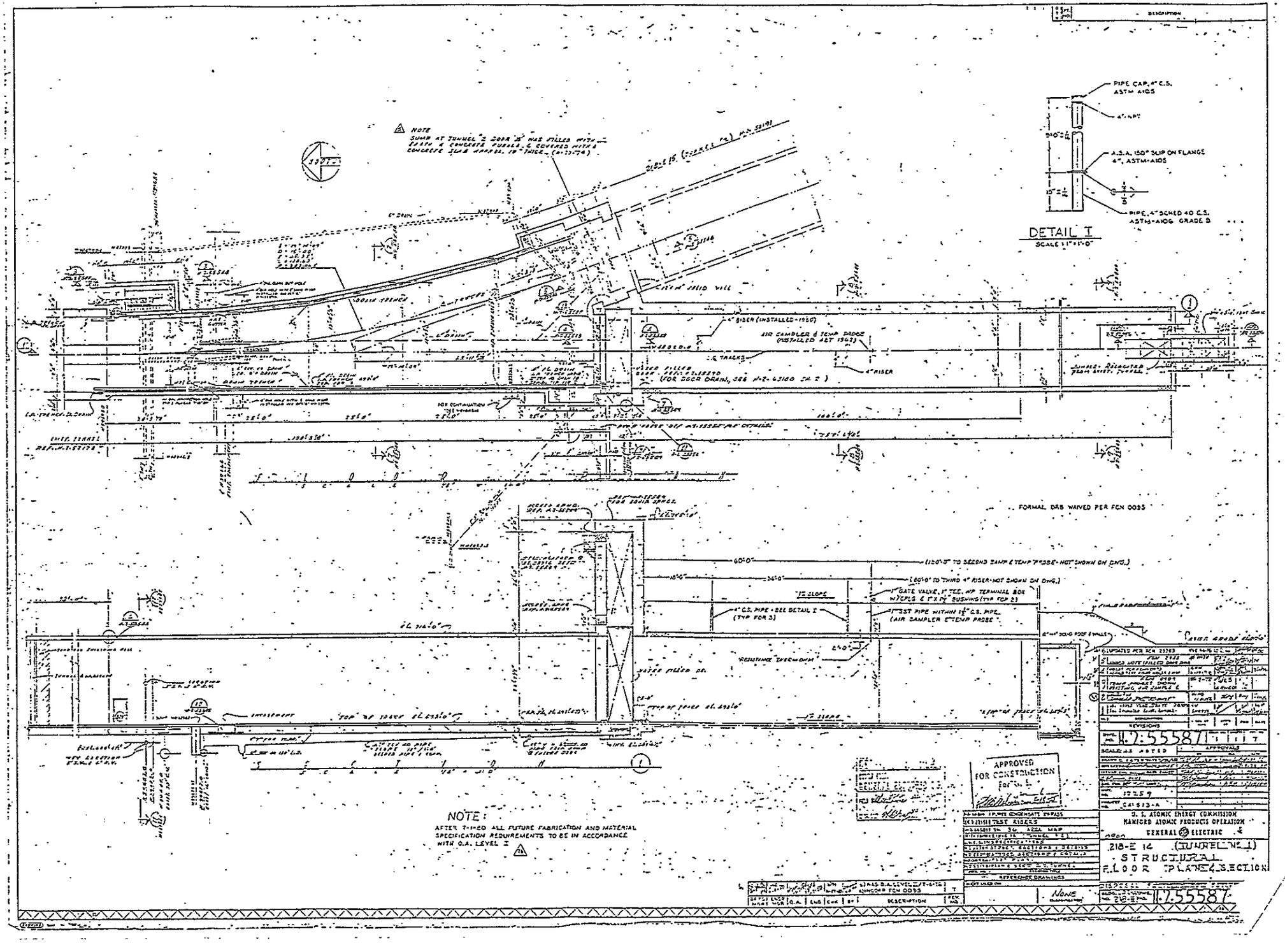
* ADD TO PARTS LIST ON DWG.

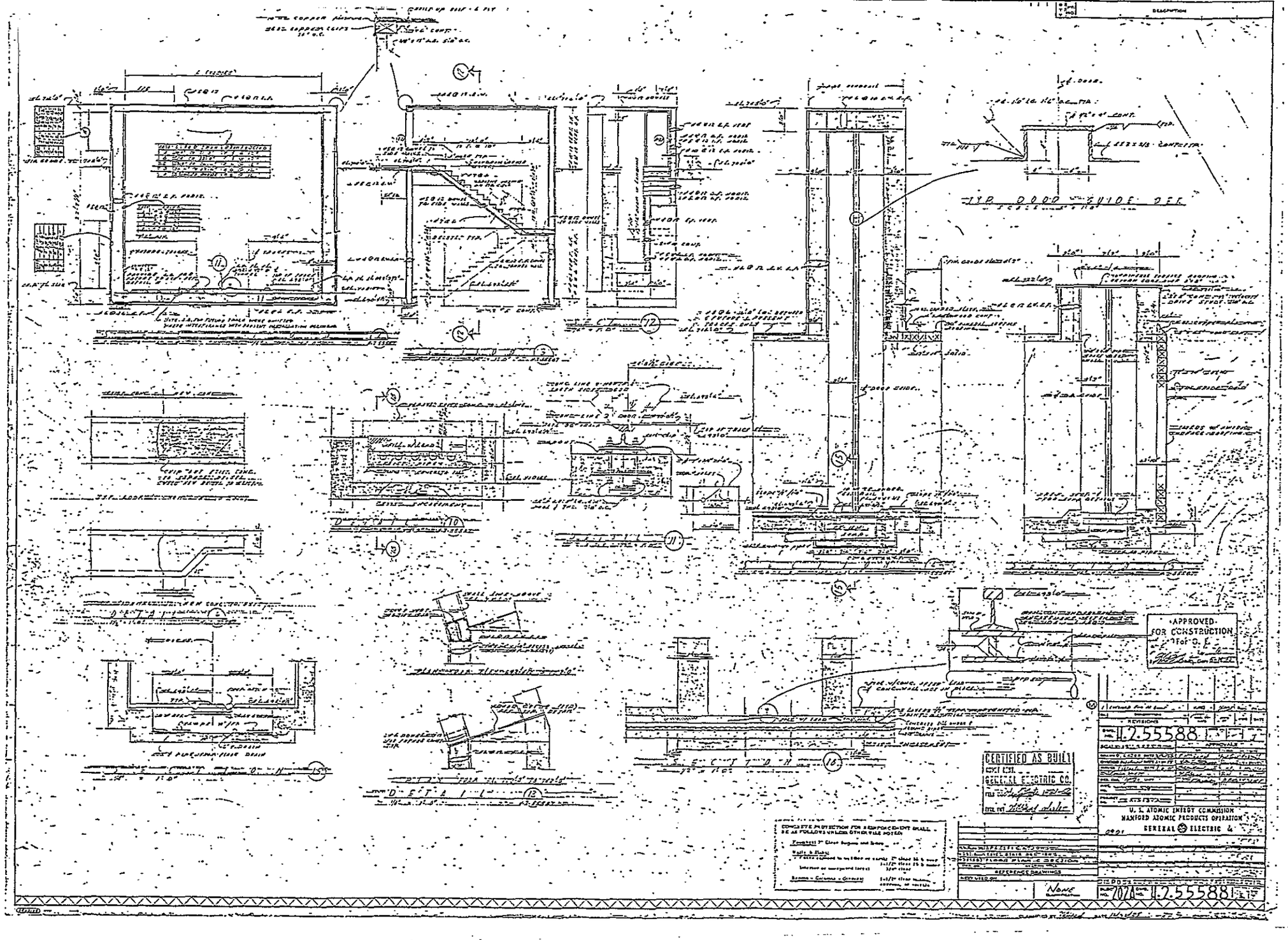
ENGINEERING CHANGE NOTICE CONTINUATION SHEET

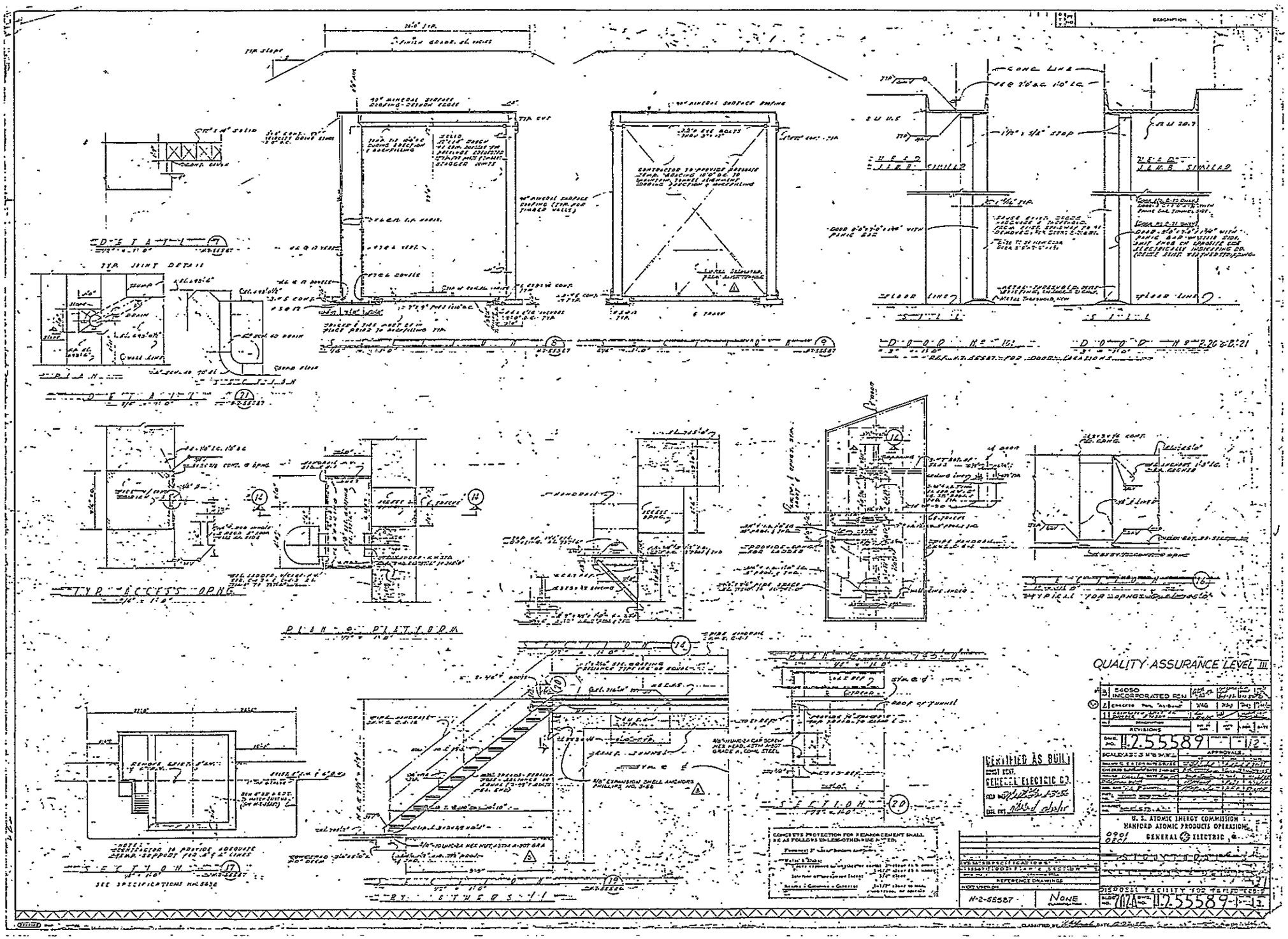
1..ECN 154266



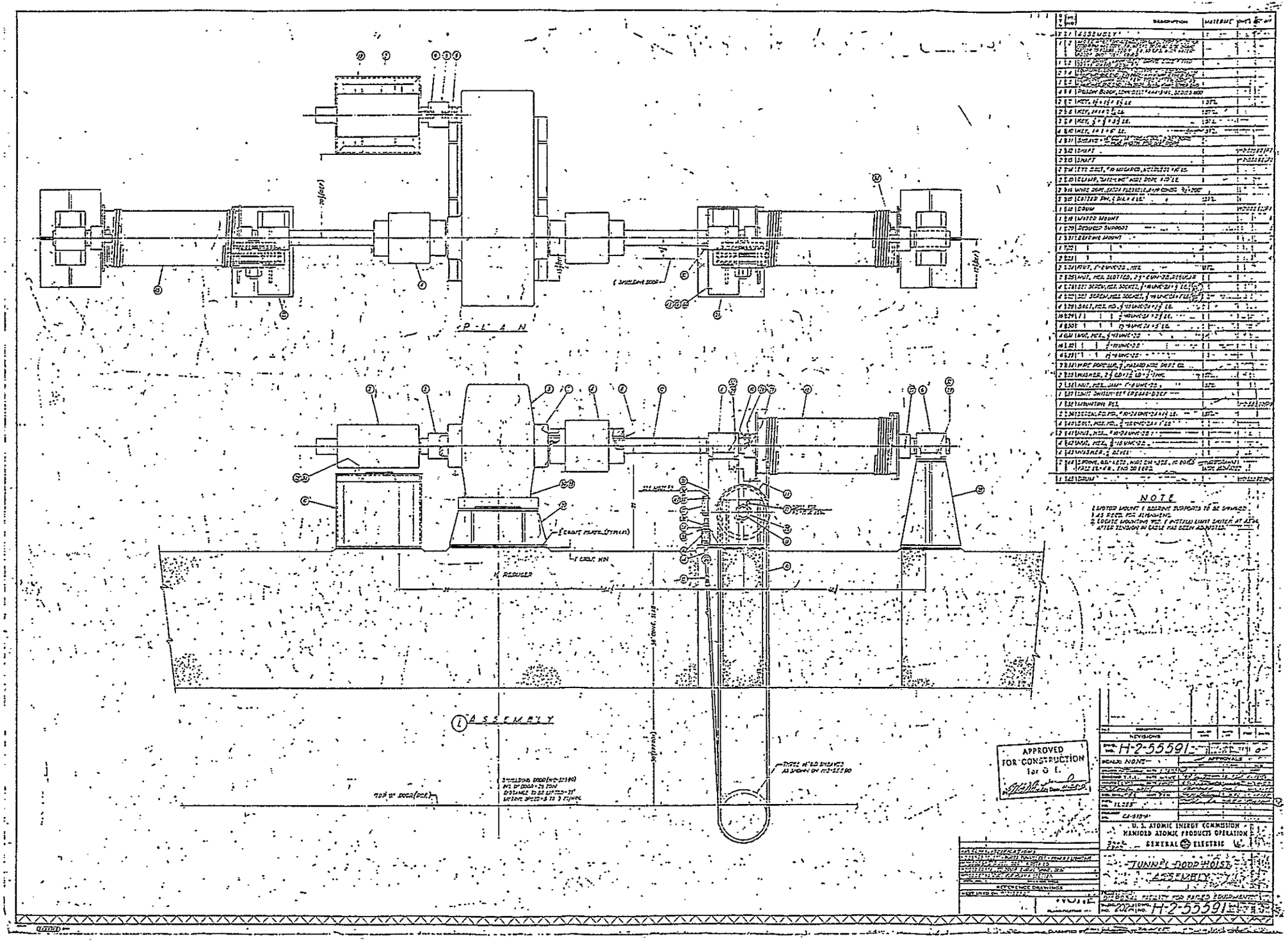
QUALITY ASSURANCE LEVEL III
FOR MORE COMPLETE AREA MAP, SEE H-2-44501, SHEET No 37
CERTIFIED AS BUILT
GENERAL ELECTRIC CO.
U. S. ATOMIC ENERGY COMMISSION
HANFORD ATOMIC PRODUCTS OPERATION
GENERAL ELECTRIC
218-E-14
DISPOSAL TUNNEL
FOR FAILED EQUIPMENT
PLOT PLAN
H-2-55586

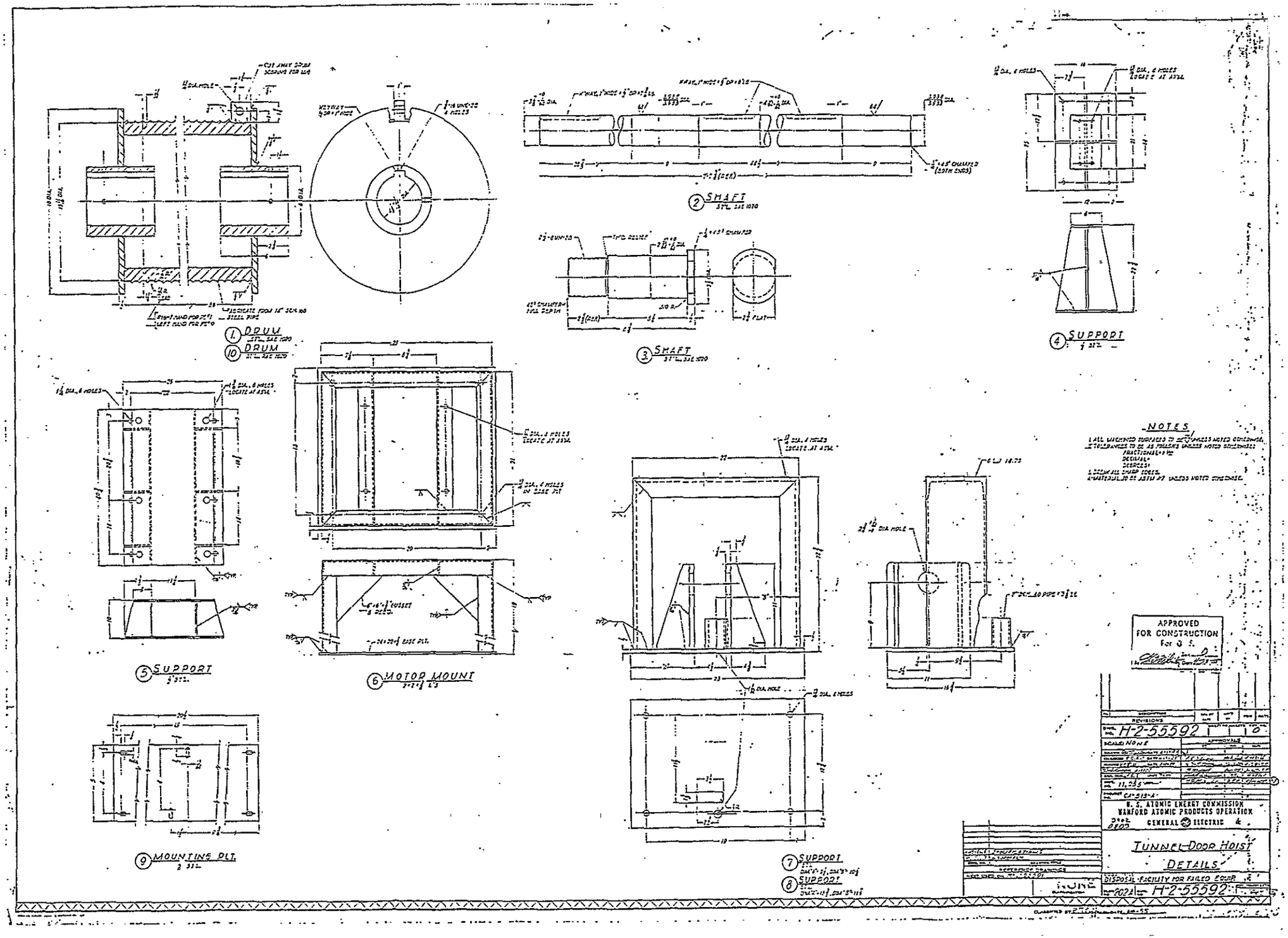

DETAIL I
SCALE 1"=1'-0"
PIPE CAP, 4" C.S. ASTM A105
A.S.A. 150# SLIP ON FLANGE 4", ASTM-A105
PIPE, 4" SCHED 40 C.S. ASTM-A106 GRADE B
FORMAL DRB WAIVED PER FCN 0095
NOTE:
AFTER 7-1-60 ALL FUTURE FABRICATION AND MATERIAL SPECIFICATION REQUIREMENTS TO BE IN ACCORDANCE WITH Q.A. LEVEL I
APPROVED FOR CONSTRUCTION
U. S. ATOMIC ENERGY COMMISSION
HANFORD ATOMIC PRODUCTS OPERATION
GENERAL ELECTRIC
218-E 14 (TUNNEL No. 1)
STRUCTURAL
FLOOR PLAN & SECTION
H-7-55587

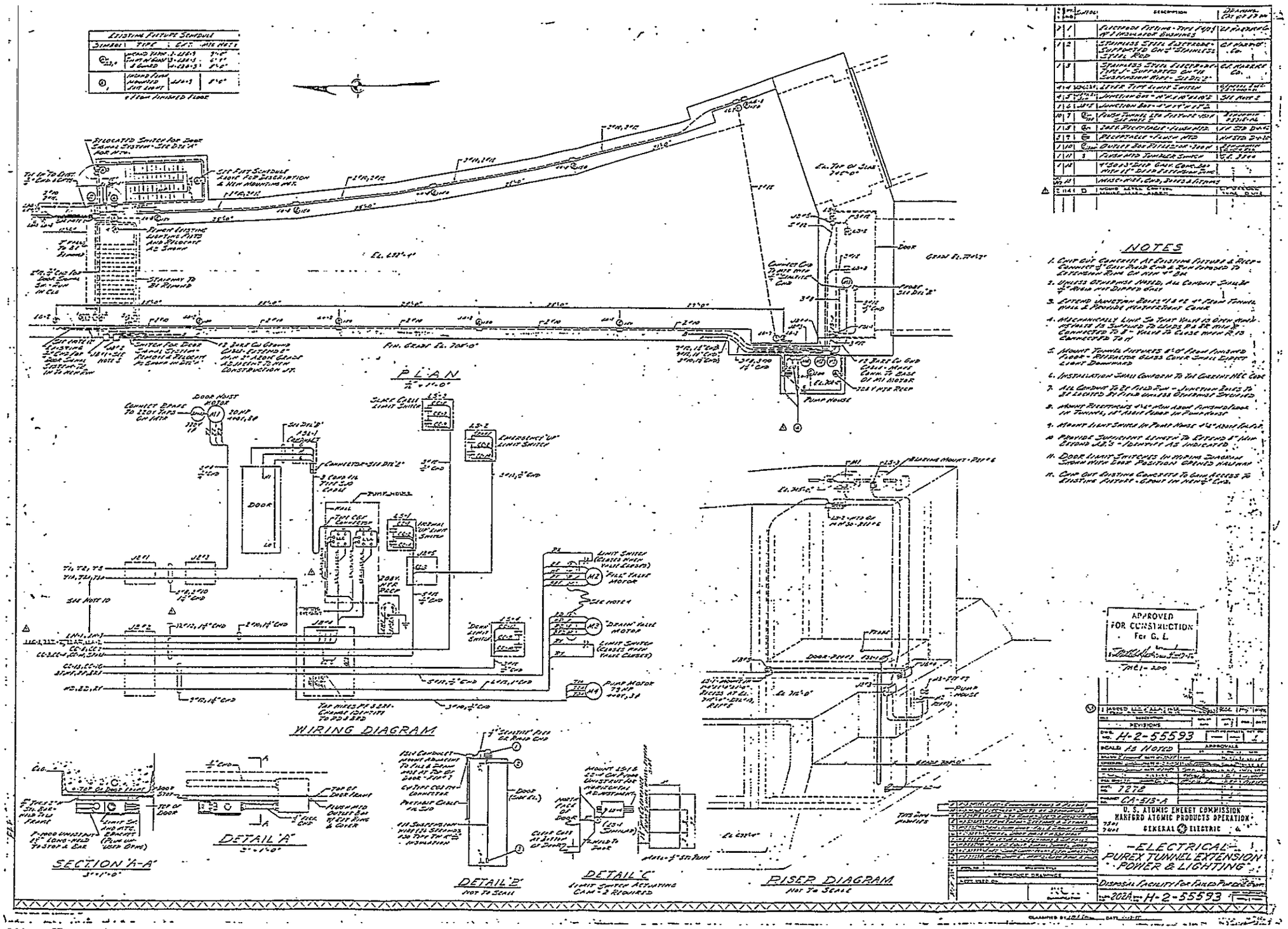

APPROVED FOR CONSTRUCTION
CERTIFIED AS BUILT
GENERAL ELECTRIC CO.
U. S. ATOMIC ENERGY COMMISSION
HANFORD ATOMIC PRODUCTS OPERATION
GENERAL ELECTRIC
REFERENCE DRAWINGS
NONE
1.2.55588
1.2.555881

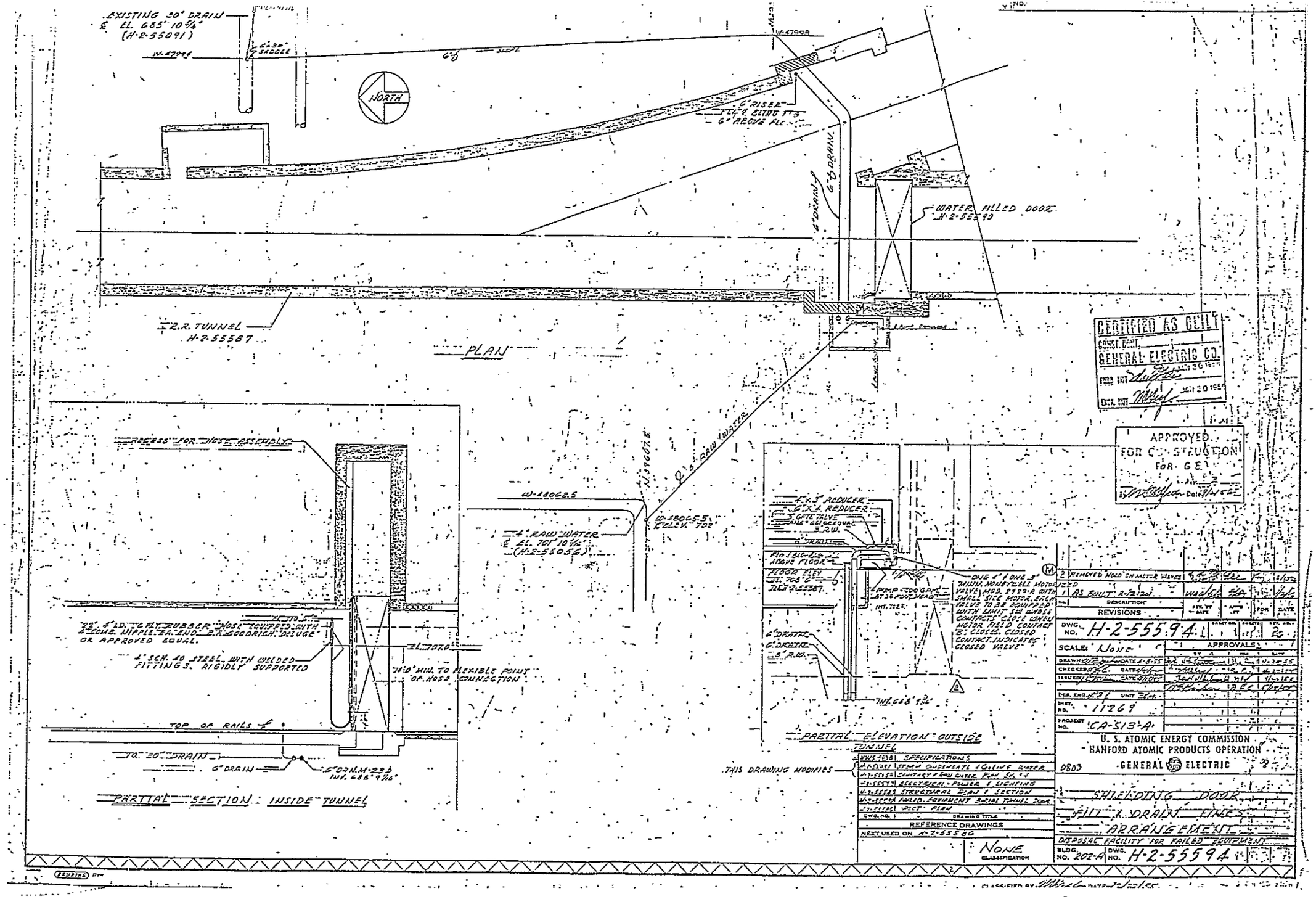

QUALITY ASSURANCE LEVEL III
CERTIFIED AS BUILT
GENERAL ELECTRIC CO.
U. S. ATOMIC ENERGY COMMISSION
HANFORD ATOMIC PRODUCTS OPERATIONS
GENERAL ELECTRIC
DISPOSAL FACILITY 100 FEET
H-2-55587
NONE
H-2-55589
TYP. JOINT DETAIL
TYP. ACCESS OPNG.
PLAN & PLATFORM
SECTION
SEE SPECIFICATIONS HW-5832
CONCRETE PROTECTION FOR REINFORCEMENT SHALL BE AS FOLLOWS:
ROOF OF TUNNEL

H-2-55590
U. S. ATOMIC ENERGY COMMISSION
NAVAL ATOMIC PROPULSION OPERATION
GENERAL ELECTRIC
APPROVED FOR CONSTRUCTION
NONE

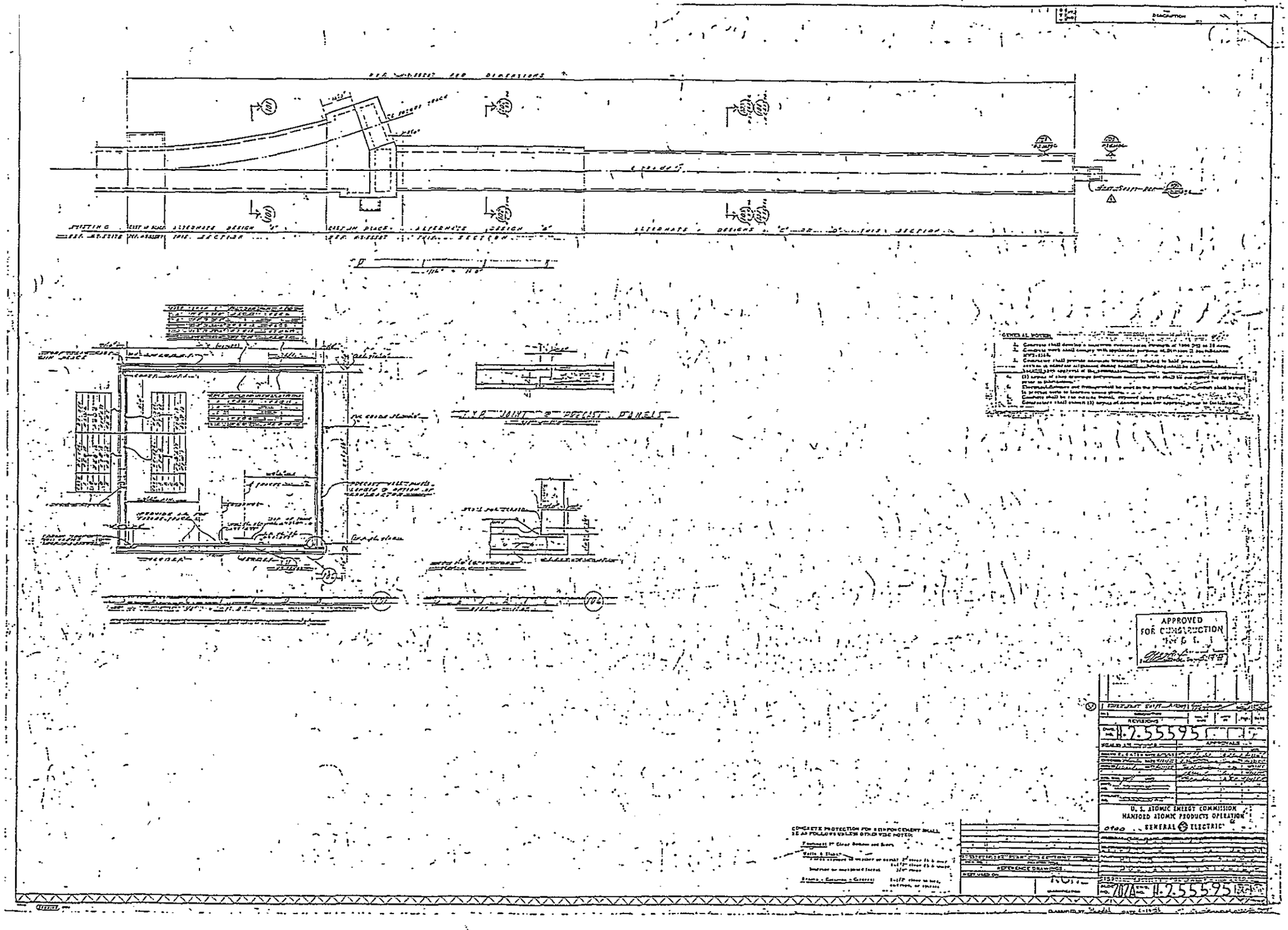

PLAN
ASSEMBLY
NOTE
APPROVED FOR CONSTRUCTION for G.E.
U. S. ATOMIC ENERGY COMMISSION
HANFORD ATOMIC PRODUCTS OPERATION
GENERAL ELECTRIC
TUNNEL DOOR HOIST
ASSEMBLY
H-2-55591

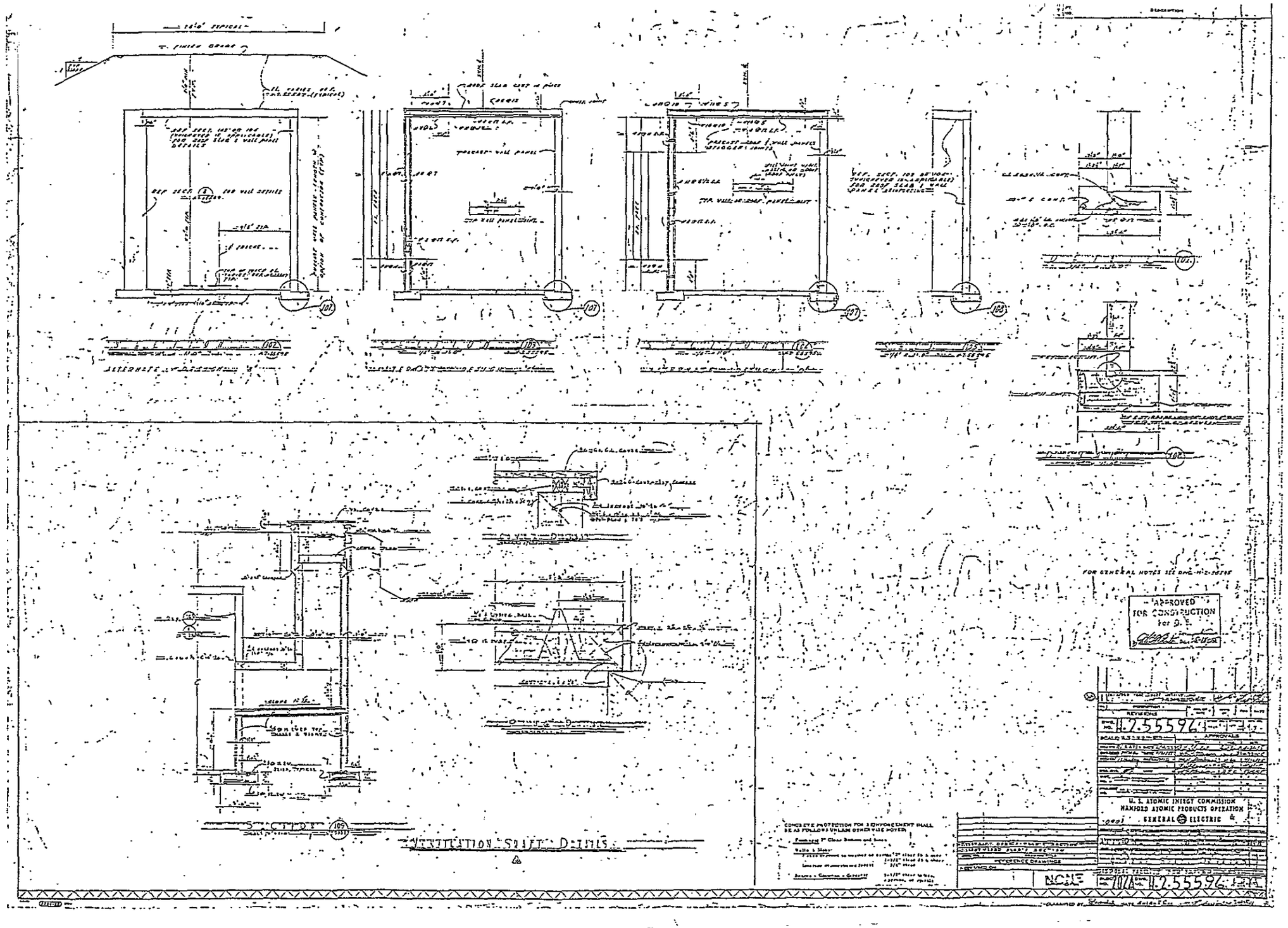

1 DRUM
10 DRUM
2 SHAFT
3 SHAFT
4 SUPPORT
5 SUPPORT
6 MOTOR MOUNT
7 SUPPORT
8 SUPPORT
9 MOUNTING PLT.
NOTES
APPROVED FOR CONSTRUCTION
H-2-55592
SCALE NONE
U. S. ATOMIC ENERGY COMMISSION
HANFORD ATOMIC PRODUCTS OPERATION
GENERAL ELECTRIC
TUNNEL-DOOR HOIST
DETAILS
DISPOSAL FACILITY FOR FAILED FOUP
H-2-55592


PLAN
WIRING DIAGRAM
SECTION 'A-A'
DETAIL 'A'
DETAIL 'B'
DETAIL 'C'
RISER DIAGRAM
NOTES
APPROVED FOR CONSTRUCTION For G. E.
H-2-55593
GA-513-A
U. S. ATOMIC ENERGY COMMISSION
HANFORD ATOMIC PRODUCTS OPERATION
GENERAL ELECTRIC
ELECTRICAL
PUREX TUNNEL EXTENSION
POWER & LIGHTING
DISPOSAL FACILITY FOR FIXED PURPOSE
202A H-2-55593


EXISTING 20" DRAIN
℄ EL. 685' 10 5/16"
(H-2-55091)
W-47998
℄ 20" SADDLE
6'-0" SLOPE
NORTH
6" RISER
FLG'D BLIND FTG
6" ABOVE FLOOR
6" DRAIN
WATER FILLED DOOR
H-2-55590
R.R. TUNNEL
H-2-55587
PLAN
CERTIFIED AS BUILT
CONST. DEPT.
GENERAL ELECTRIC CO.
FIELD INT.
ENGR. INT.
APPROVED FOR CONSTRUCTION
FOR G.E.
RECESS FOR HOSE ASSEMBLY
W-48068.5
4" RAW WATER
℄ EL. 701' 10 5/16"
(H-2-55056)
N. STORE
2½" RAW WATER
W-48068.5
℄ ELEV. 702'
4"x3" REDUCER
3"x2½" REDUCER
3" GATE VALVE
FLOOR ELEV
EL. 708'-6"
REF. H-2-55587
PUMP 700 GPM
87' 3" FOOT HEAD
INT. 702'
ONE 4" & ONE 3"
MIN. HONEYWELL MOTORIZED
VALVE, MOD. 2970-R WITH
SMALL SIZE MOTOR. EACH
VALVE TO BE EQUIPPED
WITH UNIT SIZE GLASS
CONTACTS. CLOSE WHEN
MOTOR FIELD CONTACT
"B" CLOSED. CLOSED
CONTACT INDICATES
CLOSED VALVE
6" DRAIN
6" DRAIN
3" R.W.
INV. 668' 9 7/16"
22' 4" I.D. GAY RUBBER HOSE EQUIPPED WITH
3" COMB. NIPPLE BY END BY GOODRICH "DELUGE"
OR APPROVED EQUAL.
4" SCH. 40 STEEL WITH WELDED
FITTINGS. RIGIDLY SUPPORTED
14'-0" MIN. TO FLEXIBLE POINT
OF HOSE CONNECTION
TOP OF RAILS
TO 20" DRAIN
6" DRAIN
6" DRAIN M-23 b
INV. 668' 9 7/16"
PARTIAL SECTION: INSIDE TUNNEL
PARTIAL ELEVATION OUTSIDE
TUNNEL
THIS DRAWING MODIFIES
W-48068 SPECIFICATIONS
H-2-55581 STEAM, COMPRESSED & DELUGE WATER
H-2-55582 SANITARY & RAW WATER PIPE SYS.
H-2-55583 ELECTRICAL POWER & LIGHTING
H-2-55584 STRUCTURAL PLAN & SECTION
H-2-55586 FAILED EQUIPMENT BURIAL TUNNEL DOOR
H-2-55587 "PLOT" PLAN
DWG. NO. DRAWING TITLE
REFERENCE DRAWINGS
NEXT USED ON H-2-55566
NONE
CLASSIFICATION
2 REMOVED HOLD ON MOTOR VALVES
1 AS BUILT 2-12-58
DESCRIPTION
REVISIONS
DWG. NO. H-2-55594
SCALE: NONE
APPROVALS
DRAWN
CHECKED
ISSUED
DES. ENG.
INST. NO. 11269
PROJECT NO. CA-513-A
U. S. ATOMIC ENERGY COMMISSION
HANFORD ATOMIC PRODUCTS OPERATION
GENERAL ELECTRIC
0803
SHIELDING DOOR
FILL & DRAIN LINES
ARRANGEMENT
DISPOSAL FACILITY FOR FAILED EQUIPMENT
BLDG. NO. 202-A
DWG. NO. H-2-55594

9 2 1 2 4 3 1 7


APPROVED FOR CONSTRUCTION
U. S. ATOMIC ENERGY COMMISSION
HANFORD ATOMIC PRODUCTS OPERATION
GENERAL ELECTRIC



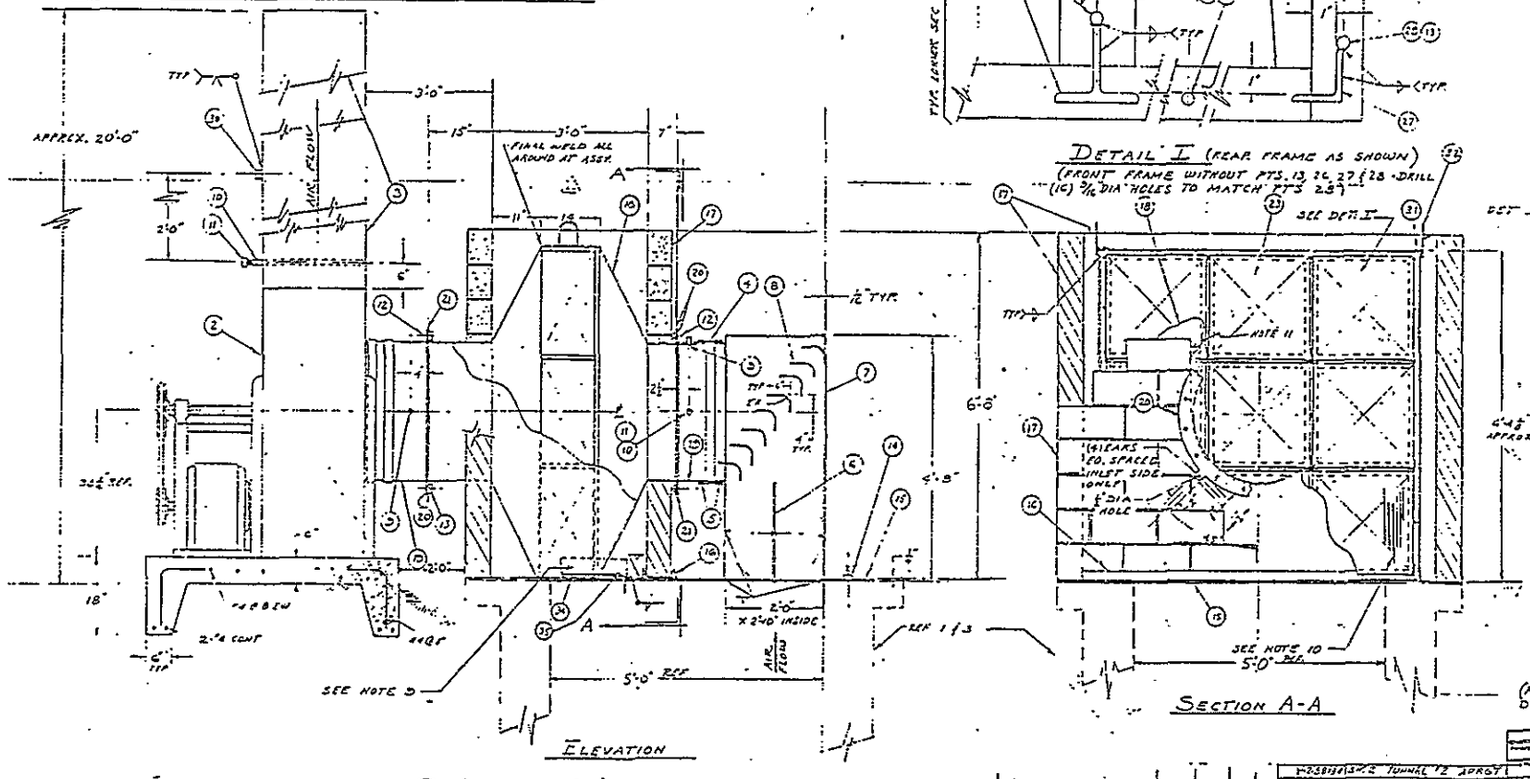
APPROVED FOR CONSTRUCTION
U. S. ATOMIC ENERGY COMMISSION
HANFORD ATOMIC PRODUCTS OPERATION
GENERAL ELECTRIC
H-2-55596
NONE

9 2 1 2 4 , 5 1 9

General Notes

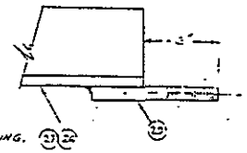
1. THE BLOWER (PT. 2) SHALL BE A CENTRIFUGAL TYPE CAPABLE OF 10,000 CFM @ 2" H_2O – SIMILAR TO PEERLESS MOD. 270 K, BELT DRIVEN BLOWER WITH UP DRAFT & DRIVE COVER.
2. DIMENSIONS FOR PTS 3, 4, 5, 18, 19, 20, 21 & 22 ARE DEPENDENT UPON THE DIMENSIONS OF THE BLOWER (PT 2) THAT IS USED.
3. THE SAMPLE TAP INSTALLED IN THE STACK IS TO BE APPROX. 27" LONG, "HD. EXPOSED END ONLY – PLUG OPPOSITE END. PIPE, INSIDE OF DUCT IS TO BE DRILLED WITH (12) 3/8" DIA. HOLES EQUALLY SPACED SO THAT THEY OPEN DOWN INTO FLOW OF EXHAUST AIR.
4. STACK PT 3 SHALL BE ANCHORED WITH (4) 3/4" STEEL GUY WIRE CABLE 2/3 DISTANCE UP FROM BASE.
5. ALL STEEL PARTS SHALL BE IN ACCORDANCE WITH ASTM-A7 (PIPE ASTM-A53) & SHALL BE PROTECTED WITH AMERCOAT #33 IN ACCORDANCE WITH MFGS. RECOMMENDATIONS.
6. PART #23 CWS FILTERS SHALL BE 'MOISTURE RESISTANT' WITH GASKETS BOTH SIDES, IN ACCORDANCE WITH HVS 7511-5. FILTERS WILL BE FURNISHED BY THE COMMISSION.
7. CAULK AROUND EDGES OF PT. 15 AFTER 1" IS BOLTED IN PLACE.
8. LOCATE ON-OFF SWITCH NEAR FAN MOTOR.
9. LEAVE ONE BLOCK OPENING IN BOTTOM [ ] CORNER OF SHELD & INSTALL 3/4" COUPLING ON BOTTOM OF FILTER INLET SIDE – RUN PIPE PT. #34 TO VALVE PT #35 & THRU PT. 15 – VALVE HANDLE FACE OPENING.
10. FILTER SEPARATORS TO BE IN VERTICAL POSITION.
11. OMIT BLOCKS PT #17 ABOVE DUCT PT #13 TO ALLOW REMOVAL & REPLACEMENT OF FILTER UNIT.
12. FOR TUNNEL #2 (EAST TUNNEL) ARR'GT; SEE – H-2-58136 – SH-1 & 2.

QTY.	#	DESCRIPTION	
X	1	ASSEMBLY & INSTALLATION	—
1	2	BLOWER	NOTE 1
AR	3	STACK DUCT – 16 GAUGE STL.	NOTE 2 & 9
2	4	SLEEVE 6" LONG – 3/8" THK NEOPRENE	NOTE 2
4	5	BAND – 2" WIDE – 16 GAUGE STL.	NOTE 2
1	6	DAMPER – MANUAL OPERATION	
AR	7	VERT. RECTANGUL. DUCT – 16 GA. STL.	
8	8	FIXED DIRECTIONAL COVER	
2	9	1" SCREWED – HALF COUPLING – C.S.	ASTM-A181-GIT
AR	10	1/2" SCH 40 PIPE – SAMPLE TAP – C.S.	ASTM-A53-GIT
2	11	1/2" SCREWED PIPE CAP C.S.	ASTM-A197-GIT
32	12	1/2"-13UNC-2A X 1 1/2" LG HEX HD BOLT C.S.	ASTM-A307-GIT
72	13	1/2"-13UNC-2B HEX NUT C.S.	
AR	14	1/2"-10UNC-2B HEX NUT C.S.	ASTM-A307-GIT
1	15	0'-0" SQUARE X 3/8" THK	
AR	16	8 LB 11.5" C.S.	
AR	17	CONCRETE BLOCK 6" WIDE 8" HIGH FACE	
AR	18	FILTER HOUSING 16 GA STL.	NOTE 2
AR	19	32" DIA DUCT 16 GA. STL	NOTE 2
4	20	FLANGE 1/4" THK	
2	21	GASKET 3/8" THK TO MATCH PT #20 NEOPRENE	NOTE 2
AR	22	CONCRETE PAD (FOR PT 2)	6'-0" SQUARE
3	23	CWS FILTER 24" X 24" X 12" THK	SEE NOTE 6.
AR	24	2" X 1/4" F.B C.S.	DET. I
AR	25	3" X 1/4" F.B. "	DET. I
6	26	ST 3 I C.25" "	EACH PIECE TO BE 10" LONG
6	27	2" X 2" X 1/4" L "	"
25	28	3/8" Ø ROD THD ONLY 2" LONG "	EACH PIECE TO BE 12" LONG
12	29	1/4" Ø ROD " "	EACH PIECE TO BE 6" LONG
1	30	1" SCREWED – HALF COUPLING C.S.	ASTM-A181-GIT
2	31	12" X 2" X 1/4" L X 14" LONG C.S.	DET. II
2	32	5/8" Ø ROD LIFTING BAIL C.S.	"
—	—		
AR	34	3/4" SCH 40 PIPE C.S.	WITH COUPLING
1	35	3/4" GATE VALVE	ASTM-A197-GIT

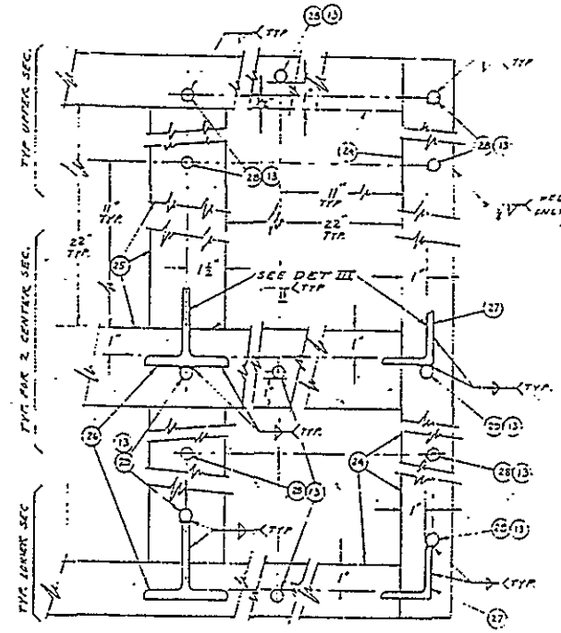


ELEVATION

(1) ASSEMBLY & INSTALLATION



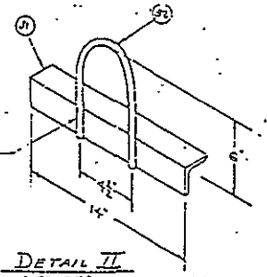
DET III



DETAIL I (REAR FRAME AS SHOWN)

(FRONT FRAME WITHOUT PTS. 13, 26, 27 & 28 – DRILL (16) 3/16" DIA HOLES TO MATCH PTS 28)

SECTION A-A



DETAIL II

2 PLACES

H-2-58134 1/2 T

(FOR TUNNEL #2, SEE SH. 2 H-2-58134). THIS DWG WAS DEVELOPED FROM REV. 2 OF H-2-58134 IN 'VOID' FILE, SH 1 OF 1)

H-2-58134 SH. 2 TUNNEL #2 APROT	
4 H-2-58134 ELEC. PLANS & SECTIONS	
5 H-2-58135 ELEVATION SECTIONS & DETAILS	
6 H-2-58136 ELEVATION PLAN & SECTIONS	
3 H-2-58134 STEEL SECTIONS & DETAILS	
2 H-2-58134 DWG INDEX & MAPS	
1 H-2-58134 CONST. SPECS.	

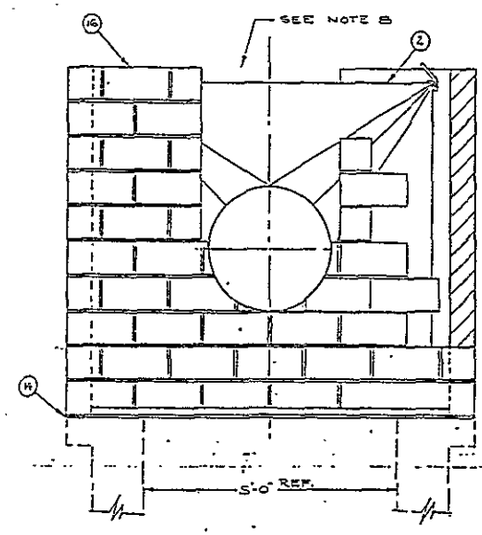
REFERENCE DRAWINGS

LISTED ON SCH. SHEET 2

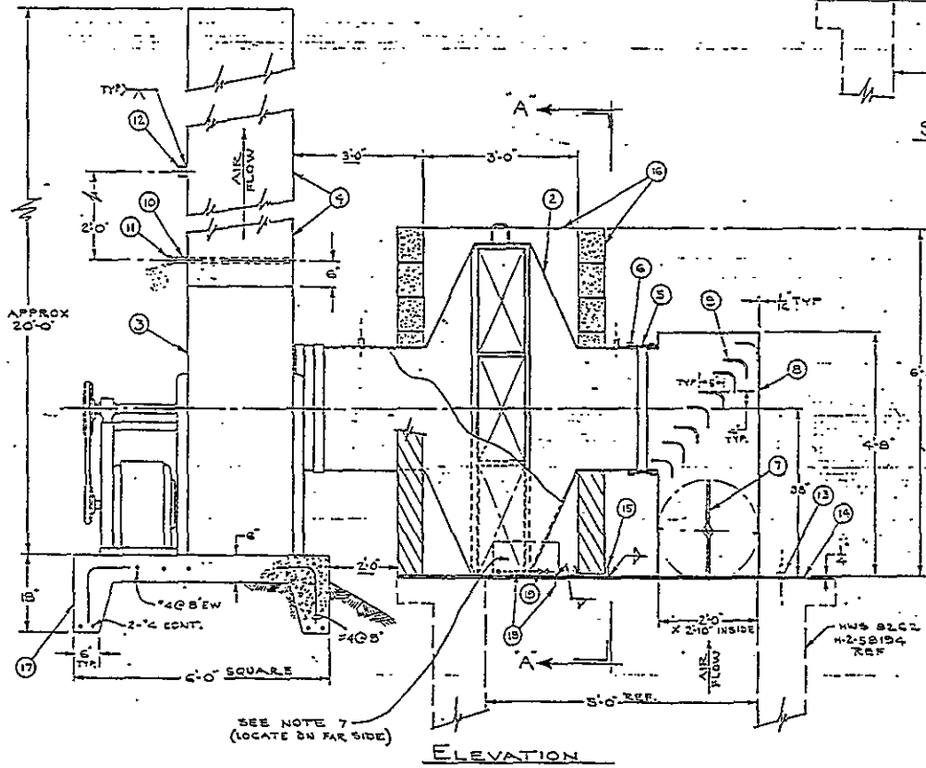
APPROVED FOR CONST.	U. S. ATOMIC ENERGY COMMISSION
APPROVED FOR ELECTRICAL	Atomic Richland Hanford Company
APPROVED FOR PLANT	Richland, Washington
APPROVED FOR STRUCT.	BURIAL TUNNEL #1
SCALE NONE	VENTILATION
R. H. LAYFIELD	ARR'GT.
202-A	8300
NONE	H-2-58134 1/2

0 2 1 2 4 , 5 2 0

ATT	PT NO	DESCRIPTION	
X	1	ARRANGEMENT	—
1	2	FILTER ASSY (SEE NOTE 10)	H-2-74259
1	3	BLOWER	NOTE 1
AR	4	STACK DUCT - 16 GA. STL	NOTE 3
2	5	SLEEVE (NEOPRENE IMPREGNATED GLASS - 9" WIDE	BLOEN FABRIDUCT
4	6	BAND - 2" WIDE X 16 GA. STL	—
1	7	DAMPER - MANUAL OPERATION 12GA STL	W/3 S.A. TO DN DUCT PER STOPS
AR	8	VERT RECTANGLE DUCT - 16 GA STL	C. STL ASTM-A36
8	9	FIXED DIRECTIONAL LOUVER 16 GA STL	
AR	10	3/4 SCH 40 PIPE - SAMPLE TAP (SEE NOTE 2)	C. STL ASTM-A106
1	11	3/4 SCR. PIPE CAP	C. STL ASTM-A234
1	12	1" SCR. HALF COUPLING	
AR	13	3/4-10UNC-2B HEX NUT	C. STL ASTM-A307
1	14	8'-0" SQ. 3/4" THK C.S. W/ 24" X 24" HOLE AS SHOWN PER PT. 15 & 16	DRILL 1/2 HOLES PT. 14 & BOLTS
AR	15	8 LJ 11.5 C.S.	LOC. UNDER PT. 6 IN CENTER PT. 4
AR	16	CONCRETE BLOCK 6" WIDE 8"X16" FACE	SHIELD 4 SIDES OF PT. 2
AR	17	CONCRETE PAD	6'-0" SQ.
AR	18	1/2" SCH 40 PIPE	C. STL ASTM-A106
1	19	1/2" GATE VALVE	61.25 C01



SECTION A-A



ELEVATION

(1) ARRANGEMENT

GENERAL NOTES

1. THE BLOWER SHALL BE A CENTRIFUGAL TYPE CAPABLE OF 10,000 CFM @ 2" H_2O - SIMILAR TO PEERLESS MOD. 207 K, BELT DRIVEN BLOWER WITH UP DRAFT & DRIVE COVER.
2. THE SAMPLE TAP INSTALLED IN THE STACK IS TO BE APPROX. 27" LONG, THD. EXPOSED END ONLY. PLUG OPPOSITE END OF PIPE & DRILL (12) 1/8" DIA. HOLES EQ. SPACED ALONG LOWER SIDE OF PIPE THAT IS INSIDE OF DUCT.
3. STACK - PT #3 SHALL BE ANCHORED WITH (6) 1/2" STEEL GUY WIRE CABLE 2/3 DISTANCE UP FROM BASE.
4. ALL EXPOSED CARBON STEEL TO BE COATED WITH (1) PRIME COAT & (2) FINISH COATS, 5 MIL VINYL PER MFG'S RECOMMENDATIONS — AMERCOAT #33, CARBOLINE P-333, LANKOTE 200, OR EQUAL.
5. CAULK AROUND EDGES OF PT. 14 AFTER IT IS BOLTED IN PLACE.
6. LOCATE ON OFF SWITCH NEAR MOTOR.
7. LEAVE "ONE BLOCK" OPENING IN BOTTOM ON END NEXT TO DRAIN ON FILTER. INSTALL PIPE & VALVE, PTS. 18 & 19. RUN PIPE THRU COVER. PT. 14 - VALVE HANDLE TO FACE OPENING.
8. OMIT BLOCKS PT. 16 ABOVE FILTER DUCT TO ALLOW REMOVAL & REPLACEMENT OF FILTER ASSY. PT #2 - SEE SEC. A-A.
9. THIS ARR'GT APPLIES TO THE LONGER (EAST) BURIAL TUNNEL #2. (FOR TUNNEL #1, SEE H-2-58134 SHEET #1).
10. AFTER ALL SPARES HAVE BEEN USED, PN 2 TO BE REPLACED WITH H-2-94756.

Rockwell Hanford Operations
Richland, Washington

QUALITY ASSURANCE LEVEL I

H-2-58205 S. BURIAL TUNNEL #1 FILTER							
H-2-58208 ELEC. PLANS & SECT.	M					COORD NOTE 10. DIRECT DWG CHANGE	5
H-2-58203 ELLIPSE SEC. & DETAIL	U					INCORP ADDED ITEM 24478 TITLE CORRECTION	4
H-2-58201 ELLIPSE PLAN & SECT.							
H-2-58194 STRUCT SECT & DETAILS						TITLE CHANGE	3
H-2-58191 SWG. INDEX & TOPOG							2
H-2-58162 CONST. SPECS.							
REFERENCE DRAWINGS						REVISIONS	
NEXT USED ON H-2-58181						DRAWING STATUS ISSUED	5

U. S. ATOMIC ENERGY COMMISSION
RICHLAND OPERATIONS OFFICE
Atlantic Richfield Hanford Company
Richland, Washington 99352

REC'T
INCORP
LAYFIELD

BURIAL TUNNEL #2 VENTILATION ARRANGEMENT

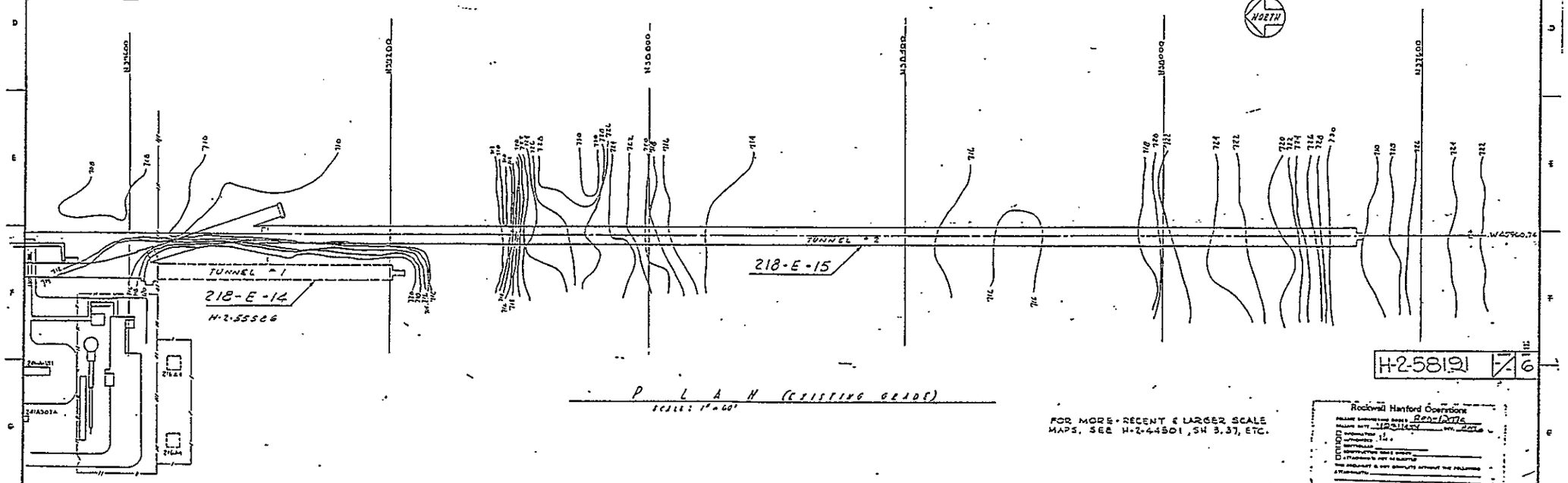
202-A 8900

NONE H-2-58134 1 2 2

QTY.		DESCRIPTION

DRAWINGS INDEX

DWG. NO.	TITLE	INDEX NO.
	ARCHITECTURAL - CIVIL	
H-2-58191	SERVING MAPS & EXISTING TOPOG.	0110
H-2-58192	PLOT PLAN & PROFILE, ARCH LINES	0110
H-2-58193	ARCHITECTURAL PLANS	0800
H-2-58194	STRUCTURAL SECTIONS & DETAILS	0901
H-2-58195	STRUCTURAL SECTIONS & DETAILS	0901
H-2-58196	ROOF PLAN-STRUCTURAL SECTIONS & DETAILS	0901
H-2-58197	SWITCH EXTENSION DETAILS	0202
H-2-58198	MISCELLANEOUS DETAILS	0901
H-2-58199	WATER FILLED DOOR " "	1800
H-2-58200	DOOR 12" PIPING & DETAILS	2500 & 1000
H-2-58132	BURIAL TUNNEL VENTILATION	8400
H-2-58232	REINFORCEMENT PLANS	0900
H-2-58233	REINFORCEMENT SECTIONS & DETAILS	0900
H-2-58237	CLEARANCE DIAGRAM FOR TUNNEL SECTION	0800
	MECHANICAL	
H-2-58206	PIPING PLAN & DETAILS	8500
H-2-58207	CONDENSATE PLAN & PROFILE	6500
H-2-84750	BURIAL TUNNEL #2 FILTER ASSEMBLY	8900
H-2-58238	SURVEY CONTROL & DATA	0202
H-2-58532	PUREX TUNNEL REINFORCEMENT - PLAN	0300 (200-A)
H-2-58533	PUREX TUNNEL REINFORCEMENT - SECTIONS & DETAILS	0300 (200-A)
SK-2-3133	CLEARANCE DIAGRAM FOR TUNNEL SEC	0000
	ELECTRICAL	
H-2-58208	ELECTRICAL PLAN & DETAILS	7201-7502



PLAN (EXISTING GRADE)
SCALE: 1" = 60'

FOR MORE RECENT & LARGER SCALE MAPS, SEE H-2-44501, SH 3, 37, ETC.

H-2-58191 | 1/1 | 6

Rockwell Hanford Operations

6	UPDATE DWG INDEX DIRECT. DWG CHANGE		
5	ADDED REF DWGS & NOTE S.DG 45 WAS 28214 QUV	BFT	
4	FCN. 17754 PHOTO RETRACE		

H-2-55526	218-E-14 TUNNEL #1
H-2-31269	218-E PLOT PLAN

U.S. ATOMIC ENERGY COMMISSION
RICHLAND OPERATIONS OFFICE
Atlantic Richfield Hanford Company

APPROVED FOR CONST.
APPROVED FOR PURCHASE

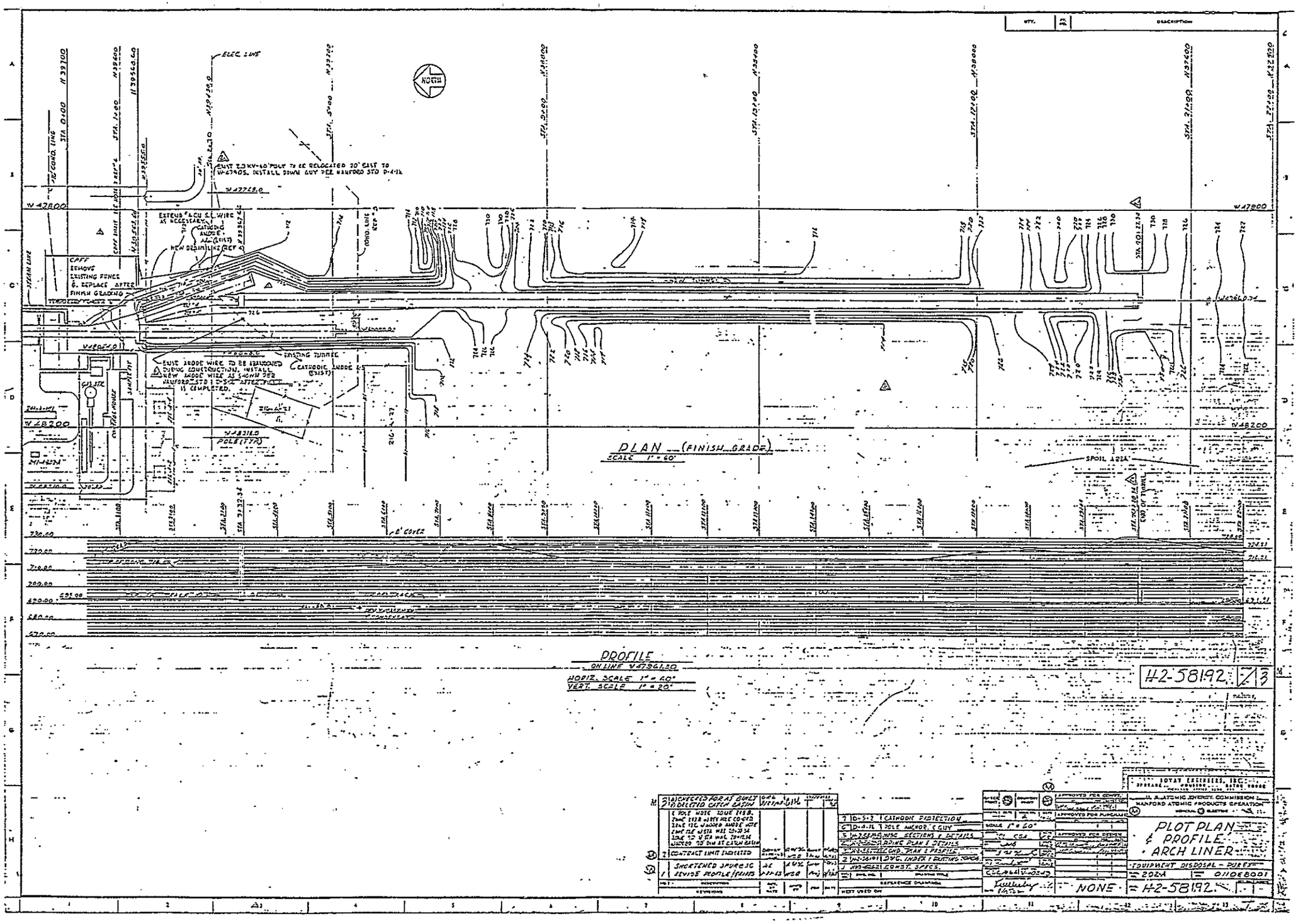
SCALE SHOWN

218-E-15
DISPOSAL TUNNEL #2
FOR FAILED EQUIPMENT
PLOT PLAN

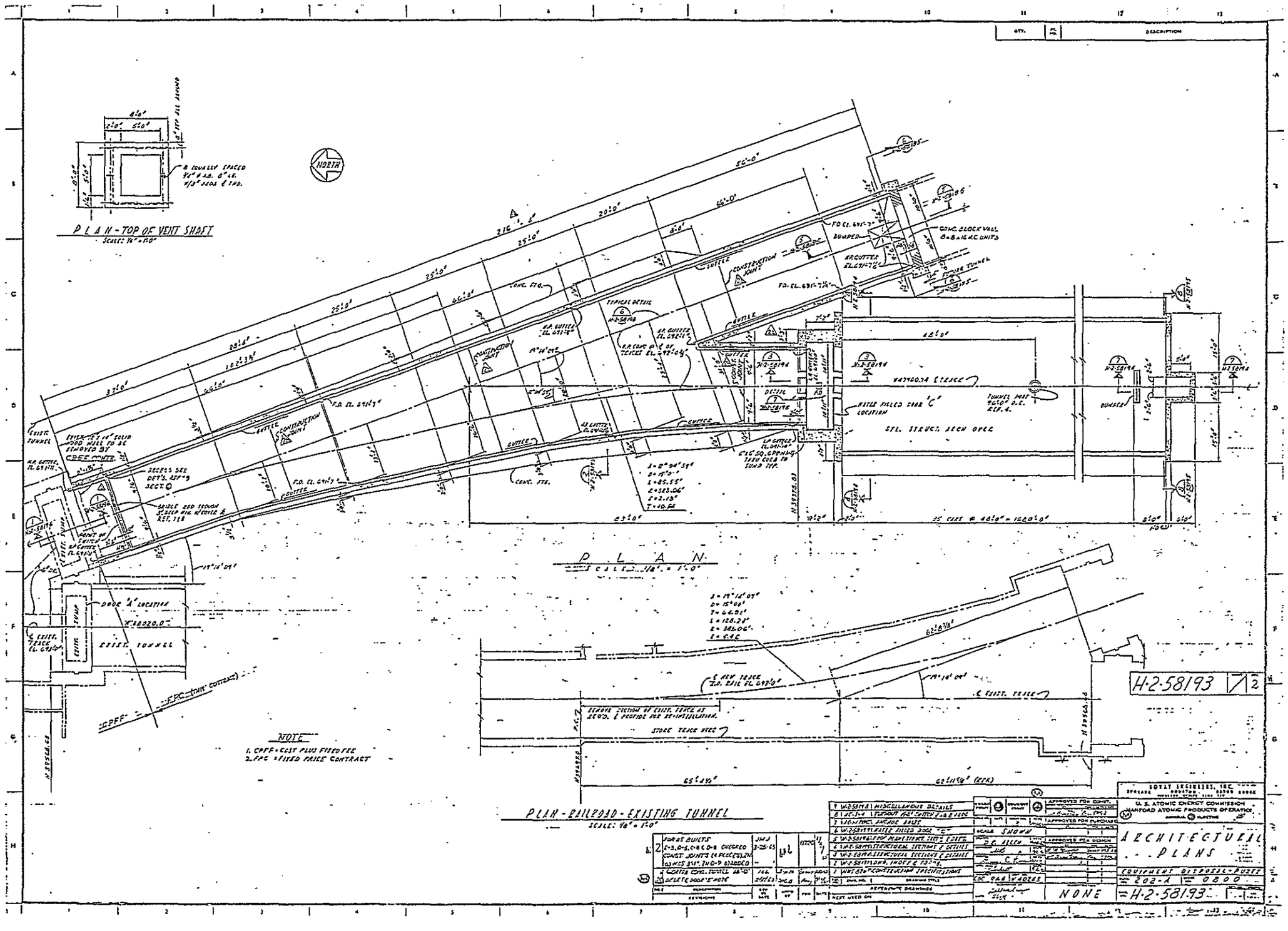
EQUIPMENT DISPOSAL - PUREX

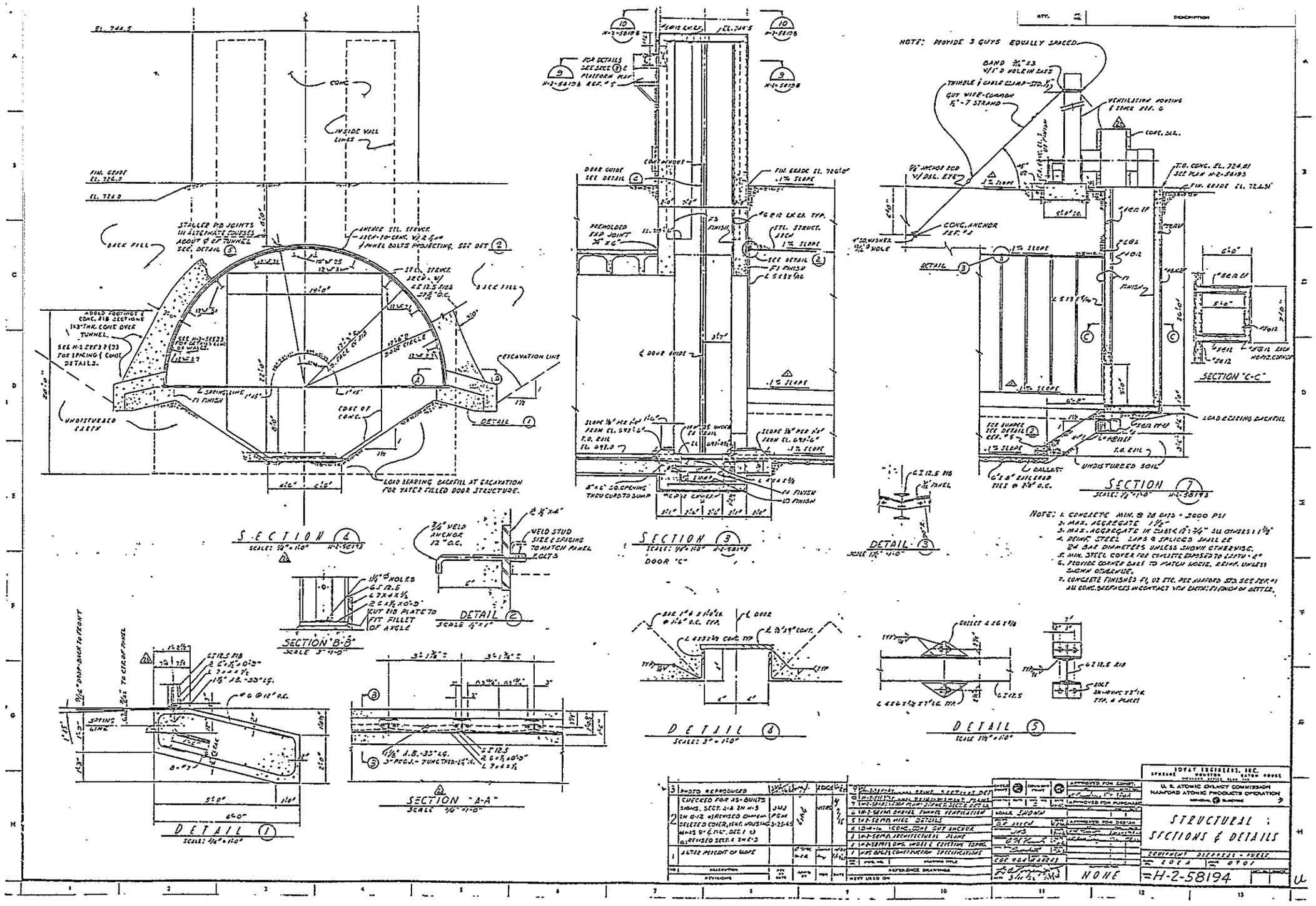
NONE

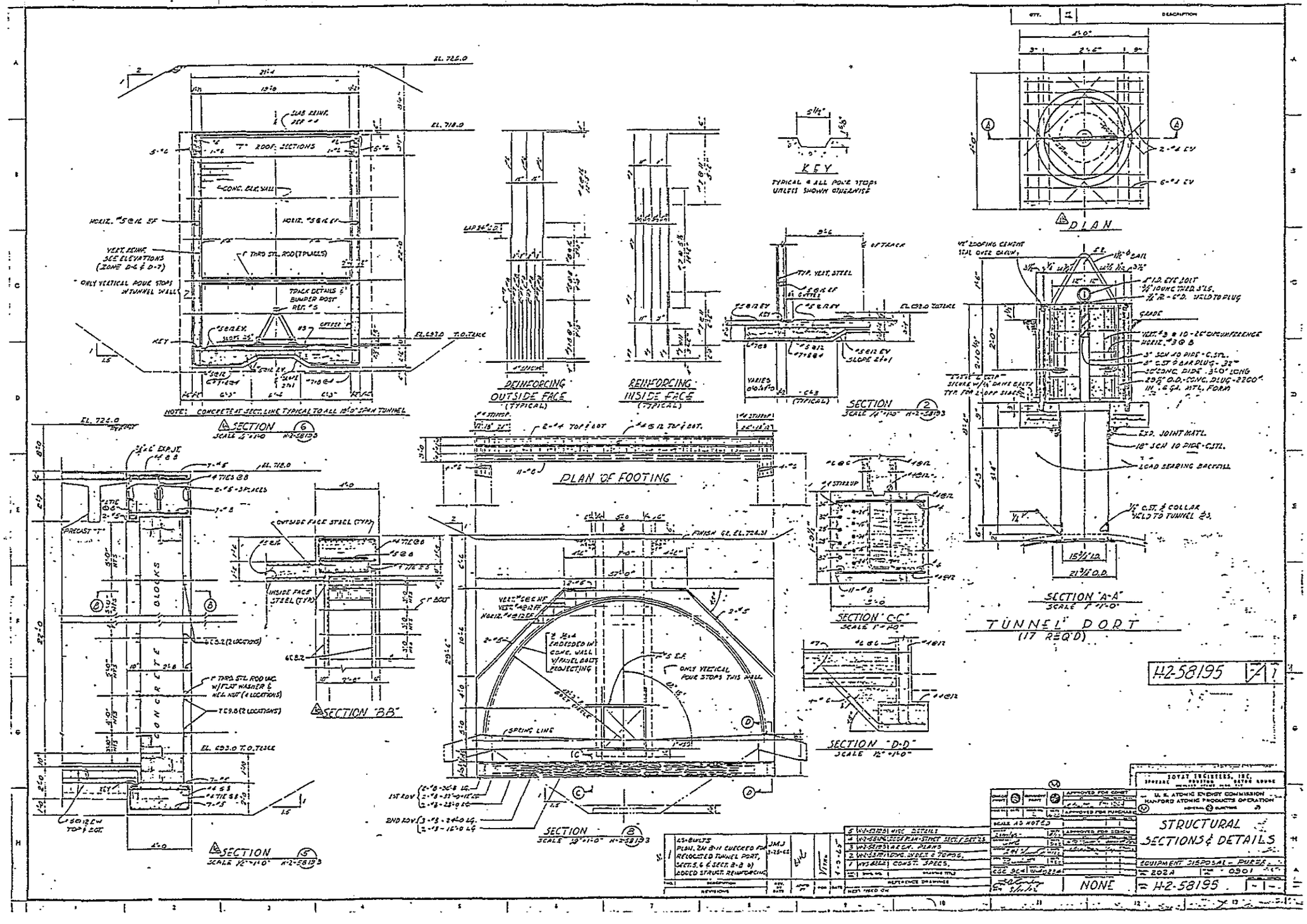
H-2-58191

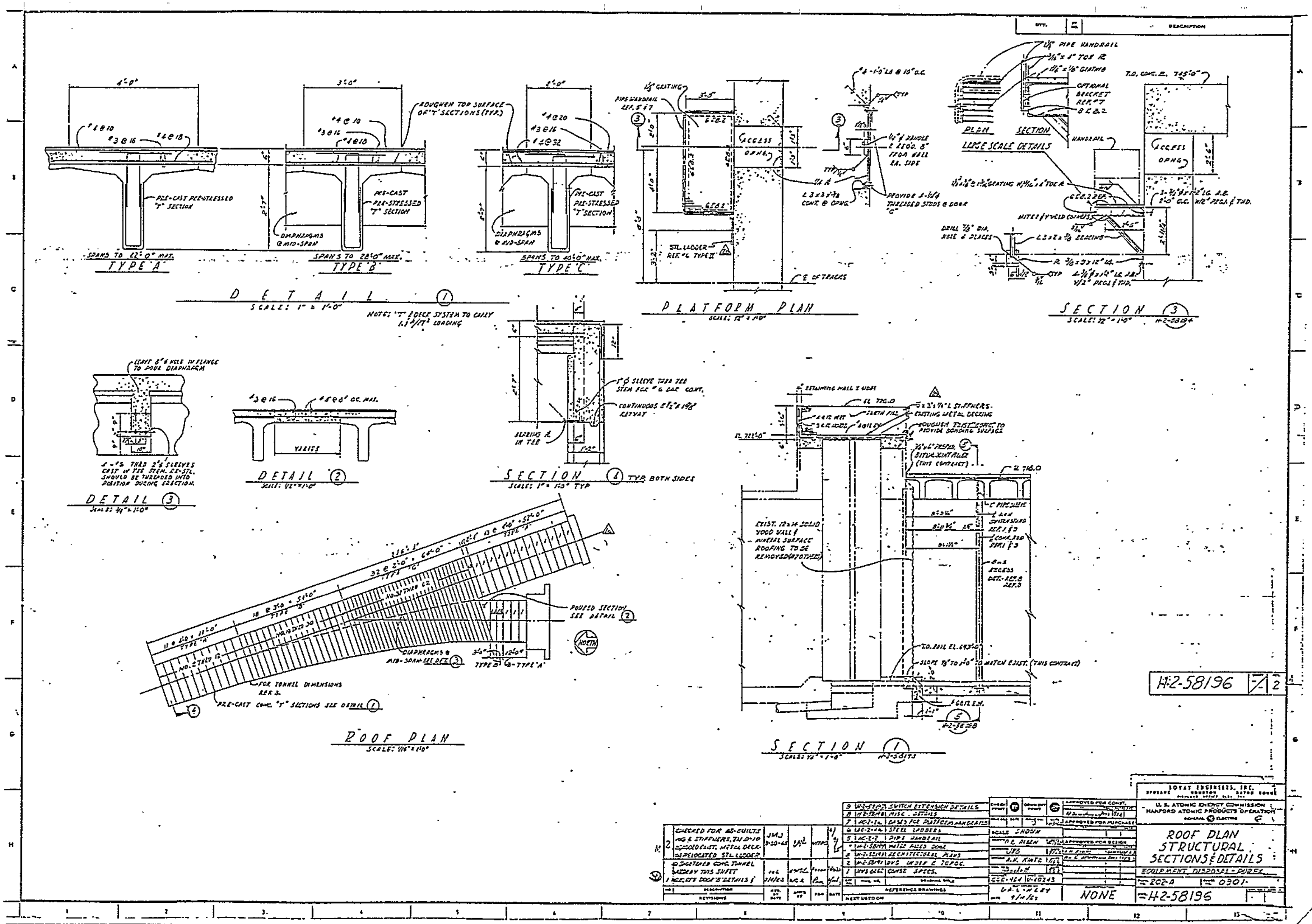


PLAN (FINISH GRADE)
SCALE 1" = 60'
PROFILE
ON LINE W47961.30
HORIZ. SCALE 1" = 60'
VERT. SCALE 1" = 20'
NORTH
ELEC. LINE
W 47800
W 48200
SPOIL AREA
CATHODIC ANODE
NEW DRAIN LINE
EXISTING TUNNEL
POLE (TYP.)
CONTRACT LIMIT INDICATED
SHORTENED SPUR @ SC
REVISE PROFILE
CATHODIC PROTECTION
POLE ANCHOR & GUY
WISC. SECTIONS & DETAILS
PRIME PLAN & DETAILS
GND. PLAN & PROFILE
DWG. INDEX & EXISTING TOPOG.
CONST. SPECS.
REFERENCE DRAWINGS
NEXT USED ON
SCALE 1" = 60'
APPROVED FOR CONST.
APPROVED FOR PURCHASE
APPROVED FOR DESIGN
NONE
H2-58192
LOVAT ENGINEERS, INC.
SPOKANE - HOUSTON - BATON ROUGE
U. S. ATOMIC ENERGY COMMISSION
HANFORD ATOMIC PRODUCTS OPERATION
PLOT PLAN & PROFILE ARCH LINER
EQUIPMENT DISPOSAL - PUREX
202-A
0110E8001
H2-58192


PLAN - TOP OF VENT SHAFT
NORTH
PLAN
STL. STRUCT. ARCH OVER
EXIST. TUNNEL
PLAN - RAILROAD - EXISTING TUNNEL
NOTE
1. CPFF = COST PLUS FIXED FEE
2. FPC = FIXED PRICE CONTRACT
H-2-58193
SOYAT ENGINEERS, INC.
U. S. ATOMIC ENERGY COMMISSION
HANFORD ATOMIC PRODUCTS OPERATION
ARCHITECTURAL PLANS
EQUIPMENT DISPOSAL - PUREX
202-A
0800
NONE
H-2-58193


SECTION 4
SCALE: 1/4" = 1'-0"
SECTION 3
SCALE: 1/4" = 1'-0"
DOOR "C"
SECTION 7
SCALE: 1/4" = 1'-0"
SECTION "C-C"
DETAIL 1
DETAIL 2
DETAIL 3
DETAIL 4
DETAIL 5
SECTION "B-B"
SECTION "A-A"
NOTE: PROVIDE 3 GUYS EQUALLY SPACED.
NOTE: 1. CONCRETE MIN. @ 28 DAYS = 3000 PSI
2. MAX. AGGREGATE 1 1/2"
3. MAX. AGGREGATE IN CUBE < 12" = 3/4" ALL OTHERS = 1 1/2"
4. REINF. STEEL LAPS & SPLICES SHALL BE 24 BAR DIAMETERS UNLESS SHOWN OTHERWISE.
5. MIN. STEEL COVER FOR CONCRETE EXPOSED TO EARTH = 2"
6. PROVIDE CORNER BARS TO MATCH HORIZ. REINF. UNLESS SHOWN OTHERWISE.
7. CONCRETE FINISHES F1, U2 ETC. PER HANFORD STD. SEE DET. #1
ALL CONC. SURFACES IN CONTACT WITH EARTH: F1 FINISH OR BETTER.
IDAHO ENGINEERS, INC.
U. S. ATOMIC ENERGY COMMISSION
HANFORD ATOMIC PRODUCTS OPERATION
STRUCTURAL : SECTIONS & DETAILS
SCALE SHOWN
NONE
H-2-58194


SECTION (6)
SCALE 1/2"=1'-0"
NOTE: CONCRETE AT SECT. LINE TYPICAL TO ALL 18'-0" SPAN TUNNEL
"T" ROOF SECTIONS
CONC. ELEC. WALL
HORIZ. #5 @ 12 EF
VERT. REINF. SEE ELEVATIONS (ZONE D-6 & D-7)
1" THRD STL. ROD (TYP. ALL)
* ONLY VERTICAL POUR STOPS IN TUNNEL WALL
TRACK DETAILS & BUMPER POST REF. #5
KEY
EL. 722.0
EL. 718.0
EL. 693.0 T.O. TRACK
REINFORCING OUTSIDE FACE (TYPICAL)
REINFORCING INSIDE FACE (TYPICAL)
KEY
TYPICAL @ ALL POUR STOPS UNLESS SHOWN OTHERWISE
SECTION (2)
SCALE 1/4"=1'-0"
PLAN
14" ROOFING CEMENT SEAL OVER CHAUL
1" I.D. EYE BOLT
3/4" IRONE TYED STLS.
1/2" R - 6" D. WELD TO PLUG
GRADE
VERT. #3 @ 10 - 26" CIRCUMFERENCE
HORIZ. #3 @ 8
3" SCH 40 PIPE - C.STL.
3" C.ST & BAR PLUG - 32"
30" CONC. PIPE - 3'-0" LONG
29.5" O.D. - CONC. PLUG - 22.00"
14 GA. MTL. FORM
EXP. JOINT MATL.
18" SCH 10 PIPE - C.STL.
LOAD BEARING BACKFILL
1/2" C.ST. & COLLAR WELD TO TUNNEL ∅3.
15 3/4" I.D.
21 3/4" O.D.
SECTION "A-A"
SCALE 1"=1'-0"
TUNNEL PORT
(17 REQ'D)
PLAN OF FOOTING
FINISH GR. EL. 724.31
SPRING LINE
ONLY VERTICAL POUR STOPS THIS WALL
SECTION (8)
SCALE 1/8"=1'-0"
SECTION "C-C"
SCALE 1"=1'-0"
SECTION "D-D"
SCALE 1/2"=1'-0"
SECTION (5)
SCALE 1/2"=1'-0"
PRECAST "T"
CONCRETE BLOCKS
EL. 693.0 T.O. TRACK
OUTSIDE FACE STEEL (TYP.)
INSIDE FACE STEEL (TYP.)
SECTION "BB"
1ST ROW
2ND ROW
H-2-58195
STRUCTURAL SECTIONS & DETAILS
EQUIPMENT DISPOSAL - PUREX
NONE
H-2-58195


DETAIL 1
SCALE: 1" = 1'-0"
NOTE: "T" DECK SYSTEM TO CARRY
TYPE "A"
TYPE "B"
TYPE "C"
PRE-CAST PRE-STRESSED "T" SECTION
ROUGHEN TOP SURFACE OF "T" SECTIONS (TYP.)
PLATFORM PLAN
STL. LADDER
ACCESS OPNG.
SECTION 3
LARGE SCALE DETAILS
1½" PIPE HANDRAIL
OPTIONAL BRACKET
DETAIL 3
DETAIL 2
SECTION 4 TYP. BOTH SIDES
ROOF PLAN
POURED SECTION SEE DETAIL 2
PRE-CAST CONC. "T" SECTIONS SEE DETAIL 1
FOR TUNNEL DIMENSIONS
SECTION 1
EXIST. 12x14 SOLID WOOD WALL & MINERAL SURFACE ROOFING TO BE REMOVED (BY OTHERS)
EL. 716.0
TO. EXIST. EL. 695-0
H-2-58196
ROOF PLAN STRUCTURAL SECTIONS & DETAILS
U.S. ATOMIC ENERGY COMMISSION
HANFORD ATOMIC PRODUCTS OPERATION
NONE
H-2-58196

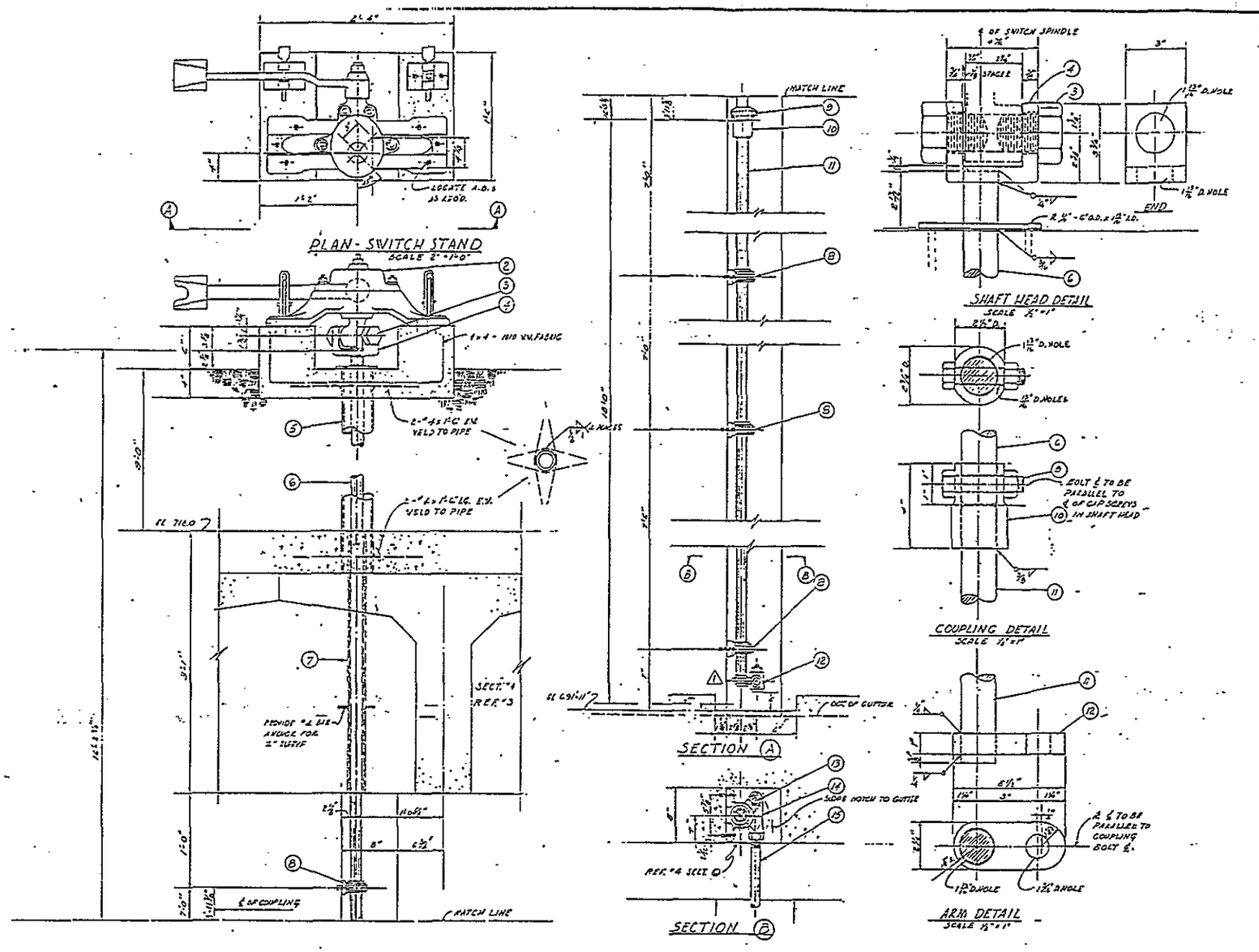
9 2 1 2 4 . 5 2 7

QTY.	ITEM NO.	DESCRIPTION
X	1	ASSEMBLY
* 1	2	SWITCH STAND - RAILROAD BUFFALO STYLE 36CD SEE NOTE 2
2	3	HEX HD CAP SCREWS - VIT/CLOTH FIRE TWD. 7/8"-9N - 1 3/4" LG. - SEE NOTE 2
1	4	SHAFT HEAD "U" SEE DETAIL
1	5	4" SCH 40 PIPE STAND - 8'-4" LG.
1	6	1 7/16" Ø SHAFT - W/COVER R - 16" 5 1/8" LG. - AISI - C 1141
1	7	2" SCH 40 PIPE SLEEVE 3'-5" LG.
4	8	1 1/2" PILLOW BLOCKS - BOSTON BN9 -
1	9	3/4" HEXHD - 10 UNC MACH. BOLT - 3 1/2" LG. W/HEX NUT
1	10	COUPLING SEE DETAIL
1	11	1 7/16" Ø SHAFT - 18'-0" LG. AISI - C 1141
1	12	ARM SEE DETAIL
* 1	13	1 1/2" TUNNED BOLT SWITCH PART #3608D SEE NOTE 2
* 1	14	CLEVIS SWITCH PART #3606D SEE NOTE 2
* 1	15	CONNECTING ROD SWITCH PART #3608D SEE NOTE 2

* PARTS FURNISHED BY COMMISSION

GENERAL NOTES:

1. PIPE MATERIAL ASTM GRADE A
   PLATE MATERIAL A7-46
   SHAFT MATERIAL AISI - C 1141.



SWITCH EXTENSION ASSEMBLY (1)
SCALE 2" = 1'-0"

H-2-58197 A1

REVISIONS				
1	CHECKED FOR AS-BUILTS PART 3,4 & 12. ZN 4-4 & 2-4 a. ZN 5-6 b) DELETED & RELOCATED PART #12, SEC.	JMJ 3-25-69		
4	W-3-58 PG 1 STRUCT. & MISC. DETS.			
3	W-3-58 PG 2 ROOF PLAN STRUCT. SECT. & DETS.			
2	W-3-58 PG 3 ARCH PLANS			
1	WYS 8202 CONST. SPECS.			

SCALE AS NOTED

NONE

JOYAT ENGINEERS, INC.
SPOKANE RICHLAND BATON ROUGE

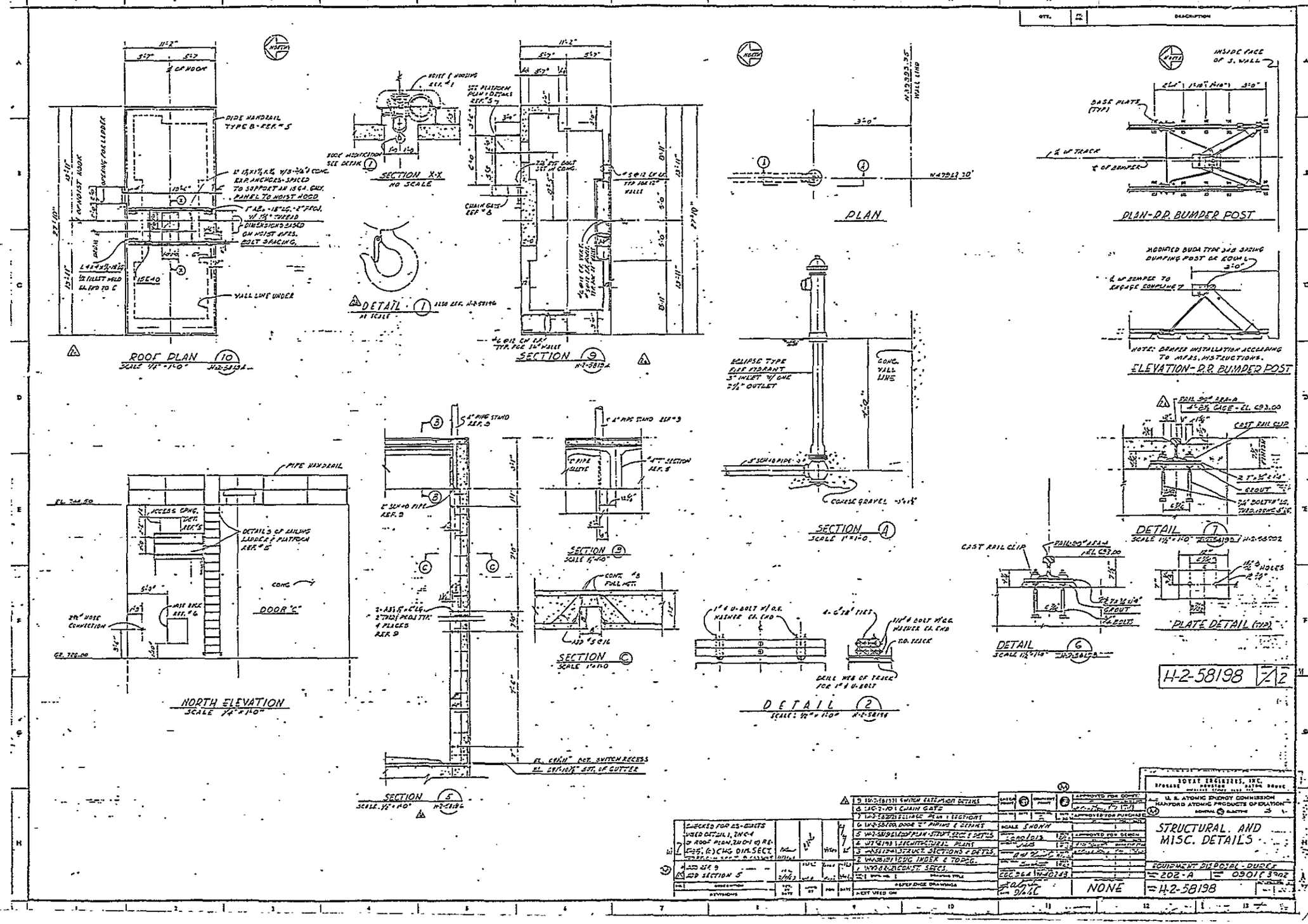
U. S. ATOMIC ENERGY COMMISSION
HANFORD ATOMIC PRODUCTS OPERATION
GENERAL ELECTRIC

SWITCH EXTENSION DETAILS

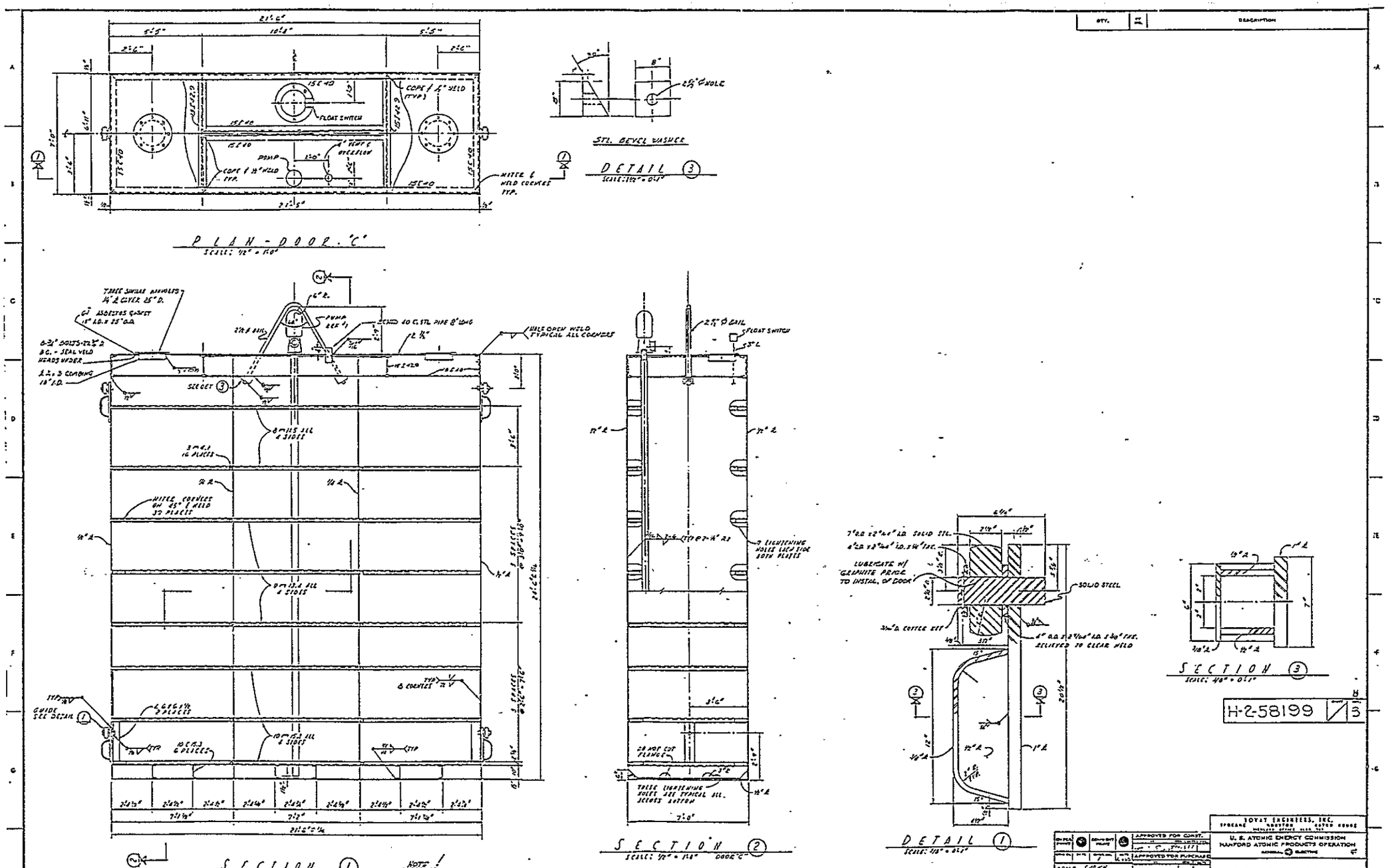
EQUIPMENT DISPOSAL - PUREX

202-A 0202

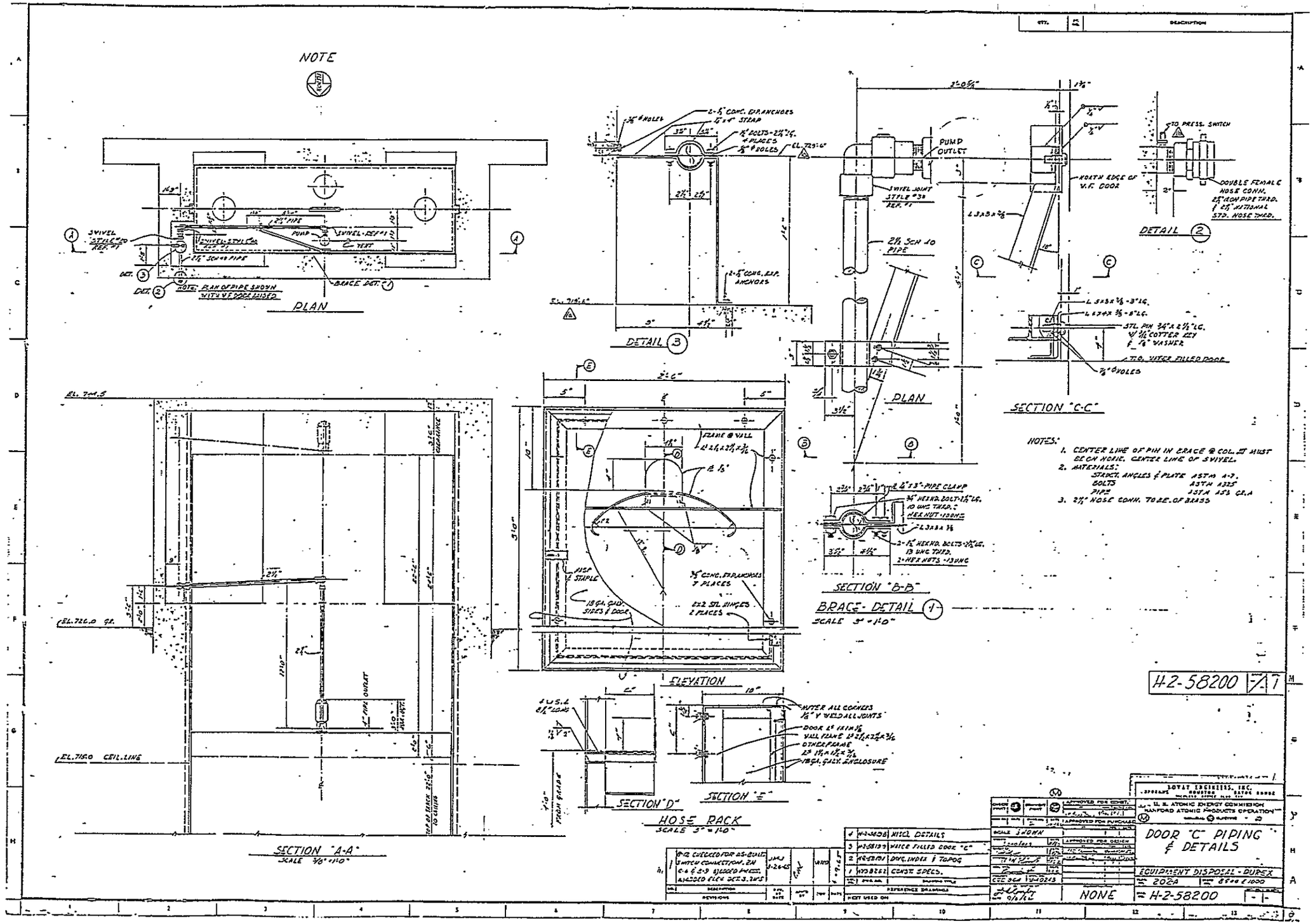
H-2-58197

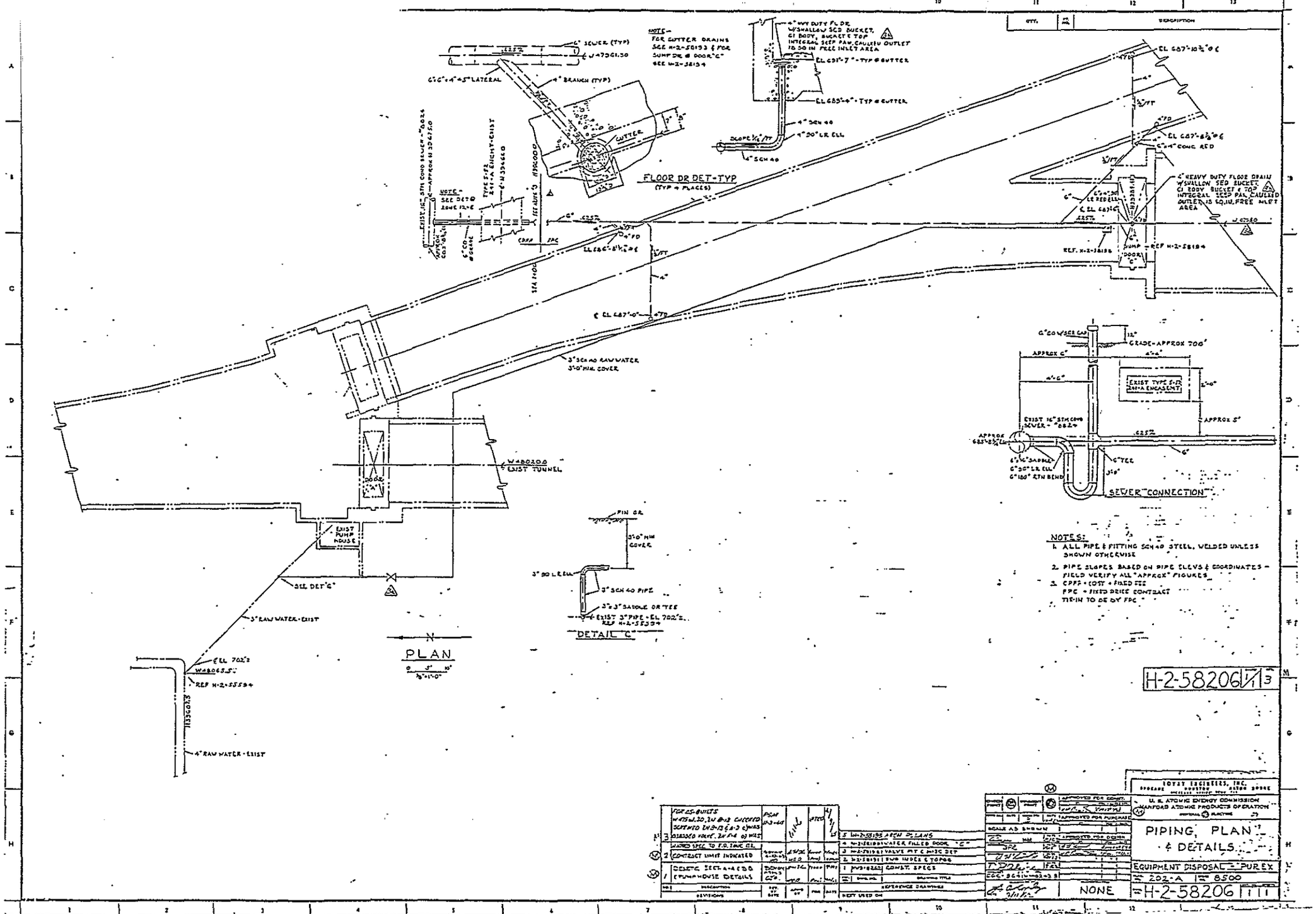

ROOF PLAN (10)
SECTION X-X
DETAIL (1)
SECTION (9)
PLAN
SECTION (4)
PLAN-D.P. BUMPER POST
ELEVATION-D.P. BUMPER POST
DETAIL (7)
PLATE DETAIL (TYP)
DETAIL (6)
DETAIL (2)
NORTH ELEVATION
DOOR "C"
SECTION (5)
SECTION (8)
SECTION (C)
H-2-58198
STRUCTURAL AND MISC. DETAILS
NONE

QTY.	NO.	DESCRIPTION

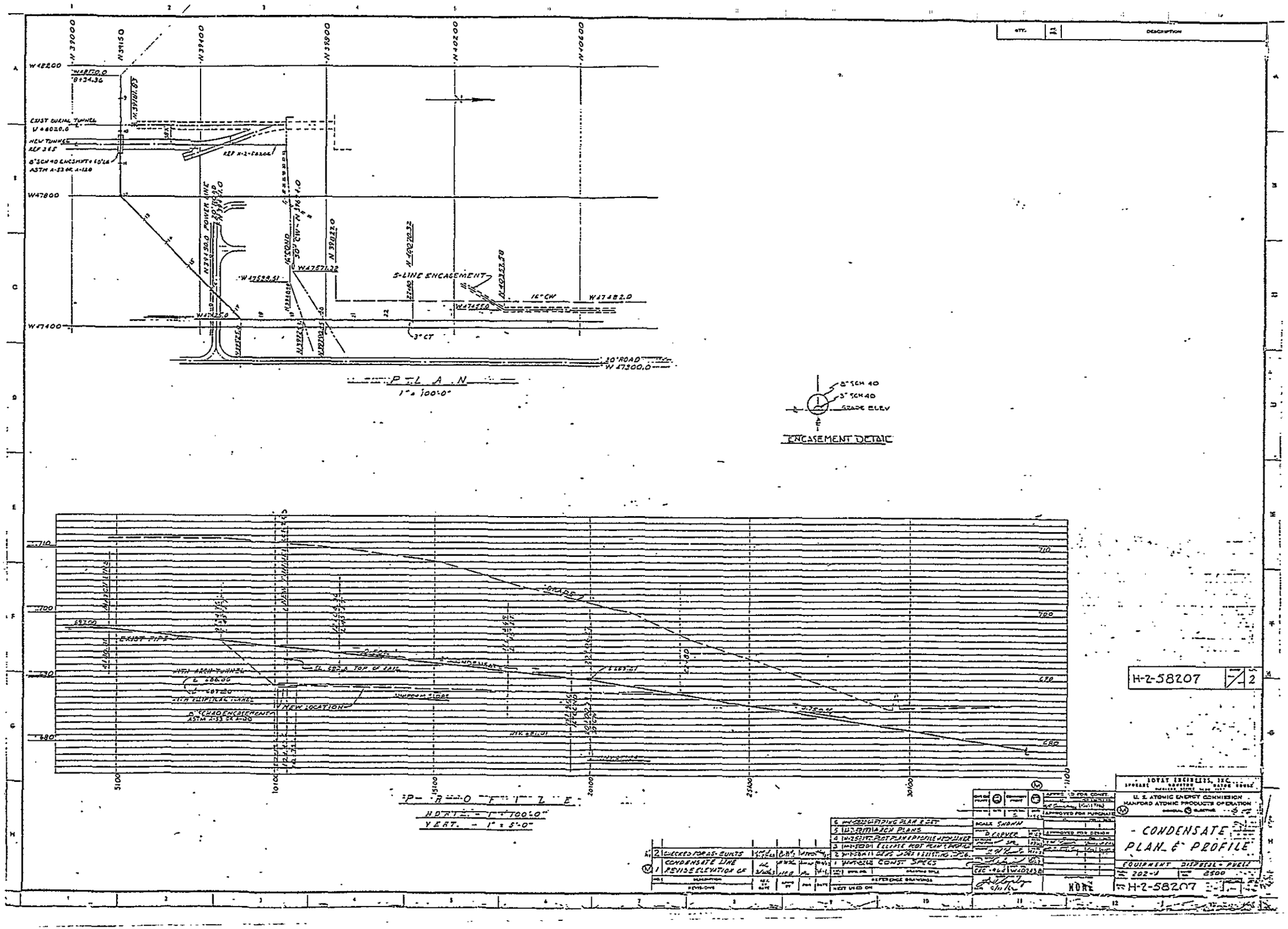


NOTE

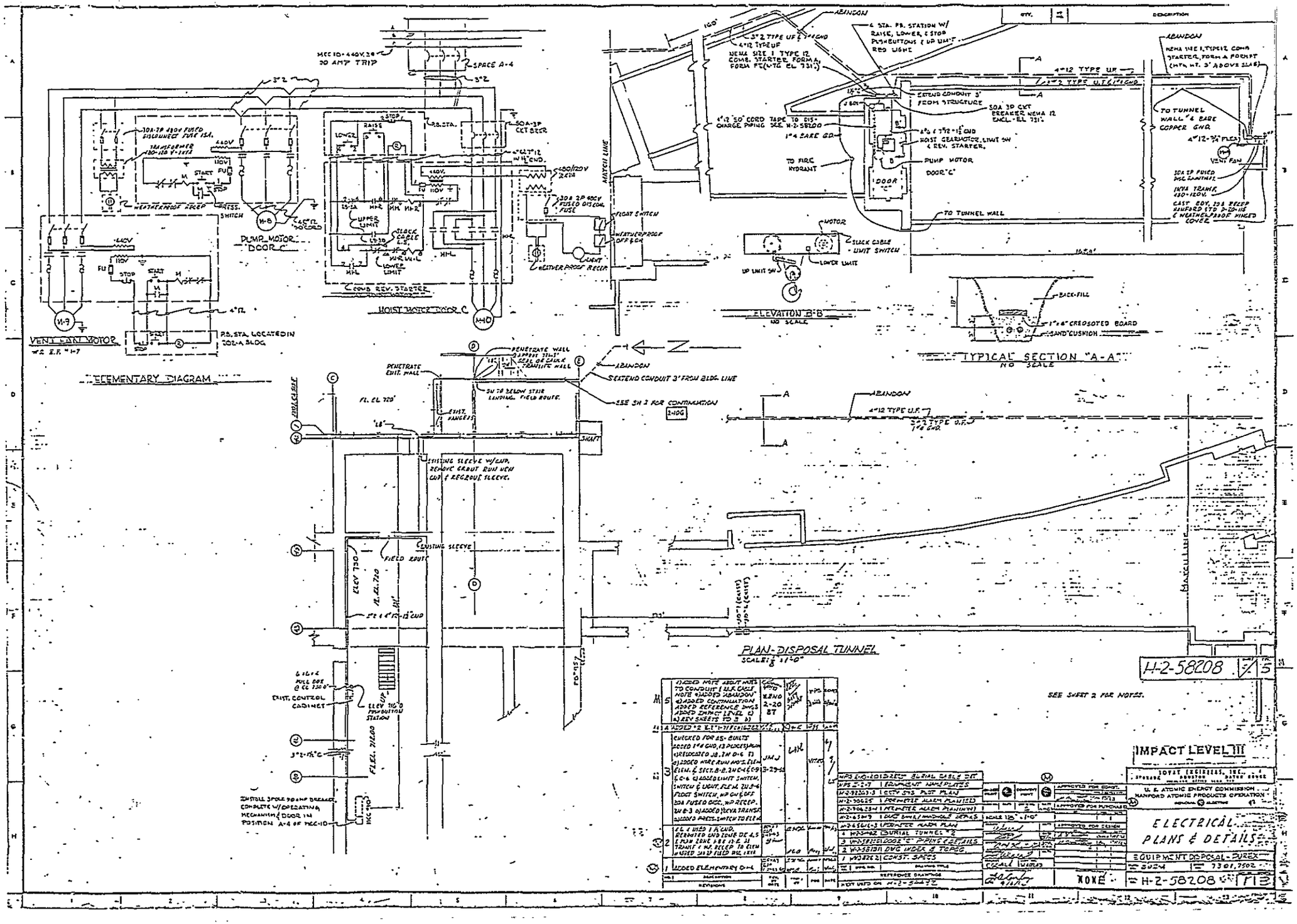

PLAN
SECTION "A-A"
SCALE 3/8" = 1'-0"
DETAIL 3
DETAIL 2
PLAN
SECTION "C-C"
SECTION "B-B"
BRACE - DETAIL 1
SCALE 3" = 1'-0"
ELEVATION
SECTION "D"
SECTION "E"
HOSE RACK
SCALE 3" = 1'-0"
NOTES:
1. CENTER LINE OF PIN IN BRACE @ COL. 27 MUST BE ON HORIZ. CENTER LINE OF SWIVEL.
2. MATERIALS:
STRUCT. ANGLES & PLATE ASTM A-7.
BOLTS ASTM A325
PIPE ASTM A53 GR.A
3. 2½" HOSE CONN. TO BE OF BRASS
H-2-58200
DOOR "C" PIPING & DETAILS
EQUIPMENT DISPOSAL - DUPEX
NONE
H-2-58200

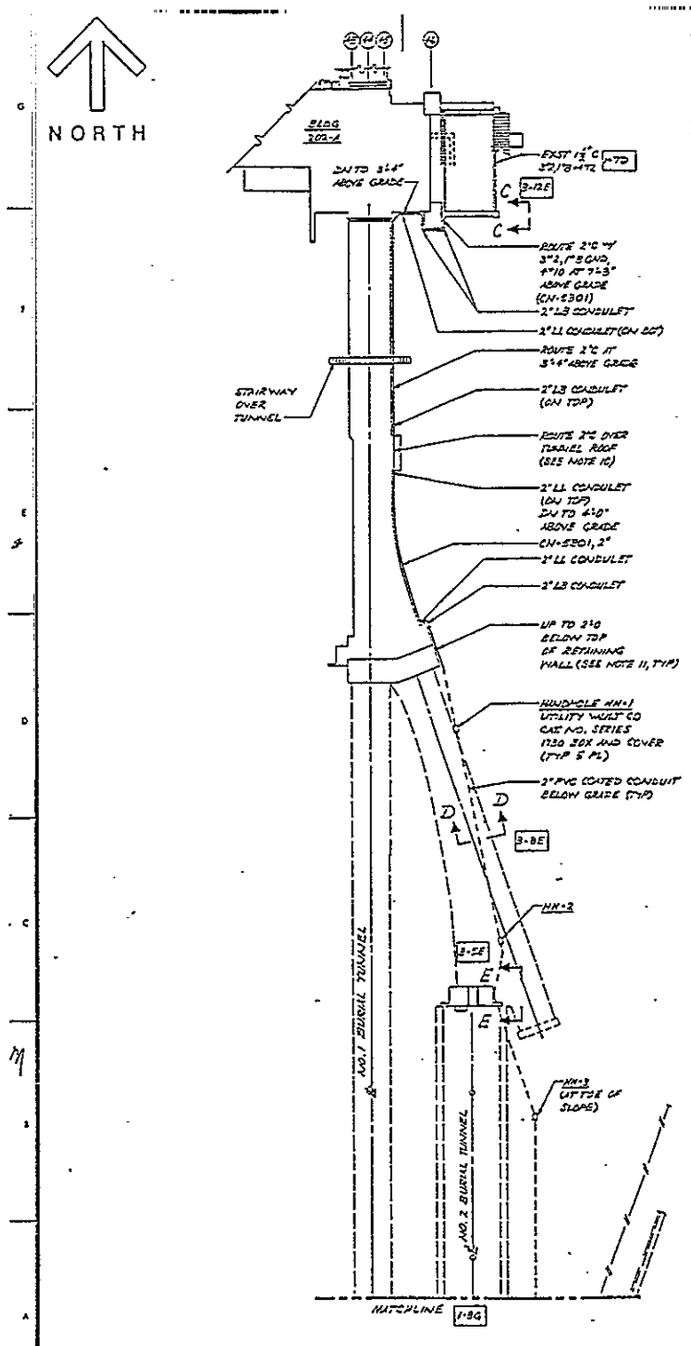


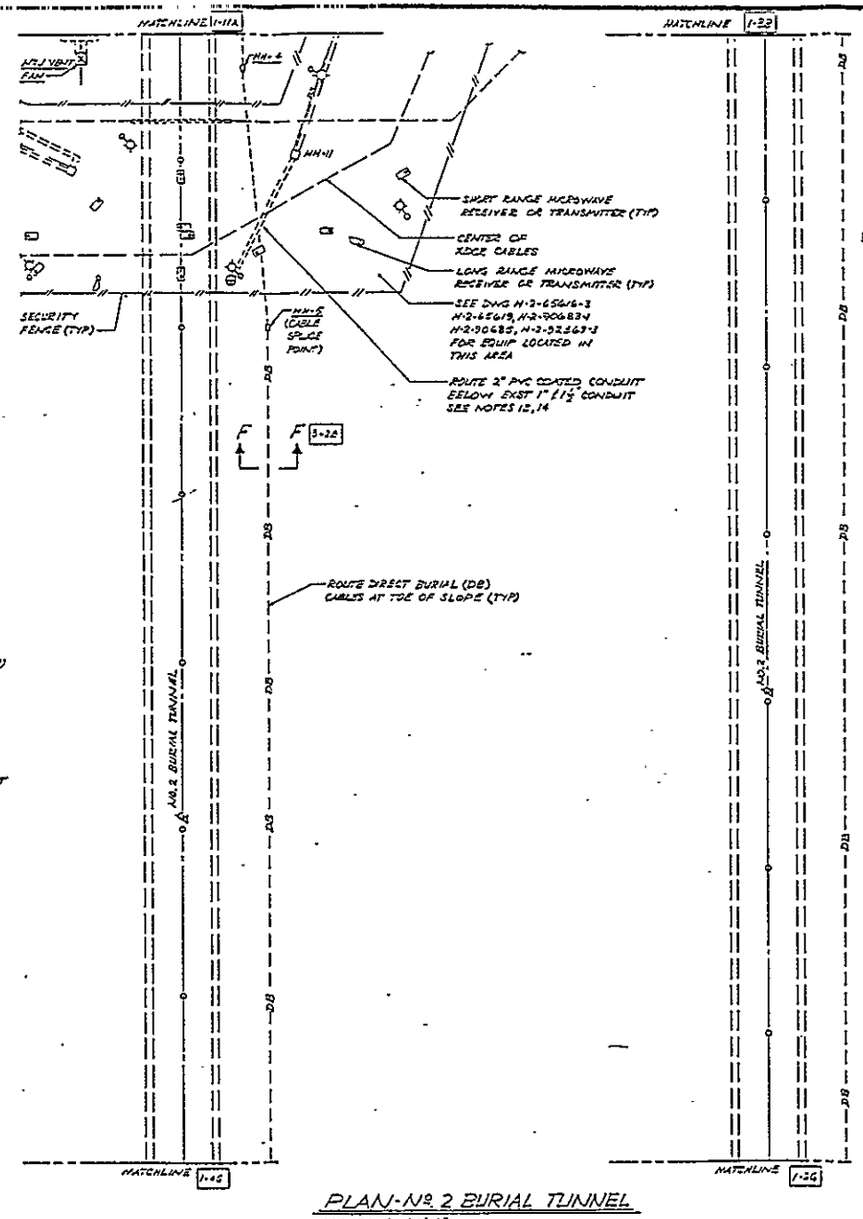
FLOOR DR DET-TYP
(TYP 4 PLACES)
SEWER CONNECTION
DETAIL "C"
PLAN
NOTES:
1. ALL PIPE & FITTING SCH 40 STEEL, WELDED UNLESS SHOWN OTHERWISE
2. PIPE SLOPES BASED ON PIPE ELEVS & COORDINATES - FIELD VERIFY ALL "APPROX" FIGURES
3. CPFF = COST + FIXED FEE
FPC = FIXED PRICE CONTRACT
TIE-IN TO BE BY FPC
H-2-58206
U. S. ATOMIC ENERGY COMMISSION
HANFORD ATOMIC PRODUCTS OPERATION
PIPING, PLAN & DETAILS
EQUIPMENT DISPOSAL - PUREX
202-A
8500
NONE
H-2-58206

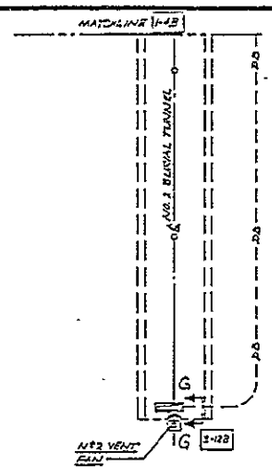


PLAN
1" = 100'-0"
5-LINE ENCASEMENT
16" CW
W 47482.0
W 47400
W 47800
W 48200
N 39000
N 39150
N 39400
N 39800
N 40200
N 40600
EXIST BURIAL TUNNEL
NEW TUNNEL
POWER LINE
3" CT
20' ROAD
W 47300.0
ENCASEMENT DETAIL
8" SCH 40
3" SCH 40
GRADE ELEV
PROFILE
HORIZ. - 1" = 100'-0"
VERT. - 1" = 5'-0"
EXIST PIPE
NEW LOCATION
GRADE
5100
10100
15100
20100
25100
30100
H-2-58207
2
CHECKED FOR AS-BUILTS
CONDENSATE LINE
REVISE ELEVATION OF
REVISIONS
REFERENCE DRAWINGS
NEXT USED ON
SCALE SHOWN
APPROVED FOR CONST.
APPROVED FOR PURCHASE
APPROVED FOR DESIGN
HORIZ
U. S. ATOMIC ENERGY COMMISSION
HANFORD ATOMIC PRODUCTS OPERATION
CONDENSATE
PLAN & PROFILE
EQUIPMENT DISPOSAL - PUREX
202-A
2500
H-2-58207


ELEMENTARY DIAGRAM
VENT FAN MOTOR
PUMP MOTOR "DOOR C"
HOIST MOTOR "DOOR C"
COMB REV. STARTER
ELEVATION "B-B"
TYPICAL SECTION "A-A"
NO SCALE
PLAN-DISPOSAL TUNNEL
SCALE: 1/8" = 1'-0"
IMPACT LEVEL III
SEE SHEET 2 FOR NOTES.
H-2-58208
ELECTRICAL PLANS & DETAILS
EQUIPMENT DISPOSAL - PUREX
NONE







NOTES:

1. INSTALLATION SHALL CONFORM TO THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE (NFPA-70)
2. EXPOSED CONDUIT AND FITTINGS SHALL BE RIGID GALVANIZED STL.
3. CONDUIT AND ASSOCIATED FITTINGS BELOW GRADE SHALL BE PVC COATED RIGID GALVANIZED STEEL. SCRAPES, CUTS OR GOUGES THAT OCCUR PRIOR TO OR DURING INSTALLATION SHALL BE REPAIRED TO RETAIN THE INTEGRITY OF THE FACTORY PVC COATING USING A POLYVINYL CHLORIDE SPRAY OR BRUSH-ON COATING.
4. EQUIPMENT SHALL BE AS SPECIFIED OR COGNIZANT ENGINEER APPROVED EQUAL.
5. WIRE PULLING COMPOUND SHALL BE "T-REX EXS" AS MANUFACTURED BY ELECTRO COMPOUND CO, POLYWATER MANUFACTURED BY AMERICAN POLYWATER CORP, OR COMPOUND RECOMMENDED BY THE CABLE MANUFACTURER.
6. CLEAN AND PAINT FACTORY PRIMED JUNCTION BOX (JB-1296) WITH TWO COATS OF GRAY ENAMEL PAINT. PREP AND APPLICATION SHALL BE PER THE PAINT MANUFACTURER'S INSTRUCTIONS.
7. PROVIDE AND INSTALL A RUBBER/SILICONE GASKET FOR EXST JUNCTION BOX (16"X16"X6") LOCATED AT THE WATER FILLED-LOOP.
8. LB CONDUIT FITTINGS SHALL BE CROUSE-HINDS FORM B, CAT. NO. LB68 W/NEOPRENE GASKET, CAT. NO. GASKBOGN AND COVER, CAT. NO. 680.
9. LL CONDUIT FITTINGS SHALL BE CROUSE-HINDS FORM B, CAT. NO. LL68 W/NEOPRENE GASKET, CAT. NO. GASKBOGN AND COVER, CAT. NO. 680.
10. SUPPORT CONDUIT ROUTED ACROSS THE TUNNEL ROOF ON PT00 UNISTRUT WHICH IS FASTENED TO A 2"WX6"WX12'L PRESSURE TREATED BOARD. FASTEN CONDUIT TO UNISTRUT USING A 2" ONE-HOLE PIPE STRAP, STEEL CITY, CAT. NO. HS-406. DO NOT PENETRATE ROOF OR ROOF FLASHING.
11. FASTEN CONDUIT TO VERTICAL SURFACES USING A 2" ONE-HOLE PIPE STRAP, STEEL CITY, CAT. NO. HS-406 AND A 2" CLAMP BACK, STEEL CITY, CAT. NO. CB-206.
12. CONDUCTORS IN CONDUIT SHALL HAVE TYPE XHHW INSULATION RATED FOR 600V. DIRECT BURIED CONDUCTORS SHALL HAVE TYPE TC INSULATION RATED FOR 600V AND BE APPROVED FOR DIRECT BURIAL USE.
13. DRAINAGE OF ALL DUCT RUNS MUST BE PROVIDED BY SLOPING THE DUCT AND/OR BY INSTALLING A DRAIN IN THE LOWEST POINT OF THE RUN. (SIMILAR TO HPS E-40-11) DUCTS SHALL BE SLOPED A MINIMUM OF 3" PER 100' BETWEEN ADJACENT HANDHOLES OR FROM A HIGH POINT IN THE DUCT TO THE HANDHOLE OPENINGS.

CONTINUED ON SH 3 3-2E

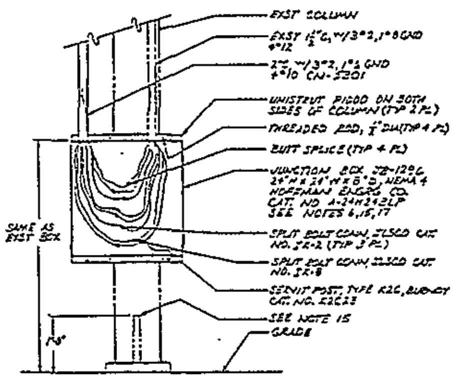
PLAN-No. 2 BURIAL TUNNEL

SCALE: 1" = 30'-0"

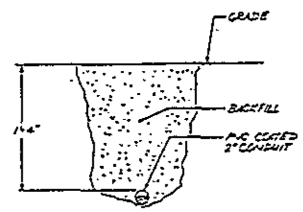
IMPACT LEVEL III

U. S. Department of Energy	PLAN - NO. 2 BURIAL TUNNEL	
Richland Operations Office, Richland, Washington 99352		
SHOWN	202-A	7201, 8001
NONE	H-2-58208	2 3

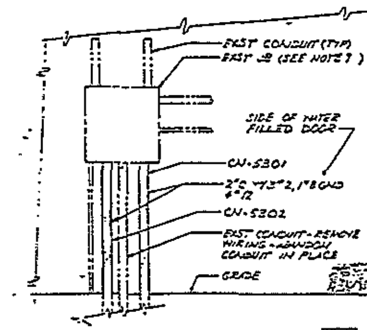
REVISIONS		
0		



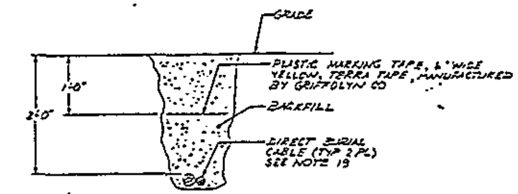
SECTION C-C 2-10C
SCALE: 1" = 1'-0"
(JUNCTION BOX SHOWN WITH COVER REMOVED)



SECTION D-D 2-10C
NO SCALE



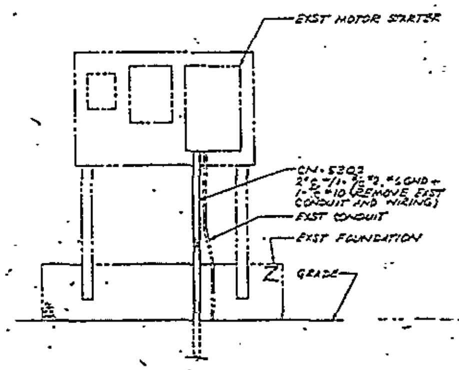
SECTION E-E 2-11C
SCALE: 1" = 1'-0"



SECTION F-F 2-2E
NO SCALE

NOTES: (CONTINUED FROM SH 2 3-18)

14. CONDUIT THAT PASSES UNDER THE ISOLATION ZONE (DOUBLE SECURITY FENCE) SHALL NOT AT ANY POINT BE CLOSER THAN 4 FEET VERTICALLY OR 7 FEET HORIZONTALLY TO THE XDCR (GUIDAR) CABLES. ALL EXCAVATION IN THIS ZONE SHALL BE BY HAND SHOVEL USING EXTREME CAUTION SO AS NOT TO NICK OR CUT THE BURIED XDCR CABLES.
15. REMOVE EXST 6"x6"x4" JUNCTION BOX. CUT EXST CONDUIT AND WIRING ENTERING FROM BOTTOM OF BOX TO 1'-0" ABOVE GRADE.
16. SEE ADVANCE MATERIAL PROCUREMENT FORM NO. 1235 PRIOR TO ORDERING MATERIALS.
17. LABEL JB-1296 WITH A SIZE "C" EQUIPMENT NAMEPLATE WITH 3/16" LETTERS PER HPS ER-7. NAMEPLATE TO READ: JB-1296
18. PERMANENTLY LABEL EACH CONDUIT WITH THE CONDUIT NUMBER AS SHOWN ON THE DRAWING. FASTEN THE LABEL APPROXIMATELY 24" FROM THE EQUIPMENT. THE CONDUIT LABEL SHALL CONSIST OF A STAINLESS STEEL MARKER PLATE, 3/4"W x 3-1/2"L, PANDUIT CORP, CAT. NO. MMP350-C. ATTACH THE MARKER PLATE USING STAINLESS STEEL TIE, .18"W x 14-1/2"L, PANDUIT CORP, CAT. NO. MLT4S-CP.
19. INSTALL DIRECT BURIAL CABLES AS SHOWN IN HPS E-10-20 (DETAIL 1) EXCEPT OMIT 1"x8" WOOD BOARD.



SECTION G-G 2-2E
NO SCALE

SEE SHEET 2 FOR NOTES.

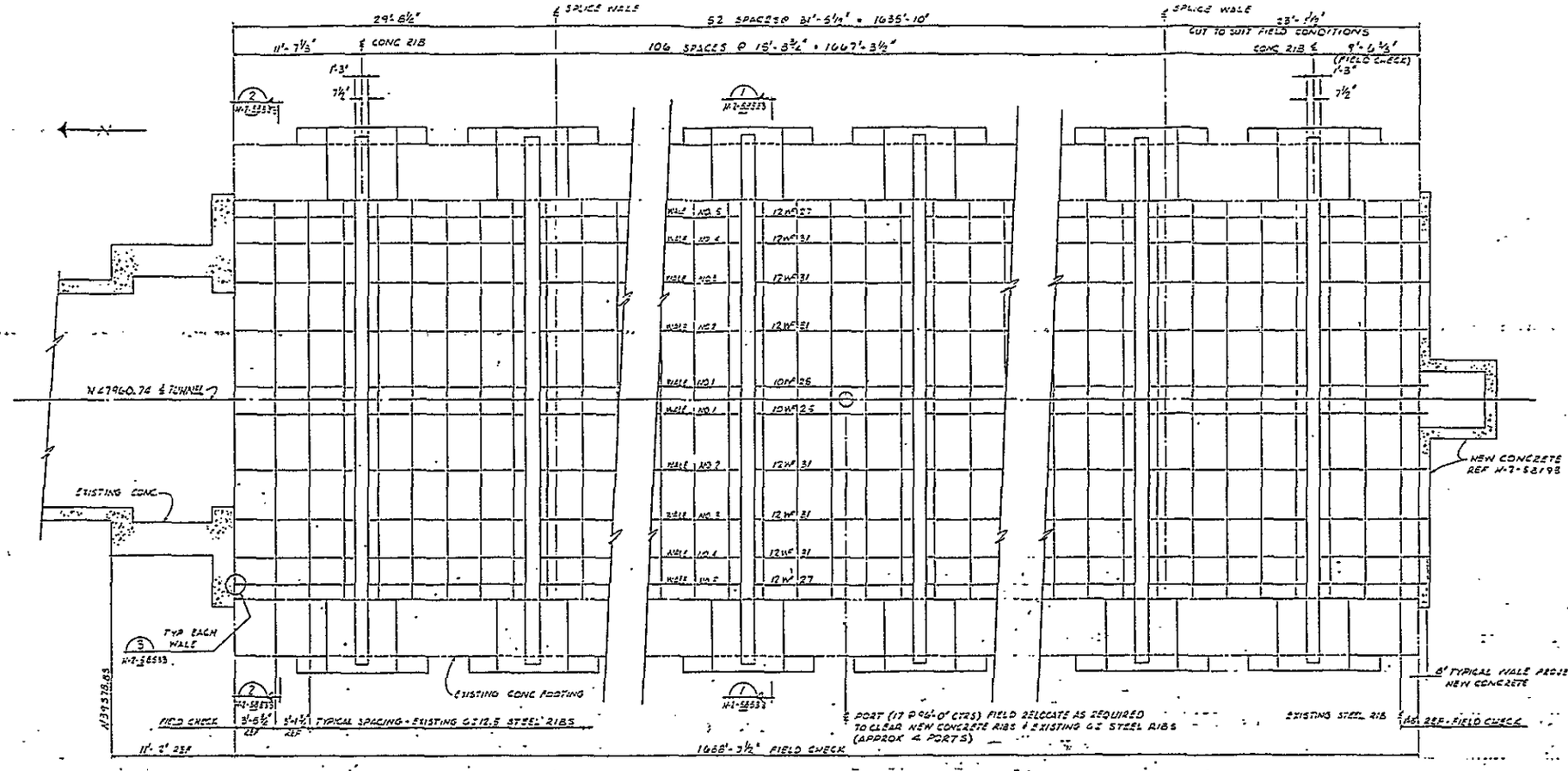
IMPACT LEVEL III

U.S. Department of Energy
Rockwell Hanford Operations

SECTIONS - NO. 2 BURIAL TUNNEL

SHOWN | 202-A | 7301
NONE | H-2-58208 | 3 | 3

9 1 1 2 4 5 3 5



PLAN

0 4 8 FT

1/4" = 1'-0"

INTERNAL STEEL WALE LIST				
WALE NO.	SIZE	QTY	LENGTH	SPLICE @
1	10 WF 26	2	29'-6 1/2"	106 @ 6 x 5/16" x 0'-8"
	12 WF 27	106	31'-5 1/16"	
	10 WF 25	2	23'-9 3/8" *	
2	12 WF 31	2	29'-6 1/2"	106 @ 6 x 5/16" x 0'-10"
	12 WF 31	106	31'-5 1/2"	
	12 WF 31	2	23'-9 3/8" *	
3	12 WF 31	2	29'-6 1/2"	106 @ 6 x 5/16" x 0'-10"
	12 WF 31	106	31'-5 1/2"	
	12 WF 31	2	23'-9 3/8" *	
4	12 WF 31	2	29'-6 1/2"	106 @ 6 x 5/16" x 0'-10"
	12 WF 31	106	31'-5 1/2"	
	12 WF 31	2	23'-9 3/8" *	
5	12 WF 27	2	29'-6 1/2"	106 @ 6 x 5/16" x 0'-10"
	12 WF 27	106	31'-5 1/2"	
	12 WF 27	2	23'-9 3/8" *	

* CUT TO SUIT FIELD CONDITIONS

GENERAL NOTES

1. CONCRETE TO DEVELOP A COMPRESSIVE STRENGTH OF 4000 # PSI PRIOR TO ANY BACKFILL LOADING
2. REINFORCING STEEL TO BE ASTM-A-432.
3. STRUCTURAL STEEL, PLATES & BOLTS TO BE ASTM-A-36.
4. H.W.-4793-S STANDARD SPECIFICATION FOR PLACING REINFORCED CONCRETE.
5.
6. H.W.-4926-S STANDARD SPECIFICATION FOR WELDING CARBON STEELS.
7. PAINTING: ALL EXPOSED STEEL SHALL RECEIVE A 20 MIL DRY THICKNESS COATING COMPOUND, BITUMINOUS, SOLVENT COAL TAR BASE CONFORMING TO MIL SPEC MIL-C-184 B0 (DOCKS) (EM.1) (KOPPERS BITUMASTIC #50)
8.
9. SLOPES ON INTERIOR OF TUNNEL SECTION SHALL BE MAINTAINED DURING CONSTRUCTION.

7	W-2-58195	ARCHITECTURAL PLANS		
	W-4-4399-S	BATCHING & DELIVERY OF CONC.		
	W-4-4798-S	REINF CONC PLACEMENT		
	H.W.-4926-S	WELDING CARBON STEELS		
	W-2-58533	REINFORCED CONCRETE TUNNELS & PORTS		
REFERENCE DRAWINGS				
USED WITH				

1	JWJ	3-30-61	PART OF NOTE 9. CHANGED FOR AS-BUILT. DELETED NOTES 5, 8 & 10 DELETED
			ISSUED FOR APPROVAL
DRAWING STATUS			

H-2-58532 V.1

GENERAL ELECTRIC
HANFORD WORKS
APPROVED FOR CONFORMANCE WITH DESIGN CRITERIA

U. S. ATOMIC ENERGY COMMISSION
RICHLAND OPERATION OFFICE

SCALE SHOWN

VITRO ENGINEERING CO.
A DIVISION OF VITRO CORP. OF AMERICA

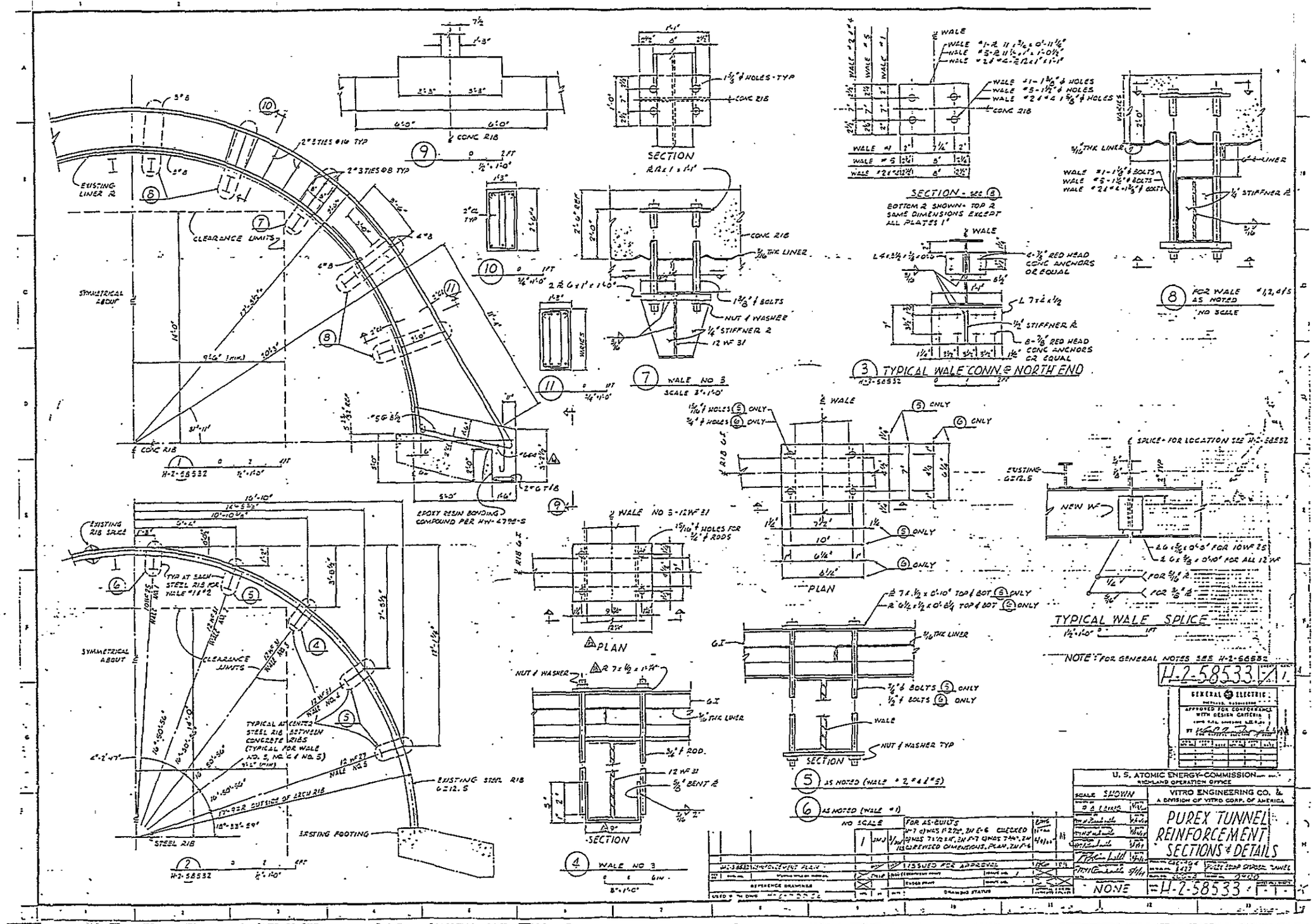
PUREX TUNNEL REINFORCEMENT PLAN

PUREX TUNNEL WASTE TUNNEL

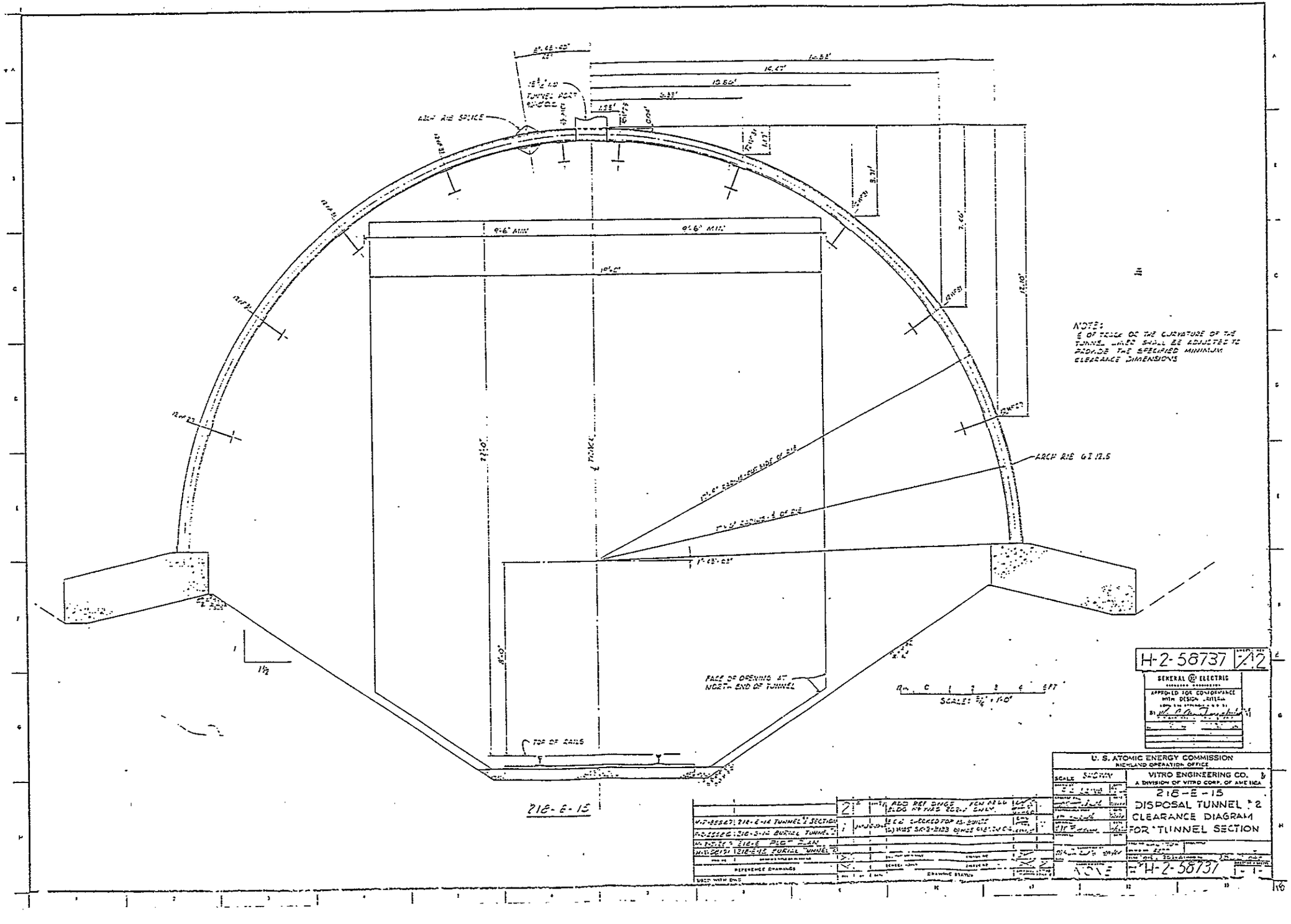
NONE

H-2-58532

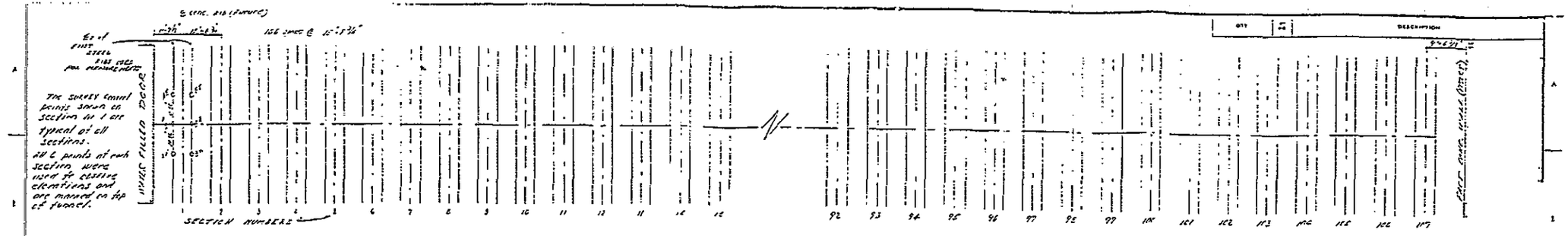
9 1 1 2 4 , 3 7



SECTION
SECTION - see 8
BOTTOM R SHOWN - TOP R SAME DIMENSIONS EXCEPT ALL PLATES 1"
TYPICAL WALE CONN @ NORTH END
FOR WALE #1,2,4,5 AS NOTED
NO SCALE
WALE NO 3
SCALE 3"=1'-0"
PLAN
TYPICAL WALE SPLICE
NOTE: FOR GENERAL NOTES SEE H-2-58532
EXISTING LINER R
CLEARANCE LIMITS
SYMMETRICAL ABOUT
EXISTING RIB SPLICE
EXISTING STEEL RIB
EXISTING FOOTING
STEEL RIB
EPOXY RESIN BONDING COMPOUND PER HW-4798-S
NUT & WASHER
NUT & WASHER TYP
WALE NO 3-12WF31
H-2-58532
H-2-58533
GENERAL ELECTRIC
APPROVED FOR CONFORMANCE WITH DESIGN CRITERIA
U. S. ATOMIC ENERGY COMMISSION
RICHLAND OPERATION OFFICE
VITRO ENGINEERING CO. &
A DIVISION OF VITRO CORP. OF AMERICA
SCALE SHOWN
PUREX TUNNEL REINFORCEMENT SECTIONS & DETAILS
NONE
H-2-58533



ARCH RIB SPLICE
TUNNEL PORT
9'-6" MIN
9'-6" MIN
19'-0"
22'-0"
8'-0"
℄ TRACK
ARCH RIB GI 12.5
FACE OF OPENING AT NORTH END OF TUNNEL
TOP OF RAILS
NOTE:
℄ OF TRACK OR THE CURVATURE OF THE TUNNEL LINER SHALL BE ADJUSTED TO PROVIDE THE SPECIFIED MINIMUM CLEARANCE DIMENSIONS
SCALE: 3/4" = 1'-0"
218-E-15
H-2-58737
GENERAL ELECTRIC
APPROVED FOR CONFORMANCE WITH DESIGN CRITERIA
U. S. ATOMIC ENERGY COMMISSION
RICHLAND OPERATION OFFICE
VITRO ENGINEERING CO.
A DIVISION OF VITRO CORP. OF AMERICA
218-E-15
DISPOSAL TUNNEL #2
CLEARANCE DIAGRAM
FOR TUNNEL SECTION
H-2-58737



The (one-time) ℄ data of the tunnel was obtained prior to the repair contract by tying measurements from the original ℄ to the center of each steel rib joint, the joint being the only physical point available on the tunnel. Staff references to the tunnel plan ℄, elevations of ℄ points shown were also taken prior to the repair contract and were numbered sections.

SURVEY PRIOR TO TUNNEL REPAIR JUNE 62

SECTION NO.	ELEVATIONS AE	AE	AW	BE	BE	BW	℄ VARIANCE ℄ - ℄	SECTION NO.	ELEVATIONS IE	IE	IW	BE	BE	BW	℄ VARIANCE ℄ - ℄
1		715.61			715.61		0'0"	57	715.22	715.05	715.22	715.36	715.40	714.95	0"
2	715.29	715.54			715.93		0'0"	58	715.23	715.97	715.23	715.20	715.85	715.26	0"
3	715.27	715.56	715.06	715.31	715.55	715.16	0'0"	59	715.17	715.05	715.22	715.23	715.95	715.32	0"
4	715.31	715.91	715.15	715.34	715.75	715.06	0'0"	60	715.00	715.60	715.20	715.09	715.60	715.42	0"
5	715.22	715.50	715.04	715.31	715.91	715.19	0'0"	61	715.00	715.87	715.44	715.05	715.95	715.42	0"
6	715.29	715.27	715.11	715.27	715.21	715.06	0'0"	62	715.00	715.64	715.32	715.63	715.52	715.22	0"
7	715.25	715.62	715.04	715.24	715.81	715.04	0'0"	63	715.02	715.83	715.44	715.62	715.36	715.23	0"
8	715.18	715.64	715.03	715.15	715.52	715.21	0'0"	64	715.04	715.32	715.32	715.61	715.72	715.46	0"
9	715.20	715.92	715.54	715.04	715.89	715.04	0'0"	65	715.23	715.23	715.61	715.21	715.71	715.62	0"
10	715.18	715.84	715.03	715.15	715.52	715.21	0'0"	66	715.21	715.26	715.21	715.23	715.26	715.21	0"
11	715.16	715.82	715.03	715.15	715.21	714.93	0'0"	67	715.24	715.06	715.61	715.21	715.31	715.31	0"
12	715.17	715.76	715.01	715.11	715.32	715.02	0'0"	68	715.27	715.94	715.44	715.23	715.85	715.45	0"
13	715.13	715.65	714.93	715.13	715.65	715.93	0'0"	69	715.42	715.46	715.62	715.43	715.52	715.42	0"
14	715.16	715.82	715.06	715.15	715.43	715.57	0'0"	70	715.26	715.96	715.49	715.60	715.96	715.56	0"
15	715.13	715.62	714.93	715.02	715.72	715.30	0'0"	71	715.26	715.34	715.26	715.26	715.22	715.05	0"
16	715.19	715.70	715.36	715.09	715.73	715.01	0'0"	72	715.18	715.78	715.46	715.82	715.82	715.05	0"
17	715.20	715.83	715.04	715.23	715.78	715.02	0'0"	73	715.24	715.78	715.64	715.64	715.21	715.05	0"
18	715.21	715.72	715.06	715.24	715.62	715.02	0'0"	74	715.30	715.78	715.42	715.62	715.72	715.21	0"
19	715.23	715.70	715.04	715.06	715.76	715.57	0'0"	75	715.39	715.84	715.21	715.47	715.32	715.46	0"
20	715.22	715.66	715.54	715.71	715.15	715.05	0'0"	76	715.26	715.80	715.50	715.20	715.40	715.57	0"
21	715.24	715.66	715.01	715.13	715.62	715.03	0'0"	77	715.40	715.60	715.86	715.62	715.62	715.05	0"
22	715.20	715.56	715.06	715.09	715.56	715.66	0'0"	78	715.25	715.23	715.23	715.21	715.26	715.25	0"
23	715.22	715.60	715.62	715.51	715.61	715.64	0'0"	79	715.23	715.23	715.21	715.23	715.23	715.26	0"
24	715.22	715.56	715.29	715.22	715.52	715.21	0'0"	80	715.21	715.21	715.21	715.21	715.26	715.26	0"
25	715.19	715.56	715.03	715.08	715.47	715.46	0'0"	81	715.26	715.19	715.23	715.23	715.23	715.26	0"
26	715.23	715.53	715.41	715.46	715.57	715.29	0'0"	82	715.21	715.26	715.25	715.23	715.23	715.23	0"
27	715.21	715.39	715.28	715.13	715.61	715.77	0'0"	83	715.24	715.24	715.26	715.26	715.26	715.23	0"
28	715.25	715.37	715.03	715.03	715.23	715.62	0'0"	84	715.23	715.28	715.23	715.27	715.26	715.26	0"
29	715.26	715.56	715.02	715.09	715.56	715.56	0'0"	85	715.24	715.23	715.23	715.26	715.23	715.23	0"
30	715.21	715.51	715.82	715.33	715.61	715.62	0'0"	86	715.24	715.23	715.26	715.26	715.26	715.26	0"
31	715.21	715.83	715.84	715.20	715.62	715.62	0'0"	87	715.25	715.23	715.23	715.26	715.23	715.26	0"
32	715.27	715.56	715.82	715.47	715.76	715.64	0'0"	88	715.26	715.23	715.26	715.26	715.26	715.26	0"
33	715.21	715.29	715.60	715.60	715.73	715.67	0'0"	89	715.23	715.26	715.26	715.26	715.26	715.26	0"
34	715.21	715.29	715.88	715.88	715.76	715.82	0'0"	90	715.23	715.23	715.26	715.26	715.26	715.26	0"
35	715.26	715.42	715.62	715.63	715.44	715.87	0'0"	91	715.26	715.23	715.23	715.26	715.23	715.23	0"
36	715.24	715.30	715.62	715.62	715.58	715.62	0'0"	92	715.26	715.23	715.23	715.26	715.26	715.26	0"
37	715.24	715.30	715.62	715.62	715.58	715.62	0'0"	93	715.26	715.23	715.23	715.26	715.26	715.26	0"
38	715.26	715.26	715.62	715.62	715.62	715.62	0'0"	94	715.26	715.23	715.26	715.26	715.26	715.26	0"
39	715.26	715.26	715.62	715.62	715.62	715.62	0'0"	95	715.26	715.23	715.26	715.26	715.26	715.26	0"
40	715.26	715.26	715.62	715.62	715.62	715.62	0'0"	96	715.26	715.23	715.26	715.26	715.26	715.26	0"
41	715.26	715.26	715.62	715.62	715.62	715.62	0'0"	97	715.26	715.23	715.26	715.26	715.26	715.26	0"
42	715.26	715.26	715.62	715.62	715.62	715.62	0'0"	98	715.26	715.23	715.26	715.26	715.26	715.26	0"
43	715.26	715.26	715.62	715.62	715.62	715.62	0'0"	99	715.26	715.23	715.26	715.26	715.26	715.26	0"
44	715.26	715.26	715.62	715.62	715.62	715.62	0'0"	100	715.26	715.23	715.26	715.26	715.26	715.26	0"
45	715.26	715.26	715.62	715.62	715.62	715.62	0'0"	101	715.26	715.23	715.26	715.26	715.26	715.26	0"
46	715.26	715.23	715.62	715.62	715.62	715.62	0'0"	102	715.26	715.23	715.26	715.26	715.26	715.26	0"
47	715.26	715.26	715.62	715.62	715.62	715.62	0'0"	103	715.26	715.23	715.26	715.26	715.26	715.26	0"
48	715.26	715.26	715.62	715.62	715.62	715.62	0'0"	104	715.26	715.23	715.26	715.26	715.26	715.26	0"
49	715.26	715.26	715.62	715.62	715.62	715.62	0'0"	105	715.26	715.23	715.26	715.26	715.26	715.26	0"
50	715.26	715.26	715.62	715.62	715.62	715.62	0'0"	106	715.26	715.23	715.26	715.26	715.26	715.26	0"
51	715.26	715.26	715.62	715.62	715.62	715.62	0'0"	107	715.26	715.23	715.26	715.26	715.26	715.26	0"
52	715.26	715.26	715.62	715.62	715.62	715.62	0'0"								
53	715.26	715.26	715.62	715.62	715.62	715.62	0'0"								
54	715.26	715.26	715.62	715.62	715.62	715.62	0'0"								
55	715.26	715.26	715.62	715.62	715.62	715.62	0'0"								
56	715.26	715.26	715.62	715.62	715.62	715.62	0'0"								

H-2-58738 1/1

U. S. ATOMIC ENERGY COMMISSION
HANFORD ATOMIC PRODUCTS OPERATION
GENERAL ELECTRIC

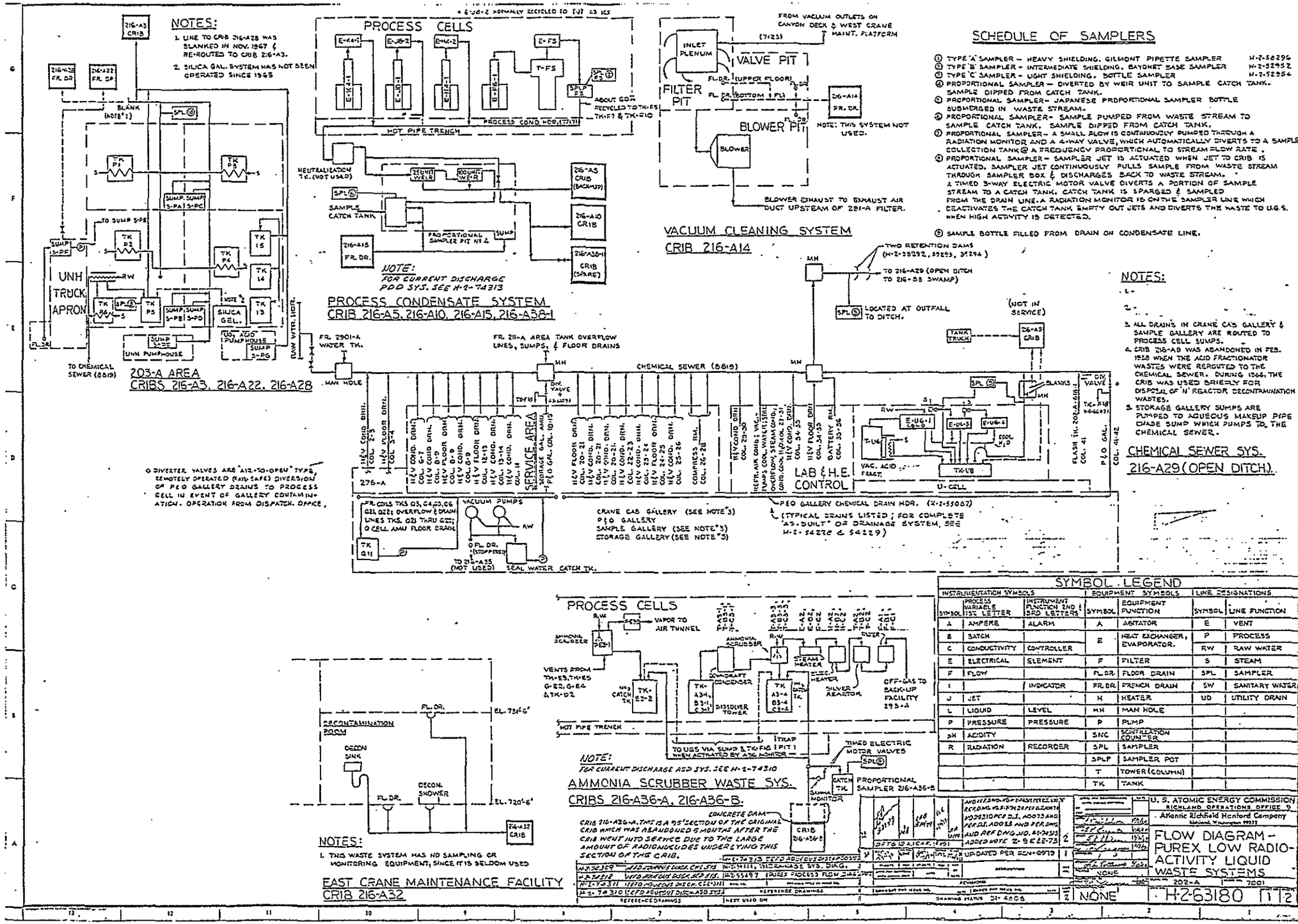
SURVEY CONTROLS AND DATA - 200E TUNNEL

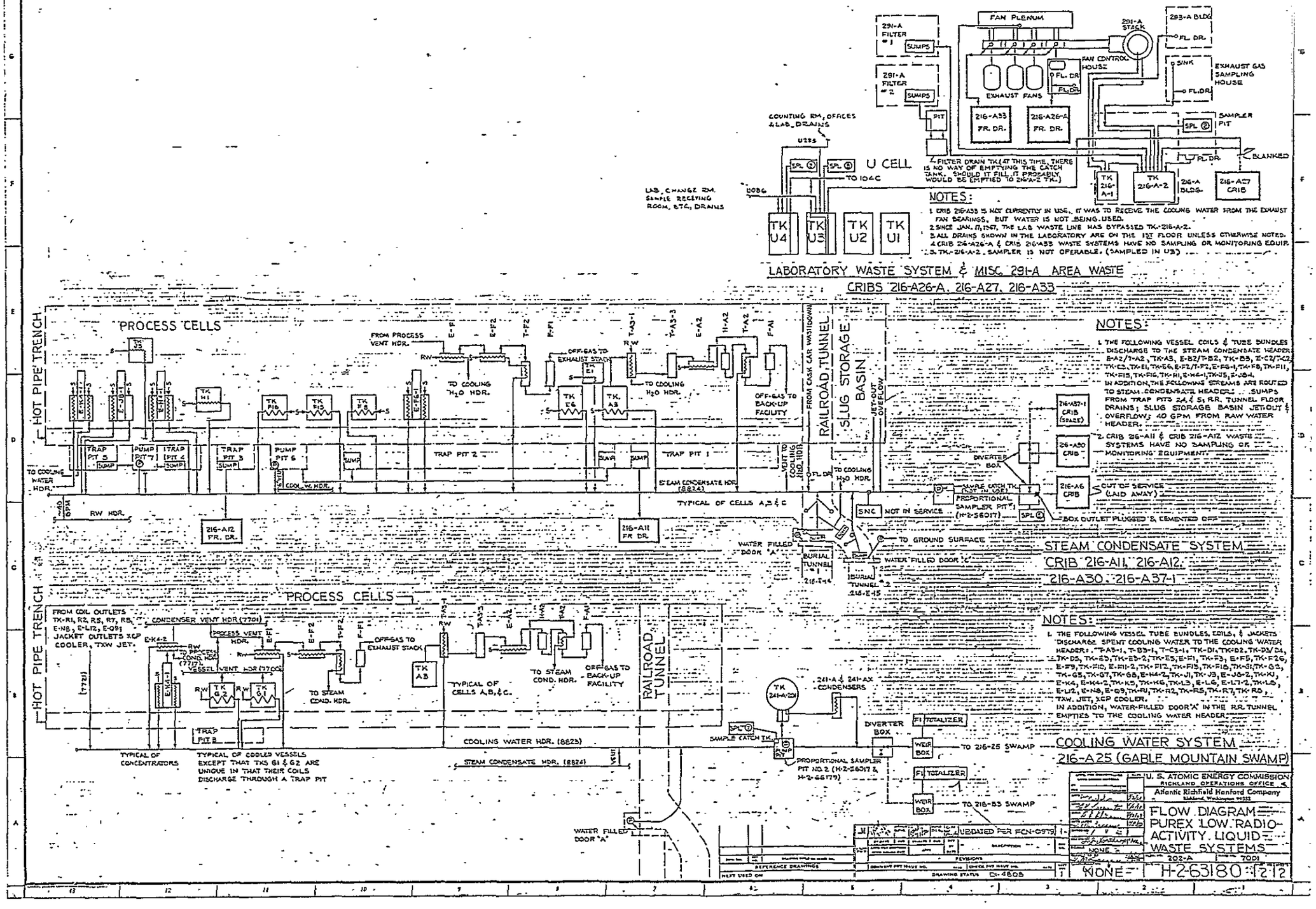
SCALE NONE

NONE

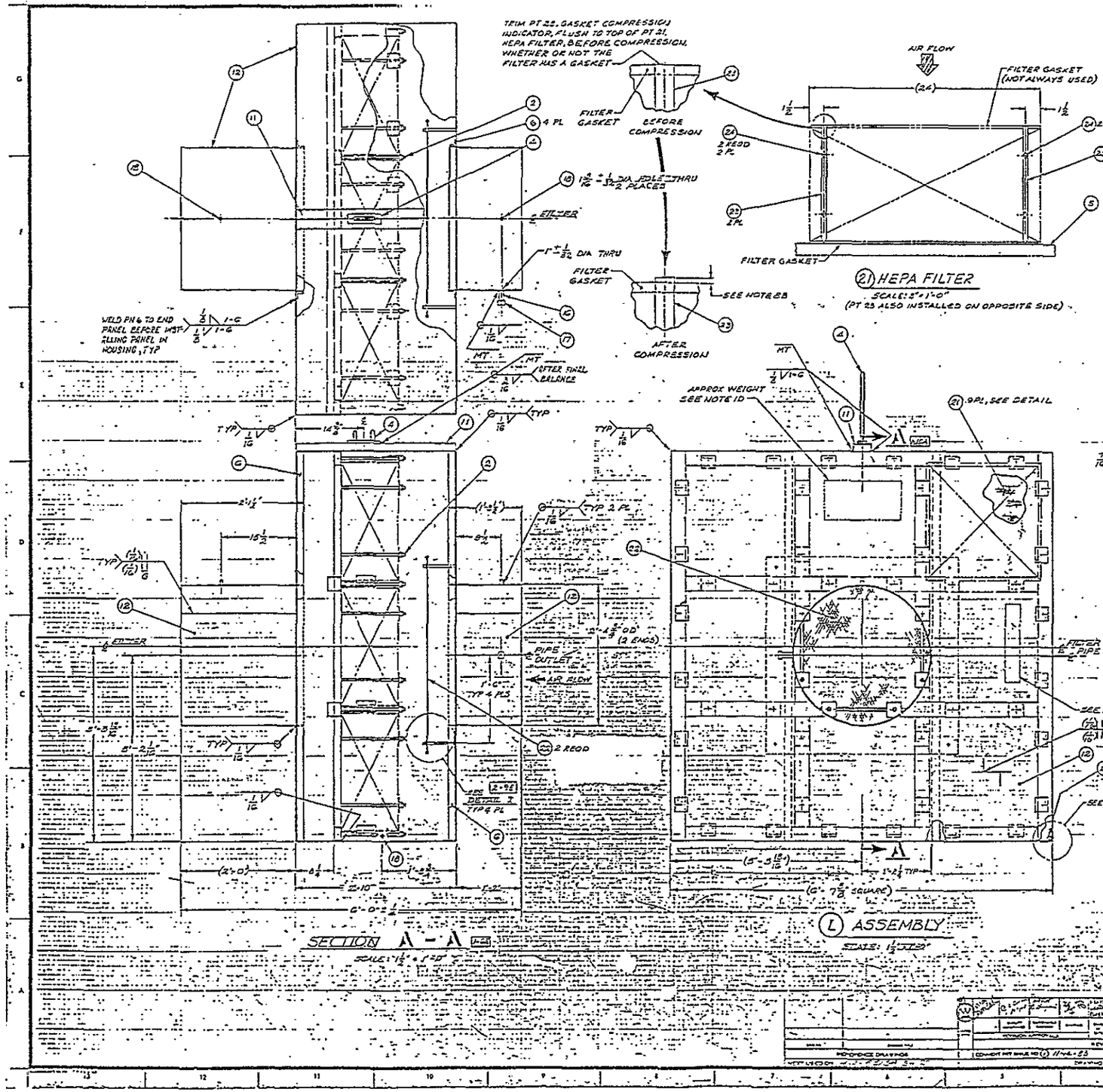
H-2-58738 1/1

9212 4 540


NOTES:
1. LINE TO CRIB 216-A28 WAS BLANKED IN NOV. 1967 & RE-ROUTED TO CRIB 216-A3.
2. SILICA GEL. SYSTEM HAS NOT BEEN OPERATED SINCE 1965
UNH TRUCK APRON
203-A AREA
CRIBS 216-A3, 216-A22, 216-A28
PROCESS CELLS
HOT PIPE TRENCH
PROCESS COND. HDR. (7171)
ABOUT 60% RECYCLED TO TK-F5 TK-F7 & TK-F10
NEUTRALIZATION T.E. (NOT USED)
SAMPLE CATCH TANK
PROPORTIONAL SAMPLER PIT NO 2
NOTE:
FOR CURRENT DISCHARGE PDD SYS. SEE H-2-74313
PROCESS CONDENSATE SYSTEM
CRIB 216-A5, 216-A10, 216-A15, 216-A36-1
FROM VACUUM OUTLETS ON CANYON DECK & WEST CRANE MAINT. PLATFORM
INLET PLENUM
VALVE PIT
FILTER PIT
BLOWER PIT
BLOWER
NOTE: THIS SYSTEM NOT USED.
BLOWER EXHAUST TO EXHAUST AIR DUCT UPSTEAM OF 281-A FILTER.
VACUUM CLEANING SYSTEM
CRIB 216-A14
TWO RETENTION DAMS (H-2-35292, 35293, 35294)
TO 216-A29 (OPEN DITCH TO 216-B5 SWAMP)
LOCATED AT OUTFALL TO DITCH.
(NOT IN SERVICE)
FR. 2901-A WATER TK.
FR. 211-A AREA TANK OVERFLOW LINES, SUMPS, & FLOOR DRAINS
CHEMICAL SEWER (8619)
MAN HOLE
SERVICE AREA
LAB & H.E. CONTROL
U-CELL
276-A
VACUUM PUMPS
SEAL WATER CATCH TK.
CRANE CAB GALLERY (SEE NOTE 3)
P&O GALLERY
SAMPLE GALLERY (SEE NOTE 3)
STORAGE GALLERY (SEE NOTE 3)
P&O GALLERY CHEMICAL DRAIN HDR. (H-2-55067)
(TYPICAL DRAINS LISTED; FOR COMPLETE "AS-BUILT" OF DRAINAGE SYSTEM, SEE H-2-54228 & 54229)
NOTES:
3. ALL DRAINS IN CRANE CAB GALLERY & SAMPLE GALLERY ARE ROUTED TO PROCESS CELL SUMPS.
4. CRIB 216-A9 WAS ABANDONED IN FEB. 1958 WHEN THE ACID FRACTIONATOR WASTES WERE REROUTED TO THE CHEMICAL SEWER. DURING 1966, THE CRIB WAS USED BRIEFLY FOR DISPOSAL OF 'N' REACTOR DECONTAMINATION WASTES.
5. STORAGE GALLERY SUMPS ARE PUMPED TO AQUEOUS MAKEUP PIPE CHASE SUMP WHICH PUMPS TO THE CHEMICAL SEWER.
CHEMICAL SEWER SYS.
216-A29 (OPEN DITCH).
DIVERTER VALVES ARE "A12-TO-OPEN" TYPE, REMOTELY OPERATED (FAIL-SAFE) DIVERSION OF P&O GALLERY DRAINS TO PROCESS CELL IN EVENT OF GALLERY CONTAMINATION. OPERATION FROM DISPATCH OFFICE.
PROCESS CELLS
VAPOR TO AIR TUNNEL
AMMONIA SCRUBBER
VENTS FROM TK-E3, TK-E5 G-E2, G-E4 & TK-D2
DISSOLVER TOWER
STEAM HEATER
SILVER REACTOR
OFF-GAS TO BACK-UP FACILITY 293-A
TO UGS VIA SUMP & TK-F48 (PIT 1 WHEN ACTIVATED BY A36 MONITOR)
TIMED ELECTRIC MOTOR VALVES
PROPORTIONAL SAMPLER 216-A36-B
NOTE:
FOR CURRENT DISCHARGE ASD SYS. SEE H-2-74310
AMMONIA SCRUBBER WASTE SYS.
CRIBS 216-A36-A, 216-A36-B.
CONCRETE DAM
CRIB 216-A36-A. THIS IS A 95' SECTION OF THE ORIGINAL CRIB WHICH WAS ABANDONED 5 MONTHS AFTER THE CRIB WENT INTO SERVICE DUE TO THE LARGE AMOUNT OF RADIONUCLIDES UNDERLYING THIS SECTION OF THE CRIB.
DECONTAMINATION ROOM
DECON SINK
DECON. SHOWER
EL. 734'-6"
EL. 720'-6"
NOTES:
1. THIS WASTE SYSTEM HAS NO SAMPLING OR MONITORING EQUIPMENT, SINCE IT IS SELDOM USED
EAST CRANE MAINTENANCE FACILITY
CRIB 216-A32
SCHEDULE OF SAMPLERS
① TYPE 'A' SAMPLER – HEAVY SHIELDING. GILMONT PIPETTE SAMPLER H-2-58296
② TYPE 'B' SAMPLER – INTERMEDIATE SHIELDING. BAYONET BASE SAMPLER H-2-52952
③ TYPE 'C' SAMPLER – LIGHT SHIELDING. BOTTLE SAMPLER H-2-52954
④ PROPORTIONAL SAMPLER – DIVERTED BY WEIR UNIT TO SAMPLE CATCH TANK. SAMPLE DIPPED FROM CATCH TANK.
⑤ PROPORTIONAL SAMPLER – JAPANESE PROPORTIONAL SAMPLER BOTTLE SUBMERGED IN WASTE STREAM.
⑥ PROPORTIONAL SAMPLER – SAMPLE PUMPED FROM WASTE STREAM TO SAMPLE CATCH TANK. SAMPLE DIPPED FROM CATCH TANK.
⑦ PROPORTIONAL SAMPLER – A SMALL FLOW IS CONTINUOUSLY PUMPED THROUGH A RADIATION MONITOR AND A 4-WAY VALVE, WHICH AUTOMATICALLY DIVERTS TO A SAMPLE COLLECTION TANK @ A FREQUENCY PROPORTIONAL TO STREAM FLOW RATE.
⑧ PROPORTIONAL SAMPLER – SAMPLER JET IS ACTUATED WHEN JET TO CRIB IS ACTUATED. SAMPLER JET CONTINUOUSLY PULLS SAMPLE FROM WASTE STREAM THROUGH SAMPLER BOX & DISCHARGES BACK TO WASTE STREAM. A TIMED 3-WAY ELECTRIC MOTOR VALVE DIVERTS A PORTION OF SAMPLE STREAM TO A CATCH TANK. CATCH TANK IS SPARGED & SAMPLED FROM THE DRAIN LINE. A RADIATION MONITOR IS ON THE SAMPLER LINE WHICH DEACTIVATES THE CATCH TANK EMPTY OUT JETS AND DIVERTS THE WASTE TO U.G.S. WHEN HIGH ACTIVITY IS DETECTED.
⑨ SAMPLE BOTTLE FILLED FROM DRAIN ON CONDENSATE LINE.
SYMBOL LEGEND
INSTRUMENTATION SYMBOLS
EQUIPMENT SYMBOLS
LINE DESIGNATIONS
SYMBOL | PROCESS VARIABLE (1ST LETTER) | INSTRUMENT FUNCTION (2ND & 3RD LETTERS)
A AMPERE ALARM
B BATCH
C CONDUCTIVITY CONTROLLER
E ELECTRICAL ELEMENT
F FLOW
I INDICATOR
J JET
L LIQUID LEVEL
P PRESSURE PRESSURE
pH ACIDITY
R RADIATION RECORDER
SYMBOL | EQUIPMENT FUNCTION
A AGITATOR
E HEAT EXCHANGER, EVAPORATOR
F FILTER
FL DR FLOOR DRAIN
FR DR FRENCH DRAIN
H HEATER
MH MAN HOLE
P PUMP
SNC SCINTILLATION COUNTER
SPL SAMPLER
SPLP SAMPLER POT
T TOWER (COLUMN)
TK TANK
SYMBOL | LINE FUNCTION
E VENT
P PROCESS
RW RAW WATER
S STEAM
SPL SAMPLER
SW SANITARY WATER
UD UTILITY DRAIN
U.S. ATOMIC ENERGY COMMISSION
RICHLAND OPERATIONS OFFICE
Atlantic Richfield Hanford Company
FLOW DIAGRAM – PUREX LOW RADIOACTIVITY LIQUID WASTE SYSTEMS
H-2-63180


LABORATORY WASTE SYSTEM & MISC. 291-A AREA WASTE
CRIBS 216-A26-A, 216-A27, 216-A33
NOTES:
1. CRIB 216-A33 IS NOT CURRENTLY IN USE. IT WAS TO RECEIVE THE COOLING WATER FROM THE EXHAUST FAN BEARINGS, BUT WATER IS NOT BEING USED.
2. SINCE JAN. 17, 1947, THE LAB WASTE LINE HAS BYPASSED TK-216-A-2.
3. ALL DRAINS SHOWN IN THE LABORATORY ARE ON THE 1ST FLOOR UNLESS OTHERWISE NOTED.
4. CRIB 26-A26-A & CRIB 26-A33 WASTE SYSTEMS HAVE NO SAMPLING OR MONITORING EQUIP.
5. TK-216-A-2 SAMPLER IS NOT OPERABLE. (SAMPLED IN U3)
FAN PLENUM
291-A STACK
291-A FILTER #1
291-A FILTER #2
SUMPS
EXHAUST FANS
FAN CONTROL HOUSE
293-A BLDG
EXHAUST GAS SAMPLING HOUSE
SAMPLER PIT
216-A33 FR. DR.
216-A26-A FR. DR.
FILTER DRAIN TK. (AT THIS TIME, THERE IS NO WAY OF EMPTYING THE CATCH TANK. SHOULD IT FILL, IT PROBABLY WOULD BE EMPTIED TO 216-A-2 TK.)
TK 216-A-1
TK 216-A-2
216-A27 CRIB
COUNTING RM., OFFICES & LAB. DRAINS
U295
U CELL
TO 104C
LAB. CHANGE RM. SAMPLE RECEIVING ROOM, ETC., DRAINS
TK U4
TK U3
TK U2
TK U1
HOT PIPE TRENCH
PROCESS CELLS
FROM PROCESS VENT HDR.
TO COOLING H2O HDR.
OFF-GAS TO EXHAUST STACK
OFF-GAS TO BACK-UP FACILITY
RAILROAD TUNNEL
SLUG STORAGE BASIN
JET-OUT OVERFLOW
FROM CASK CAR WASHDOWN
TRAP PIT 5
PUMP PIT 7
TRAP PIT 4
TRAP PIT 3
PUMP PIT 6
TRAP PIT 2
TRAP PIT 1
TO COOLING WATER HDR.
COOL. W. HDR.
STEAM CONDENSATE HDR. (8824)
OUT TO COOLING H2O HDR.
TYPICAL OF CELLS A, B & C
RW HDR.
216-A12 FR. DR.
216-A11 FR. DR.
NOTES:
1. THE FOLLOWING VESSEL COILS & TUBE BUNDLES DISCHARGE TO THE STEAM CONDENSATE HEADER: E-A2/T-A2, TK-A3, E-B2/T-B2, TK-B3, E-C2/T-C2, TK-C3, TK-E1, TK-E4, E-F2/T-F2, E-F6-1, TK-F8, TK-F11, TK-F15, TK-F16, TK-H1, E-H4-1, TK-J5, E-J8-1.
IN ADDITION, THE FOLLOWING STREAMS ARE ROUTED TO STEAM CONDENSATE HEADER: SUMPS FROM TRAP PITS 2, 4 & 5; R.R. TUNNEL FLOOR DRAINS; SLUG STORAGE BASIN JET-OUT & OVERFLOW; 40 GPM FROM RAW WATER HEADER.
2. CRIB 26-A11 & CRIB 216-A12 WASTE SYSTEMS HAVE NO SAMPLING OR MONITORING EQUIPMENT.
216-A37-1 CRIB (SPARE)
26-A30 CRIB
216-A6 CRIB
DIVERTER BOX
SAMPLE CATCH TK. (NOT IN USE)
PROPORTIONAL SAMPLER PIT #1 (H-2-56017)
CUT OF SERVICE (LAID AWAY)
BOX OUTLET PLUGGED & CEMENTED OFF
SNC NOT IN SERVICE
TO GROUND SURFACE
WATER FILLED DOOR "A"
BURIAL TUNNEL #1 216-E-14
BURIAL TUNNEL #2 216-E-15
STEAM CONDENSATE SYSTEM
CRIB 216-A11, 216-A12, 216-A30, 216-A37-1
PROCESS CELLS
FROM COIL OUTLETS TK-R1, R2, R5, R7, R8, E-N8, E-L12, E-G9; JACKET OUTLETS XCP COOLER, TXW JET.
CONDENSER VENT HDR. (7701)
PROCESS VENT HDR.
VESSEL VENT HDR. (7700)
TO PROCESS COND. HDR. (7717)
TO STEAM COND. HDR.
TYPICAL OF CELLS A, B, & C.
TK A3
TRAP PIT 8
TYPICAL OF CONCENTRATORS
TYPICAL OF COOLED VESSELS EXCEPT THAT TKS G1 & G2 ARE UNIQUE IN THAT THEIR COILS DISCHARGE THROUGH A TRAP PIT
COOLING WATER HDR. (8823)
STEAM CONDENSATE HDR. (8824)
241-A & 241-AX CONDENSERS
TK 241-A-201
SAMPLE CATCH TK.
PROPORTIONAL SAMPLER PIT NO. 2 (H-2-56017 & H-2-56179)
TOTALIZER
WEIR BOX
TO 216-25 SWAMP
TO 216-B3 SWAMP
NOTES:
1. THE FOLLOWING VESSEL TUBE BUNDLES, COILS, & JACKETS DISCHARGE SPENT COOLING WATER TO THE COOLING WATER HEADER: T-A3-1, T-B3-1, T-C3-1, TK-D1, TK-D2, TK-D3/D4, TK-D5, TK-E3, TK-E3-2, TK-E5; E-F1, TK-F3; E-F5, TK-F26, E-F9, TK-F10, E-H1-2, TK-F12, TK-F13, TK-F18, TK-G1, TK-G2, TK-G5, TK-G7, TK-G8, E-H4-2, TK-J1, TK-J3, E-J6-2, TK-K1, E-K4, E-K4-2, TK-K5, TK-K6, TK-L3, E-L6, E-L7-2, TK-L8, E-L12, E-N8, E-G9, TK-R1, TK-R2, TK-R5, TK-R7, TK-R8, TXW JET, XCP COOLER.
IN ADDITION, WATER-FILLED DOOR "A" IN THE R.R. TUNNEL EMPTIES TO THE COOLING WATER HEADER.
COOLING WATER SYSTEM
216-A25 (GABLE MOUNTAIN SWAMP)
WATER FILLED DOOR "A"
U. S. ATOMIC ENERGY COMMISSION
RICHLAND OPERATIONS OFFICE
Atlantic Richfield Hanford Company
FLOW DIAGRAM PUREX LOW RADIOACTIVITY LIQUID WASTE SYSTEMS
293-A
7001
NONE
H-2-63180
UPDATED PER FCN-0979
REVISIONS
REFERENCE DRAWINGS
NEXT USED ON
DRAWING STATUS
DI-4805

9 2 1 2 4 5 4 2



(21) HEPA FILTER
SCALE: 3" = 1'-0"
(PT 23 ALSO INSTALLED ON OPPOSITE SIDE)

(23) GASKET COMPRESSION INDICATOR
SCALE: 1/2

SECTION A - A
SCALE: 1 1/2" = 1'-0"

(L) ASSEMBLY
SCALE: 1 1/2" = 1'-0"

DETAIL II

QTY		PT NO	DESCRIPTION	MATL / REF
	X	1	ASSEMBLY, FILTER	
X	1	2	SUB ASSEMBLY, FRAME	
X 9		3	SUB ASSEMBLY, SUPPORT	
	1	4	LIFTING BAIL, STD 26D	H-2-90161-5
AR		5	C3 x 4.1	ASTM-A 36 CS
	AR	6	L 1 1/2 x 1 1/2 x 5/16	
24		7	L 2 1/2 x 2 1/2 x 1/4 x 5"L	
24		8	BAR 5" x 1/4" x 3"L	
48		9	BAR Ø 1/2" x 13 3/4" THD ONE END 1/2-13UNC-2A x 5"L	
	4	10	BAR Ø 1/2" x 7"L	
	1	11	C4 x 5.4 x 2'-10"L	ASTM-A 36 CS
	AR	12	SHEET 14 GA (.075)	ASTM-A570, GR33 CS
AR		13	SHEET 11 GA (.120)	ASTM-A570, GR33 CS
	AR	14	SHEET 16 GA (.060)	ASTM-A570, GR33 CS
18		15	PIPE 1/2 SCHED 40, 3"L	ASTM-A 53 CS TYPE E GR B
	1	16	PIPE 1/2 SCHED 40, 3"L	ASTM-A 53 CS TYPE E GR B
	1	17	PIPE CAP 1/2 SCREWED 3000 CLASS	ASTM-A 105 CS
	3	18	HALF COUPLING 1/2 SCR 3000 CLASS	ASTM-A 105 CS
54		19	HEAVY HEX NUT 1/2-13UNC-2B	COML CS
4		20	FLAT WASHER 1/2 NOM REGULAR SERIES	COML CS
	9	21	HEPA FILTER 24 x 24 x 11 1/2	SEE NOTE 2
	2	22	EXPANDED METAL 1/4 x NO. 16 (.060) x 40" x 40"	COML CS
	36	23	INDICATOR, GSKT CPRSN, SHEET 16 GA (.060)	ASTM-A 570 CS
	72	24	SCR, SLFTPG 1/4 x 1/2 L, PAN HD, SLOTTED, TYPE AB	COML CS

FOR GEN NOTES SEE SHEET 2

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON:
DECIMALS ANGLES FRACTIONS
± 5° ± 1/8
DO NOT SCALE PRINT

FORMAL DOCUMENT REVIEW HAS BEEN WAIVED FOR REV. 0 IN ACCORDANCE WITH EO 12570 DATED 1-5-84

IMPACT LEVEL 2

U. S. Department of Energy
Nuclear Operations Office
Westinghouse Electric Company

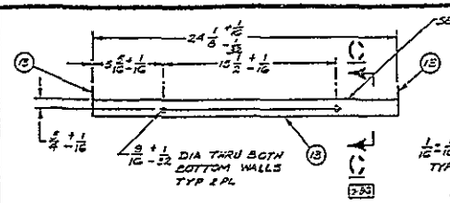
BURIAL TUNNEL 2
FILTER ASSEMBLY

NOTED 2155/202-4 2900

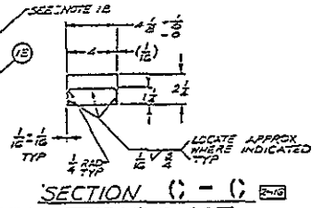
NONE | H-2-94756 | 1 | 2

INCORPORATED ECN 102277

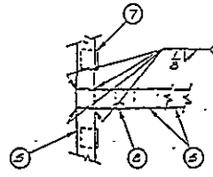
9 2 1 2 4 5 4 3



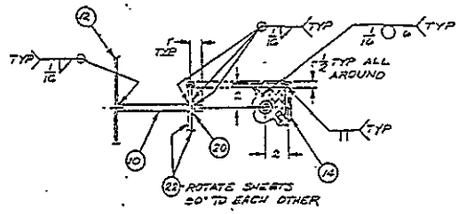
③ SUB ASSEMBLY
SCALE 5" = 1'-0"



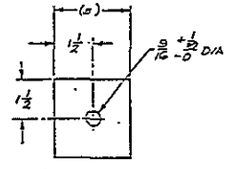
SECTION C - C
SCALE 5" = 1'-0"



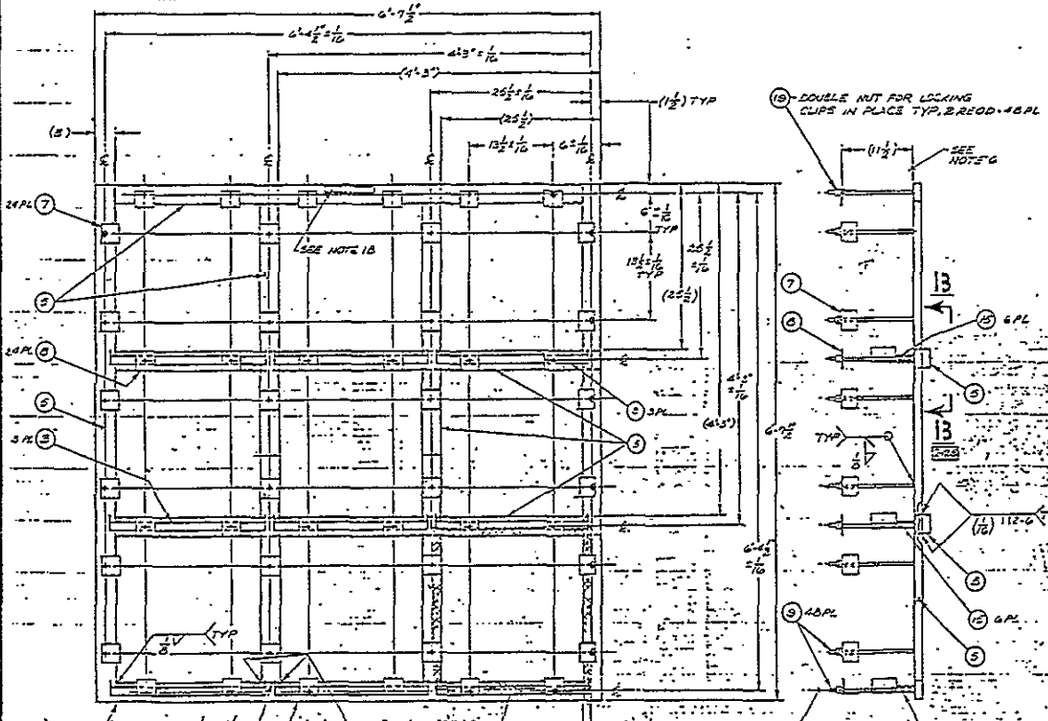
VIEW B - B
SCALE 1½" = 1'-0"



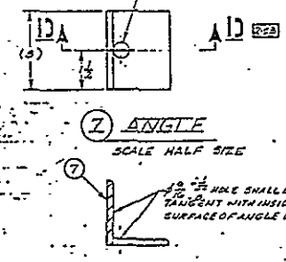
DETAIL I
SCALE 5" = 1'-0"



⑧ BAR
SCALE HALF SIZE



② SUB ASSEMBLY
SCALE 1½" = 1'-0"



SECTION D - D
SCALE HALF SIZE

② ANGLE
SCALE HALF SIZE

GENERAL NOTES

1. IDENTIFICATION SHALL BE PER WS-85-0015.

   A) IDENTIFY COMPLETED FILTER BOX ASSEMBLY 1, TYPE 7 (SELF-ADHESIVE LABEL), WITH DRAWING NUMBER, PART NUMBER, AND DRAWING REVISION NUMBER IN LOCATION INDICATED. USE 1-1/2 INCH TO 2 INCH HIGH BLACK CHARACTERS ON YELLOW BACKGROUND.

   B) IDENTIFY COMPLETED ASSEMBLIES 2 AND 3, TYPE 6 (REMOVABLE TAG), WITH DRAWING NUMBER, PART NUMBER, AND DRAWING REVISION NUMBER USING 3/4 INCH HIGH CHARACTERS.

   C) SPECIAL NOTE REQUIRED ON COMPLETED FILTER ASSEMBLY, TYPE 7 (SELF-ADHESIVE LABEL), WITH THE FOLLOWING: "ASSEMBLY MAXIMUM NEGATIVE PRESSURE NOT TO EXCEED 10 INCHES W.G." USING 1-1/2 INCH TO 2 INCH HIGH RED CHARACTERS ON YELLOW BACKGROUND, IN LOCATION INDICATED.

   D) SPECIAL NOTE REQUIRED ON COMPLETED FILTER ASSEMBLY, TYPE 7 (SELF-ADHESIVE LABEL), WITH THE FOLLOWING: "GROSS WEIGHT 3600 LBS." USING 1-1/2 INCH TO 2 INCH HIGH BLACK CHARACTERS ON YELLOW BACKGROUND.

2. HEPA FILTER (PART NO. 23) SIZE 24 INCH X 24 INCH X 11-1/2 INCH, TYPE "C" PER WPS-101-M1 WITH 3/4 INCH PLYWOOD FIRE RETARDANT FRAME. SEPARATOR LESS: GASKET SEAL ONE END ONLY - LOCATED ON DOWNSTREAM SIDE (GASKET ON BOTH ENDS MAY BE USED); WITH GALVANIZED FACEGUARD - LOCATED ON UPSTREAM SIDE (FACEGUARDS ON BOTH ENDS OR OF ANY MATERIAL MAY BE USED); 99.97 MIN EFFICIENCY D.O.P. TEST: 2400 CFM AT 1.25 INCHES W.G. (NAC STORES CAT. 242-2440-308 WILL MEET THESE REQUIREMENTS.)

3. PAINTING

   A) PREPARE AND PAINT ALL EXPOSED CARBON STEEL SURFACES WITH ONE COAT OF AMERCOAT 5383 PRIMER AND TWO FINISH COATS OF AMERCOAT 230, FINAL COLOR COAT, PER MANUFACTURER'S INSTRUCTIONS.

   B) PAINT TOP 2 INCHES OF LIFTING BAIL (PR 4) PER NOTE 3A. USE AMERCOAT 5334, FINAL COLOR YELLOW.

   C) VALSPAR HS SOLIDS 75 SERIES EPOXY PAINT MAY BE SUBSTITUTED FOR AMERCOAT PAINT.

4. REMOVE ALL BURRS AND BREAK SHARP EDGES.

5. TEST A) PRIOR TO WELDING END PLATES ON THE FILTER BOX, INSTALL THE FILTERS AND D.O.P. TEST. D.O.P. TEST SHALL BE CONDUCTED IN ACCORDANCE WITH WS8-3002M.

   B) PNEUMATIC TEST THE COMPLETE FILTER BOX PER WS-85-0078, TYPE II, AT 10 INCHES W.G. (AMBIENT TEMPERATURE REQUIREMENT IS VARIED).

   C) AFTER FINAL COMPLETION OF FABRICATION OF FILTER ASSEMBLY, REPEAT D.O.P. TEST OF FILTER INSTALLATION PER WS8-3002M.

6. AFTER ALL WELDING, BUT PRIOR TO WELDING END PLATES, THE MOUNTING FRAME SHALL MEET THE FOLLOWING TOLERANCES.

   A) THE FILTER SEATING SURFACES SHALL BE FLAT WITHIN 1/16 INCH (T.I.R.) WHEN MEASURED FOR EACH 24 INCH X 24 INCH FILTER ELEMENT.

   B) THE INDIVIDUAL FILTER OPENINGS SHALL BE SQUARE WITHIN 1/16 INCH WHEN MEASURED ALONG THE OPENING DIAGONAL. IN ADDITION, THE OVERALL DIAGONAL DIMENSIONS SHALL BE EQUAL WITHIN 1/4 INCH.

   C) SURFACE FINISH - FILTER SEATING SURFACES: ALL PITS, GOUGES, SCRATCHES, WELDING SPATTER, AND OTHER SURFACE DEFECTS SHALL BE GROUND SMOOTH AFTER WELDING WITH GROUND AREA "FEATHERED" INTO SURROUNDING BASE METAL - AVOID GOUGING AND UNDERCUTTING BELOW THE SURFACE OF THE BASE METAL - THE WELD AREA SHALL HAVE A 125 MICROINCH MAXIMUM SURFACE (FINISH PER ANSI B46.1).

7. INSTALLATION OF HEPA FILTERS.

   A) USING CLEAN CLOTHS THOROUGHLY CLEAN FILTER SEATING SURFACE WITH ACETONE OR SIMILAR TO REMOVE DIRT, OIL AND GREASE.

   B) TIGHTEN LOWER PART NO. 19 NUT, UNTIL HEPA FILTER GASKET IS COMPRESSED TO WITHIN 30% TO 70% OF ITS UNCOMPRESSED THICKNESS. VERIFY GASKET COMPRESSION BY MEASURING HEIGHT OF PART NO. 20 EXTENDING ABOVE THE HEPA FILTER. 3/4 INCH CORRESPONDS TO 50% COMPRESSION OF GASKET.

8. FAILURE OF THE HEPA FILTER BANK TO PASS THE PRELIMINARY D.O.P. TEST (SEE NOTE 5 TEST A) WILL BE CONSIDERED A REJECTION OF THE FILTER BOX ASSEMBLY. THE SOURCE OF THE LEAK MAY BE LOCATED BY A D.O.P. "SNIFF" TYPE LEAK CHECK. FOR LEAKS OCCURRING AT THE FILTER GASKET/FRAME INTERFACE, USE RTV AS A SEALANT. THE REPAIR PROCEDURE USING RTV IS AS FOLLOWS:

   A) REMOVE THE HEPA FILTER IDENTIFIED AS THE SOURCE OF THE LEAK.

   B) INSPECT THE GASKET OF THE REMOVED HEPA FILTER FOR DAMAGE. GASKETS THAT SHOW BREAKS, TEARS, AND/OR PERMANENT COMPRESSION SET UP TO 25% OF THE ORIGINAL GASKET THICKNESS SHOULD BE REPLACED PER MANUFACTURER'S RECOMMENDATIONS.

   C) WIPE FILTER SEATING SURFACE WITH 300 GRIT SAND PAPER.

   D) USING CLEAN CLOTHS, WIPE FILTER SEATING SURFACE WITH ACETONE OR SIMILAR.

   E) APPLY PRIMER OF RTV, SEALANT TO THE FILTER SEATING SURFACE PER MANUFACTURER'S INSTRUCTIONS.

   F) APPLY 3/8 INCH BEAD OF RTV SEALANT ON THE FILTER SEATING SURFACE AND INSTALL FILTER BEFORE SEALANT CURES. INSTALLATION OCCURS WITHIN 30-35 MINUTES.

   G) TIGHTEN PART NO. 19 PER NOTE 7(B).

   H) REPEAT TEST "A" IN GENERAL NOTE 5.

9. WELD AND INSPECT PER AWS D1.1/D1.3. AT ALL WELDS FINAL PASS. AT FINAL PASS OF ALL WELDS DISCONTINUITIES, "FE" AND AS CRITERIA FOR ACCEPTANCE SHALL BE MODIFIED TO DISALLOW ANY SURFACE OPENING OF ANY SIZE.

10. ALL PARTS AND MATERIAL SHALL BE AS SPECIFIED OR CONSULTANT ENGINEER APPROVED EQUAL.

11. ESTIMATED FILTER ASSY WEIGHT IS 3600 LBS.

12. PART NUMBER 22 SHALL BE IMPACT LEVEL 3. PART NUMBER 1 SHALL BE IMPACT LEVEL 1. PART NUMBERS 2 AND 3 SHALL BE IMPACT LEVEL 2, AND ALL OTHER PARTS SHALL BE IMPACT LEVEL 4.

FORMAL DOCUMENT REVIEW HAS BEEN WAIVED FOR REV.0 IN ACCORDANCE WITH EO 12070 DATED 1-5-84

IMPACT LEVEL 2

U. S. Department of Energy

BURIAL TUNNEL #2
FILTER ASSEMBLY

NONE | NOT REQD | H-2-94756 | 2

INCORPORATED ECN 107277

APPENDIX 2D

HWS-5638
SPECIFICATIONS FOR DISPOSAL FACILITY FOR FAILED EQUIPMENT
PROJECT CA-1513-A

APPENDIX 2D

HWS-5638
SPECIFICATIONS FOR DISPOSAL FACILITY FOR FAILED EQUIPMENT
PROJECT CA-1513-A

This appendix contains Tunnel 1 Construction Specifications, HWS-5638, consisting of 49 pages.

HWS-5638

SPECIFICATIONS FOR DISPOSAL FACILITY FOR FAILED EQUIPMENT

UNCONTROLLED COPY

Project CA-513-A

April 25, 1955

Prepared for General Electric Company

A. E. Engler

Engineering Standards and Materials Unit

Approved for General Electric Company

FHS. H. F. Peterson — 4-26-55

Design Section — Date

F. A. Hollenbach — 4/27/55

Manufacturing Department — Date

MAS W. B. Webster — 4-28-55

Project Section — Date

Approved for Atomic Energy Commission

H E Parker — 5-6-55

Engineering and Construction Division — Date

HANFORD ATOMIC PRODUCTS OPERATION

GENERAL ELECTRIC

HWS-5638

SPECIFICATIONS

FOR

DISPOSAL FACILITY

FOR

FAILED EQUIPMENT

Project CA-513-A

April 25, 1955

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DIVISION I

EXCAVATION, BACKFILL AND GRADING

GENERAL

1. WORK INCLUDED

The work included under this division of the specification consists of all excavation, backfill and grading in connection with the Disposal Facility for Failed Equipment. The work also includes placement of temporary sandbag barricade in existing tunnel.

2. WORK NOT INCLUDED

a. Temporary closure wall in existing tunnel will be placed and removed by others. Wall will be designed to furnish support for one side of sandbag barricade specified in Section 8, below.

b. Temporary closure wall and sandbag barricade will be removed by others upon completion of construction work.

3. PRECAUTIONS

a. If any underground wires, pipes or structures which are not shown on the drawings or marked in the field are encountered by excavation equipment, work at that point shall be halted immediately and the Commission notified. Work at such points shall not continue until approved by the Commission.

b. Extreme care shall be exercised to prevent disturbing or damaging any existing facilities such as roads, fences, power lines, pipe lines, and the like in or adjacent to the work area. Damage to any visible facilities or facilities indicated on the drawings, marked in the field or specified by the Commission shall be repaired as directed by the Commission at the Contractor's expense.

c. Heavy construction equipment shall not be operated over tunnel structure at any time. A light weight farm type tractor may be used for finish grading over top of tunnel.

WORKMANSHIP

4. EXCAVATION

a. Tunnel bottom slab and wall footings shall bear on undisturbed earth. Machine excavation for structures to bear on undisturbed earth shall be carried not closer than within three inches of the elevation shown on the drawings. Remaining excavation shall be brought to neat lines and grades by manual excavation. Depressions or holes below elevations shown on the drawings shall be filled with concrete, as directed by the Commission, at the Contractor's expense.

b. Excavated material shall be kept clear of buildings, roadways, fences, electric power lines, fire hydrants and other existing facilities.

c. Excavation for all buried lines shall be true to line and grade as shown on the drawings. Trenches shall be of such depth to allow placement of not less than 4 inches of compacted sand backfill under the pipe when passing through rocky soil or when directed by the Commission.

5. SHORING

a. Shoring shall be required for all excavations in which the sloughing of sides would undermine adjacent structures or would create hazardous working conditions. Shoring may be omitted wherever the sides are sloped to an angle not less than on horizontal to one vertical (1:1) and where existing facilities are not endangered.

b. All shoring shall be removed as backfill progresses, unless otherwise directed by the Commission.

c. Material for shoring may be steel or timber. Shoring arrangement shall be approved by the Commission prior to installation.

6. BACKFILL

a. Additional embankment material, if required in addition to material excavated under these specifications, shall be obtained from the borrow area designated by the Commission.

b. Only selected material free of frozen particles, stones greater than 8 inches in any dimension, vegetable matter and trash shall be used in any backfill.

c. Trash shall not be allowed to accumilate in spaces to be backfilled.

d. Material for load bearing backfill, such as that under stairwell and pump house, shall be placed in level layers not to exceed 12 inches loose measurement, wetted and thoroughly compacted.

e. Material for non-load-bearing backfill and embankment shall be placed in layers not to exceed 24 inches loose measurement unless otherwise specified herein, and thoroughly compacted. Compaction by loaded scrapers and/or tractors will be considered adequate for non-load-bearing compaction subject to the restrictions specified in Section 3-c. above.

f. A compacted sand cushion at least 4 inches thick shall be placed under lines in trenches where such lines pass through rocky soil or as directed by the Commission.

g. After necessary line testing has been accomplished, backfill for piping shall be carefully placed around pipe before covering with a minimum of 12 inches of compacted sand. Common backfill material shall then be placed as noted in items above.

h. Care shall be exercised during backfilling to prevent excessive loads on walls and to insure balanced loading on opposite walls.

All necessary precautions shall be exercised to insure vertical walls upon completion of backfilling.

i. Six inches of clean sand free from stones over 1 inch in diameter shall be placed over tunnel roofing material prior to placing embankment material.

j. Backfilling by means of sluicing or flooding will not be permitted.

7. FINISH GRADING

a. Areas around and adjacent to all facilities constructed under these specifications shall be graded to present reasonably smooth, uniform surfaces. Any damage to structures or facilities resulting from Contractor's operations shall be repaired or replaced at the Contractor's expense.

b. Finish grading shall be carried to elevations shown on the drawings. Surface shall consist of a 4 inch leveling course of predominantly coarse gravel to retard wind errosion. The leveling course may be formed by depositing gravel or by scarifying, dragging, raking or otherwise working to obtain the desired surface and to leave the area reasonably free of stones larger than 3 inches in diameter. Equipment for grading on top of tunnel shall be no heavier than a light weight, farm type tractor.

c. Existing roads, shoulders and ditches shall be restored to original condition upon completion of construction.

8. SANDBAG BARRICADE

a. Sandbag barricade consisting of burlap bags filled with sand shall be placed in existing tunnel in location shown on drawing and as provided in the contract.

b. Sandbags may be placed against existing tunnel temporary closure wall erected by others as noted in Section 2, above.

c. Sandbags shall be placed to block entire tunnel opening with a minimum thickness of 4 feet of sand at top of tunnel.

d. Method of placing sandbags and means of support, if required, shall be submitted to the Commission for approval in advance of work.

e. Sandbag barricade will be removed by others upon completion of construction work.

DIVISION II

CONCRETE

GENERAL

1. WORK INCLUDED

The work included under this division of the specifications consists of providing, complete and in place, all concrete and masonry work in connection with the Disposal Facility for Failed Equipment. The work includes demolition of wall and stairway on existing tunnel, connection of new construction to existing tunnel and construction of 4 foot wide, 4 inch thick sidewalk where and as shown on the drawings. Steel doors and handrail shall be salvaged for re-use on the new stairwell.

2. REINFORCING STEEL DRAWINGS

The Contractor shall furnish 4 complete sets of reinforcing steel fabrication and placing drawings to the Commission for approval prior to fabrication. Approval of drawings will be for design and general construction only and not for dimension or quantity. Approval of drawings shall in no way relieve the Contractor of responsibility for a complete job.

Five sets of approved drawings shall be furnished to the Commission at the time of shipment of material.

MATERIALS

3. CONCRETE

a. Concrete will be furnished by the Commission at the price stated in the contract. Concrete may be delivered by the Commission, at the Contractor's option and expense, as stated in the contract. Concrete mix design and slump when released to the Contractor, will be the responsibility of the Commission. The Contractor will be responsible for replacing concrete work, constructed by him which is defective due to his fault or negligence.

b. If the Contractor elects to transport concrete from the Commission's central mixing plant to the work site with his own equipment, such transportion equipment shall be of the truck agitator type or of the truck mixer type, operated at agitator speed, in accordance with ASTM Designation: C 94-48, Specifications for Ready-Mixed Concrete.

c. Concrete furnished will be designed for a compressive strength of 3000 pounds per square inch at 28 days. Slump will be adjusted to placement conditions by the Commission.

d. The Contractor shall not at any time add water to the ready mixed concrete as received from the Commission without specific approval of the Commission.

4. GROUT FOR PATCHING AND MISCELLANEOUS WORK

a. Grout for patching and miscellaneous work shall consist of 1 part portland cement and 3 parts sand with sufficient water added for proper consistency. Measurement of cement and sand shall be by volume. Sand and cement shall be thoroughly mixed while dry before adding water.

b. Cement shall be portland cement conforming to Federal Specification SS-C-192, Cement, portland, Type II, low alkali cement.

c. Sand shall be obtained either by processing of natural sand or by addition of a suitably graded blending sand and shall have a fineness modulus of not less than 2.40 nor more than 3.00. Fine aggregate shall conform to the following sieve analysis:

Sieve Designation U. S. Standard Square Mesh	Cumulative Percentage by Weight Passing	Retained
No. 4	95-100	0-5
No. 8	80-90	10-20
No. 16	55-75	25-45
No. 30	30-60	40-70
No. 50	12-30	70-88
No. 100	0-10	90-100

d. Grout not placed within one hour after adding water shall not be used. Retempering of grout will not be permitted.

5. FORM MATERIALS

a. Forms for concrete work shall be of tongue and groove lumber, plywood or steel, except that forms for exposed concrete shall be of plywood or steel. All form material in contact with concrete which will be permanently exposed shall be in good condition without holes, dents or other defects which would mar the surface.

b. Form ties or other devices for holding forms together shall be such that when ties are broken off and holes patched, metal shall be a minimum of 1 inch from any exposed concrete surface.

c. Internal wood spreaders or ties will not be permitted.

6. REINFORCING STEEL

a. All reinforcing steel shall be of clean stock, free from defects and free of bends not required by the drawings. Reinforcement shall be delivered free of rust or mill scale and properly identified.

b. Steel bar reinforcement shall be of the sizes shown on the drawings. Only deformed bars, the least dimension of which shall equal the nominal size shown, shall be used in this work. Reinforcing bars shall conform to ASTM Designation: A 15-52T, Specifications for Billet-Steel Bars for Concrete Reinforcement, intermediate grade.

7. FORM OIL

Oil for forms shall be light bodied, light colored, straight petroleum oil of penetrating, non-sludging, non-staining type manufactured specifically for use as form oil.

8. EMBEDDED ACCESSORIES

a. Embedded accessories such as door frames, door guides, railroad rail supports, track anchor bolts, and similar items shall be fabricated of material shown on the drawings. Structural steel and filler metal for embedded items shall conform to the American Institute of Steel Construction (AISC) Specification for the Design, Fabrication and Erection of Structural Steel for Buildings.

b. Equipment anchor bolts shall be fabricated in conformance with Hanford Works Standard B-1-14 unless shown otherwise on the drawings.

c. Embedded abrasive nosings for stairs shall conform to Hanford Works Standard C-5-2.

9. CURING COMPOUND

Curing compound, where used, shall be of the surface membrane type of composition and characteristics to spread readily on moist concrete and deposit an impervious non-peeling film of uniform texture. The film shall adhere to the concrete surface without chemical reaction therewith. Curing compound shall be Carter-Waters Corporation, "HUNT WHITE", or approved equal.

10. CONCRETE BRICK

Concrete brick for filling access openings shall conform to ASTM Designation: C 55-52, Specification for Concrete Building Brick, Grade A, except that aggregate shall be hard, dense crushed stone or gravel.

11. MORTAR

Ingredients for mortar shall meet the following specifications:

a. Portland cement shall conform to the requirements of Federal Specification SS-C-192, Cement, portland, Type II, low alkali cement.

b. Lime shall conform to the requirements of ASTM Designation: C 207-49, Specifications for Hydrated Lime for Masonry Purposes, Type N, Normal Hydrated Lime.

c. Aggregate shall conform to the requirements of ASTM Designation: C 144-52T, Specifications for Aggregate for Masonry Mortar.

d. Water shall be clean and free of organic or vegetable matter, acid, alkali or other deleterious substances and shall be handled in clean containers.

WORKMANSHIP

12. FORM CONSTRUCTION

a. Forms shall be so constructed that the finished concrete surfaces shall present uniform appearance conforming to the shapes, lines, grades and dimensions shown on the drawings and as may be required for proper completion of the work. Forms shall be substantial, sufficiently rigid and amply braced to prevent bulging or objectionable deflection and shall be mortar-tight. Form panels shall be accurately aligned to prevent offsets in concrete surfaces. Forms shall be designed and constructed to permit easy removal without damage to the concrete.

b. Clean-out and inspection openings shall be provided at the bottoms of all column and wall forms to permit thorough cleaning and inspection before placing concrete.

c. All forms shall be oiled before erection or before installation of reinforcing steel to insure that no oil will be present on the steel or construction joint surfaces when concrete is placed.

d. All exposed exterior corners of concrete work shall be chamfered 1 inch unless shown otherwise on the drawings.

e. Interior dimensions of finished concrete structure for shielding door shaft shall be within ± 1/2 inch and - 1/4 inch of dimensions shown on the drawings.

13. FABRICATING AND PLACING REINFORCING STEEL

a. Reinforcing steel shall be fabricated and placed in strict conformance with the following sections of the American Concrete Institute Building Code Requirements for Reinforced Concrete, ACI 318-51, unless shown otherwise on the drawings:

Section 504, Cleaning and bending reinforcement

Section 505, Placing reinforcement

Section 506, Splices in reinforcement

Section 507, Concrete protection for reinforcement

Section 906, Hooks.

b. Reinforcement shall be securely tied at all intersections and spliced with annealed iron wire not smaller than No. 18 Steel Wire Gage. Driving of nails into forms to support reinforcement will not be permitted.

c. Reinforcing bars shall not be driven or forced into the concrete after initial set has occurred.

d. Reinforcement shall be kept free from oil, grease and paint, and shall be thoroughly cleaned of dirt, loose scale or rust before being placed in the work.

14. ANCHOR BOLTS

Anchor bolts shall be accurately placed as shown on the drawings. Anchor bolts which will receive equipment base plates shall be sleeved with sheet metal pipe as noted in the standards. Sleeves shall be packed with oakum or paper prior to pouring concrete. Anchor bolts for railroad track and structural steel shall not be sleeved.

15. EMBEDDED ACCESSORIES

a. Embedded accessories shall be installed in strict conformance with details shown on the drawings or in the referenced standards. Necessary precautions shall be taken to insure all items to be embedded have been placed in the work before placing concrete.

b. Shielding door guides shall be embedded with special care to insure that guides in finished work are within 1/4 inch of plumb throughout entire height in both directions.

c. Dowels for future work shall be coated with roofing cement and wrapped with roofing felt wired in place.

16. PLACING CONCRETE

a. Before placing concrete, forms shall be thoroughly cleaned of chips, shavings or other debris and all standing water shall be removed from excavations and forms. Concrete shall not be placed until forms and reinforcement have been inspected and accepted by the Commission.

b. Earth surfaces which will contact freshly placed concrete shall be thoroughly dampened prior to placing concrete, except in freezing weather when alternate methods may be necessary as determined by the Commission.

c. Concrete shall be transported as rapidly as possible from mixer truck to forms with a minimum of jostling.

d. Concrete shall be deposited in horizontal layers not to exceed 18 inches in depth to prevent flowing along forms and subsequent segregation of the ingredients. Concrete shall be placed at such a rate that poured surfaces shall not have reached initial set before additional concrete is placed thereon.

e. Concrete shall not be allowed to drop a distance greater than five except where special equipment is utilized to prevent segregation and then only if specifically authorized by the Commission.

f. Concrete shall be thoroughly worked around reinforcement, embedded items and into all corners. Mechanical vibrators shall be used and shall be supplemented by hand spading or tamping as required. Vibrators shall be of sufficient number and power to thoroughly consolidate the concrete. Extreme care shall be used during vibration to prevent displacement of forms or reinforcing steel. Duration of vibration shall be limited to such time as is required to produce satisfactory consolidation without segregation. Concrete in surfaces to be permanently exposed shall be spaded to push coarse aggregate back from forms to secure a smooth, mortar-finish external surface, free from pockets and honeycomb.

g. At least two hours shall have elapsed after placing concrete in columns, walls or other deep pours before placing concrete in slabs supported thereon.

h. Concrete shall not be placed without written approval of the Commission when the ambient temperature is below 40° F., or when atmospheric temperatures will probably fall below 40° F. within the next 24-hour period after placing concrete. All reinforcement, forms and ground with which concrete is to come in contact shall be free of frost. Concrete deposited in cold weather shall be maintained at a temperature of not less than 70° F. for three days or not less than 50° F. for seven days.

i. Concrete delivered to job site and not placed within one hour after mixing shall be subject to rejection by the Commission. Concrete in which initial set has begun shall not be used. Retempering of concrete will not be permitted.

j. Any deposits of hardened or partially hardened concrete on forms or reinforcement above the level of the concrete already in place shall be removed before placing additional concrete.

17. CONSTRUCTION JOINTS

a. Construction joints shall be made only where shown on the drawings or as permitted by the Commission.

b. When concrete is to be poured against new concrete or existing concrete which has set, the bond surface of the set concrete shall be adequately roughened and thoroughly cleaned of all loose materials, laitance and foreign matter to expose clean, sound aggregate. The surface shall then be thoroughly flushed with a stream of clear water until waste water shows no cloudiness. The surface shall be completely covered with a thin layer of grout immediately prior to placing additional concrete.

c. Concrete or grout shall not be placed on any construction joint until surface preparation has been inspected and approved by the Commission.

18. CURING

a. Concrete shall be protected from premature drying by use of water, curing compound or by form curing.

b. For water curing, exposed surfaces shall be kept uniformly and continuously wet by a standard method acceptable to the Commission for a period of at least seven days after concrete has been finished or until such time as the Commission may direct that wetting be stopped. Only fresh clean water shall be used for water curing.

c. Where concrete is being form cured and forms are constructed of tongue and groove lumber, forms shall be kept continuously wet to maintain tight joints.

d. Curing compound, where used, shall be applied in accordance with manufacturer's specifications. Curing compound and use thereof shall be subject to approval by the Commission. Curing compounds shall not be used on surfaces where future bonding is required. In cold weather, curing compounds shall not be used on concrete surfaces which are maintained at curing temperature by the use of steam.

19. REMOVAL OF FORMS

a. Forms shall be removed only upon approval of the Commission and in a manner to insure the complete safety of the structure.

b. All forms and form materials shall be removed from the work unless specifically authorized otherwise by the Commission.

20. FINISHING

Finish of concrete surfaces shall be as follows:

a. Exposed horizontal surfaces, other than sidewalk - wood float finish

b. Sidewalk - broom finish

c. Formed surfaces - as specified in Section 21, below.

21. POINTING AND PATCHING

a. Immediately after removal of forms concrete surfaces shall be inspect for defects.

b. On permanently exposed surfaces, all joint marks, bulges, projection or loose materials shall be removed, form ties shall be cut back and all voids shall be pointed up.

c. Voids, honeycomb, form tie holes and other defects in concrete surfaces to be covered with backfill shall be repaired before backfilling. Form ties need not be broken off when located 6 inches or more below finish grade.

d. All loose materials shall be removed from areas to be repaired and exposed surfaces shall be thoroughly moistened with clean water before patching.

e. Patching shall be done only after inspection of the defective areas by the Commission and upon approval of the Commission.

22. PROTECTION OF NEW WORK

a. All concrete surfaces shall be protected from damage from any source until concrete is thoroughly set and cured. Freshly placed concrete shall be protected from falling rain until initial set has taken place.

b. Projecting reinforcement, inserts, anchor bolts, etc. shall be protected from disturbance until concrete curing activities have stopped.

23. MASONRY

23.1 MIXING MORTAR

a. Mortar ingredients shall be proportioned as follows:

1 part (minimum) portland cement

1/2 part (maximum) hydrated lime

4½ parts (maximum) dry, loose aggregate

b. All mortar materials shall be accurately measured by volume and thoroughly mixed.

c. Mortar shall be mixed in quantities not greater than are required for immediate use. Retempering of mortar will not be permitted. The use of salt or other anti-freeze admixtures will not be permitted.

23.2 LAYING BRICK

a. Bricks shall be thoroughly wetted before laying. Surfaces of bricks shall be damp at time of laying but not sufficiently wet to cause difficulty in laying.

b. Bricks shall be laid on a full, evenly spread layer of mortar. Vertical joints shall be full and shall be shoved tight. Brick courses shall be kept level with all joints raked.

c. All joints between bricks and between concrete walls and brick shall be completely filled with mortar.

24. HOIST BASE PLATE SETTINGS

a. Hoist base plates shall be accurately set to the lines and elevations shown on the drawings. All packing, chips and debris shall be removed from anchor bolt sleeves prior to setting base plates over anchor bolts.

b. A grouting procedure shall be developed which will result in supporting base plates over entire area with no voids or low spots. Grout shall be finished to conform to lines of base plates upon completion of grouting.

DIVISION III

TIMBER STRUCTURES

GENERAL

1. WORK INCLUDED

The work included under this division of the specifications consists of providing, complete and in place, all timber structures in connection with the Disposal Facility for Failed Equipment. The work includes the timber tunnel structure, wood cover over future tunnel door locations, blocking future tunnel opening, and installing wood nailers for roof edging.

MATERIALS

2. TIMBER

a. Timbers shall be Douglas fir No. 1 Posts and Timbers as produced and graded under the Standard Grading and Dressing Rules of the West Co. Lumberman's Association, and of the sizes shown on the drawings.

b. All timber to be located entirely or partially below finished ground surface grade shall be pressure treated with creosote, creosote-coal tar solution or creosote-petroleum solution in conformance with American Wood Preservers' Association (AWPA) Standard C2-54 for the Preservative Treatment of Lumber, Timbers, Bridge Ties and Mine Ties by Pressure Process.

c. All cutting, framing and drilling of holes shall be performed prior to pressure treating.

3. LUMBER IN CONTACT WITH CONCRETE

Lumber for roof over door well and other locations in permanent contact with concrete shall be Douglas fir of the size, grade and type shown on the drawings and shall be pressure treated with Tanalith in conformance with AWPA, Standard C21-54, Use of Pressure Treated Lumber in Buildings.

WORKMANSHIP

4. TIMBER CONSTRUCTION

a. Creosoted timber shall be cared for in strict conformance with AWPA Standard M4-54, Instructions for the Care of Pressure-Treated Wood after Treatment.

b. Timber shall be erected to conform to the elevations, lines, dimensions and details shown on the drawings and as may be required for proper completion of the work.

c. Timbers shall be fitted together with care to minimize effects of warp and twist. Space between adjacent timbers shall be made as small as possible. Voids of over 3/4 inch in least dimension between timbers to be covered with roofing material shall first be covered with 26 gage galvanized steel nailed in place with galvanized nails.

d. All necessary precautions shall be taken to prevent displacement of timbers during backfilling of structure. Backfilling shall be coordinated as specified in Division I, to maintain plumb walls during backfilling. Bracing detail shall be furnished to the Commission for approval prior to installation.

9 2 1 2 4 3 5 3

DIVISION IV

ROOFING AND FLASHING

GENERAL

1. WORK INCLUDED

The work included under this division of the specifications consists of providing, complete and in place, all roofing and flashing in connection with the Disposal Facility for Failed Equipment. The work includes the following:

a. Built-up coal-tar pitch and gravel roof on concrete tunnel and pump house roofs.

b. Mineral surfaced roofing on roof, walls and ends of timber tunnel structure.

c. Mineral surfaced roofing on wood cover over shaft for future shielding door.

d. Mineral surfaced roofing over timber closure of future tunnel openi

MATERIALS

2. COAL-TAR PITCH

Coal-tar pitch for built-up roofing shall conform to ASTM Designation: D-450-41, Specifications for Coal-Tar Pitch for Roofing, Dampproofing and Waterproofing, Type A. Pitch shall have a softening point within the range of 140° F. to 155° F.

3. COAL-TAR SATURATED FELT

Roofing felt for built-up roofing shall be coal-tar saturated roofing felt weighing at least 13 pounds per square (commonly referred to as "15 pound felt") and conforming to ASTM Designation: D-227-47, Specifications for Coal-Tar Saturated Roofing Felt for Use in Waterproofing and in Constructing Built-up Roofs.

4. MINERAL SURFACED ROOFING

Mineral surfaced roofing for base flashing shall be asphalt saturated felt, surfaced with mineral granules and weighing at least 83 pounds per square (referred to as "90 pound roofing") with 2 or 4 inch base edge lap. Material shall conform to the requirements of ASTM Designation: D 249-50T, Specifications for Asphalt Roofing Surfaced with Mineral Granules.

5. PLASTIC ROOFING CEMENT

Plastic roofing cement shall be Koppers "Flashing Cement", or approved equal.

6. ROOFING GRAVEL

a. Roofing gravel shall consist of hard, rounded stones free from sand, clay or any other foreign matter. Gravel shall be thoroughly dry at time of application.

b. Gravel shall have a size range of 1/2 inch minus to 1/4 inch plus.

7. COPPER FLASHING

a. Copper for flashing and flashing clips shall be of weights shown on the drawings.

b. Reglet for flashing at door shaft shall be 16 ounce copper "Pioneer Flashing Reglet" and counter flashing, or approved equal.

WORKMANSHIP

8. STORAGE, HANDLING AND PREPARATION OF MATERIALS

a. All materials, including gravel, shall be kept clean and dry and shall be protected from the weather as required.

b. Rolls of felt shall be stored in upright position and protected from damage during storage and application.

c. Pitch shall not be heated above 375° F. Temperature of pitch when applied shall be in the range of 300° F. to 350° F.

d. Cutting back or adulterating pitch in any way shall not be permitted.

e. Pitch or roofing cement shall not be allowed to spill or splash on permanently exposed surfaces of structures. Leaky containers shall not be used for handling these materials.

9. PREPARATION OF CONCRETE SURFACES

a. Concrete surfaces to receive built-up roofing shall be reasonably smooth, without depressions and free from dirt, loose material, frost or effects of freezing and thoroughly dry before any material is applied.

b. Roofing material shall not be applied until concrete has been cured to the satisfaction of the Commission.

10. PREPARATION OF TIMBER SURFACES

Surfaces of timber structures to be covered with mineral surfaced roofing shall have openings and irregularities corrected as specified in Division III, Section 4.

11. APPLICATION OF BUILT-UP ROOFING

a. Roof on concrete tunnel and on pump house shall be a 20 year rating, 4-ply, coal-tar pitch and gravel roof applied directly to concrete deck. Roof shall contain not less than the following quantities of roofing materials per 100 square feet of roof area:

Coal-tar pitch	200 pounds
Tar-saturated felt	60 pounds
Gravel	400 pounds

b. Roof shall consist of the following and be applied as follows, or roof shall be of approved equal construction:

(1) Four plies of felt laid shingle fashion lapping each ply 27½ inches over preceding ply and mopping full width under each ply. In no place shall felt touch felt. Pitch shall be applied at the rate of approximately 30 pounds per 100 square feet of area. All plies shall be cemented together full width and shall be free from wrinkles and buckles. At roof edges, the first 2 plies shall be turned back 8 inches over preceding plies and mopped solidly to top roofing ply and to each other. All plies shall extend to the top of the cants.

(2) Base flashing consisting of 3 plies of felt and 1 ply of mineral surfaced roofing applied over cants and trimmed evenly above cant.

First ply of felt shall extend out onto roof 3 inches beyond toe of cant; second ply shall extend 4-1/2 inches beyond cant; third ply shall extend 6 inches beyond toe of cant. Mineral surfaced roofing shall extend 8 inches onto roof. Each ply and mineral surfaced roofing shall be set in 1/8 inch thick coats of plastic roofing cement. Felt shall be applied in strips not over 10 feet long with staggered, 3 inch end laps sealed with roofing cement. Flashing shall be nailed through all plies into tops of cants on 12 inch centers. All plies shall be carefully pressed into cement to eliminate buckles and blisters. Mineral surfaced roofing shall be cut in strips across the roll.

(3) Copper cap flashing and roof edging installed in conformance with Section 12, Installation of Copper Flashing and Edging.

(4) One flood coat of approximately 75 pounds of pitch per 100 square feet poured (not mopped) over the broom-clean, completely dry felt surface and not less than 400 pounds of gravel per square embedded in the hot pitch.

12. INSTALLATION OF COPPER FLASHING AND EDGING

a. Metal flashing and roof edging as shown on the drawings and specified herein shall be installed after all roof plies are in place.

b. Roof flanges shall be nailed to nailers in 3 inch centers using copper nails.

c. Joints in roof edging shall be lapped 4 inches and set in roofing cement.

d. Roof flanges shall be sealed to roof with two plies of felt mopped solidly to roof and flanges with hot pitch. The first ply shall be 8 inches wide and shall be kept back approximately 1-1/2 inches from bottom of gravel stop bead. The second ply shall be 10 inches wide and shall extend approximately one inch on both sides of 8 inch strip.

13. APPLICATION OF MINERAL SURFACED ROOFING

a. Mineral surfaced roofing shall be applied over all exterior surfaces of timber construction and over shaft cover for future door. Mineral surfaced roofing shall be applied where and as shown on the drawings. Roofing over closure of openings for future tunnel shall consist of two plies of mineral surfaced roofing layed shingle fashion.

b. Lap joints shall be sealed with roofing cement and nailed on 3 inch centers.

c. Roofing material shall be cemented to concrete structure, where shown on the drawings, with roofing cement.

DIVISION V

SERVICE AND DRAINAGE PIPING

GENERAL

1. WORK INCLUDED

The work included under this division of the specifications consists of providing, complete and in place, all service and drainage piping in connection with the Disposal Facility for Failed Equipment. The work includes, but is not limited to, tunnel sump drain, tunnel floor drain system and tunnel door water fill system including pump. Contractor shall make connections to existing systems at points shown on the drawings.

2. SUBMISSION OF PUMP DATA

a. The Contractor shall furnish five sets of the following pump unit data to the Commission for approval prior to purchase of pump:

   1. Certified design characteristic curves showing head in feet, efficiency and horsepower plotted against discharge in U. S. gallons per minute from 0 to 500 gpm.

   2. Complete pump and motor specifications, including motor efficiency.

   3. Complete dimensional blueprints.

b. After approval of data noted in a. above and before delivery of pump unit, Contractor shall furnish to the Commission the following data for both pump and motor:

   1. One complete set of reproducible dimensional drawings.

   2. Fifteen sets of spare parts lists.

   3. Fifteen sets of installation instructions.

   4. Fifteen sets of operation, maintenance and lubrication instructions.

   5. Fifteen certified copies of performance curves plotted from actual tests showing head in feet, efficiency and brake horsepower plotted against discharge in U. S. gallons per minute from 0 to 500 gpm.

MATERIALS

3. PIPE, FITTINGS AND FLANGES

a. Pipe fittings and flanges for each service shall be as specified in the piping codes.

b. Pipe shall be round in section, free from flaws of any kind, reasonably straight. Pipe fittings and flanges shall conform to the requirements of the American Society for Testing Materials (ASTM), the American Water Works Association (AWWA) and the American Standards Association (ASA) as specified herein and in the piping codes.

4. VALVES

Valves shall be as shown on the drawings.

5. PIPE HANGERS AND SUPPORTS

Pipe hangers and supports for all inside services are specified herein except for certain ones which are detailed on the drawings. These specifications for pipe hangers and supports are intended to establish minimum requirements. Alternate methods of adequately supporting piping may be used with the approval of the Commission. Use of perforated straps will not be permitted.

a. Pipe hangers for all piping 2 inches and over shall be of clevis type, with adjustable swivel, rod-threaded, Grinnell Company Catalog #51, Figure 260, or approved equal. Hangers shall be fitted with adjustable swivel coupling, Grinnell Company Figure 134, or approved equal.

b. Pipe clamps for vertical risers in steel piping shall be of flat wrought steel, Grinnell Company, Catalog #51 Figure 261 or approved equal.

c. Concrete inserts where required for overhead pipe supports shall be Grinnell Company, CB-Universal Concrete Insert, Figure 282, Catalog #51, or approved equal.

d. Hanger rods for pipe hangers shall be threaded eye rods, Grinnell Company Figure 258, or right hand threaded plain rods, Grinnell Company Figure 140, or approved equal.

e. Wall type brackets, where not shown on drawings, shall be Grinnell Company Figure 195, medium weight welded steel bracket, or approved equal.

6. PUMP

The pump shall be a horizontal centrifugal, end suction pump complete with motor, coupling and bed plate or a close-coupled end suction pump. All materials in pump unit shall be of characteristics and quality to insure long operating life and minimum maintenance.

Complete pump unit shall conform to the following specifications and requirements:

a. Pump specifications:

Capacity:	400 gpm of clear water at 35° F. to 85° F. at 36 feet total dynamic head and suction head from flooded to minus 23 feet. See drawing H-2-55594 for system arrangement.
Speed:	1750 to 1800 rpm
Casing:	Cast iron, bronze fitted
Impeller:	Bronze
Flanges:	ASA Standard flanges for suction and discharge
Bearings:	Ball bearings - grease or oil lubricated
Shaft Seal:	"John Crane" or approved equal
Rotation:	Clockwise when viewed from coupling end
Coupling:	Proper size "Fast" or approved equal flexible coupling

b. Motor specifications:

Sizes:	7½ horsepower minimum. Motor characteristics such as horsepower, rating, speed, etc. shall fit the requirements of the pump without overloading motor.
Type:	Drip-proof, ball bearing, squirrel cage induction motor, normal starting torque.
Current:	440 volt, 3 phase, 60 cycle AC
Standards of Construction:	Motor shall conform to the latest applicable standards of the American Institute of Electrical Engineering (AIEE), the National Electrical Manufacturers Association (NEMA), and the American Standards Association (ASA). The AIEE Standards shall have precedence in cases of disagreement.

c. Bed plate:

Pumps and motor shall be mounted on a steel or cast iron bed plate with a drip collection channel and tapped drain. If close-coupled, pump shall have a tapped drain connection in pump casting.

WORKMANSHIP

7. PIPE WELDING

7.1 WELDER QUALIFICATION

a. All welding of carbon steel pipe shall be done by welders who have been properly qualified in accordance with the applicable test requirements of Hanford Standard HW-4900-S, Specifications for Qualifying Welders. A welder will be qualified only on the type of material and form of material he will weld and on the welding process which he will use to perform the work. Qualification test requirements for the various types of work shall be as specified below, except that qualification tests specified in nationally recognized codes governing welding of carbon steel and which are approved as equal to the tests listed below may be substituted:

For Welding Carbon Steel Pipe:

Item 8.3, Test No.1	Metal-Arc, Mild Carbon Steel Pipe, V-Groove Butt Weld

2½ Inches Schedule 80 and Smaller:

Item 8.8, Test No. 6	Oxy-Acetylene, Mild Carbon Steel Pipe, V-Groove Butt Weld.

b. Radiographic examinations of test welds will not be required.

c. Qualification tests will be conducted by the Commission at no cost to the Contractor other than the time and transportation of the personnel involved, and subject to the requirements stated in the contract.

d. It shall be the responsibility of the Contractor to insure that welders have been properly qualified before performing any welding which will become a part of the work covered by these specifications except as noted under Item 1, Work Included.

7.2 WELDING STANDARDS

Welding of carbon steel pipe shall be done in strict conformance with Hanford Standard HW-4926-S, Specification for Welding Carbon Steels, or the approved nationally recognized codes mentioned therein. Sectioning or radiography of welds will not be required.

7.3 WELD SAMPLES

Representative weld samples made by any welding process and/or procedure used in the work shall be furnished to the Commission upon request.

8. INSTALLATION OF PIPING

a. All piping shall be installed in accordance with the sizes, locations, slope and elevations shown on the drawings and the piping codes.

b. Where raised face flanges match up to flat face flanges, the raised face flanges shall be machined flat.

c. Pipe, valves and fittings shall be handled and treated with care during all phases of construction to prevent damage of any kind to material or to coating. Any damage to coating shall be repaired to the satisfaction of the Commission in conformance with AWWA C 204-51 Section 6-4. Damage to material other than coating damage, shall be cause for rejection. Under no circumstances shall pipe or accessories be dropped or dumped.

d. Interior of pipe, fittings and valves shall be kept free from dirt or foreign matter at all times. At all times when installation of pipe is not in progress, the open ends of pipe already laid shall be closed to prevent entry of dirt or foreign matter.

e. All joints and connections shall be water-tight at the specified test pressure.

9. SETTING PUMP BED PLATE

Pump bed plate shall be accurately set to line and elevation shown on the drawings. Metal shims shall be used to support bed plate at desired elevation for grouting. All packing, chips, dirt and debris shall be removed from anchor bolt holes prior to setting bed plate over bolts. Grouting procedure shall provide for completely filling space under bed plate. Grout shall be finished uniformly to conform to the lines of the bed plate.

10. HYDROSTATIC TESTING

Piping installed under these specifications shall be hydrostatically tested in conformance with the following:

a. All instruments, facilities and labor required to conduct the tests shall be furnished by the Contractor. All permanently installed instruments shall be disconnected prior to hydrostatic testing.

b. Before application of the pressure, all air shall be expelled from the pipe. To accomplish this, holes may be drilled at points of highest elevation. Holes shall be sealed with screwed plugs.

c. Each test section of the piping shall be slowly filled with water and the specified test pressure, measured at lowest point, shall be applied.

d. Duration of the test shall be at least 30 minutes without appreciable loss of pressure as determined by the Commission.

e. All piping, fittings, valves and joints shall be carefully examined during the open trench test.

f. All tests shall be made to the satisfaction and under the direction of the Commission. Any defective pipe, fittings or valves revealed during the test shall be replaced at the Contractor's expense.

g. Test pressures:

Drain lines: 25 psi

Water lines: 175 psi

11. PIPING CODES

Piping material, fabrication and installation shall conform strictly to the following Piping Codes:

Service	Piping Code
Raw water; underground and above ground	M-5
Drain lines	M-23b

PIPING CODE M5 (PUREX)

SERVICE	MAX. PRESSURE	MAX. TEMPERATURE ° F.
Raw Water, Underground and Above Ground	125 psi	Atmospheric

Pipe Sizes	3 Inches Thru 10 Inches
Pipe	Black steel schedule 40; ASTM A 53-51T or ASTM A 120-47 Seamless or Welded
Coating	Exterior surface of underground pipe and fittings shall be cleaned, primed, and coated with coal tar enamel with a bonded asbestos felt wrapper, and whitewashed in accordance with AWWA C 204-51.
Pipe Joints	Welded or Flanged
Nipples	None
Fittings	Steel butt welding ASA B16.9-1951 or where called for on drawings only, 125# cast iron flanged, ASA B16.1-1948.
Flanges	For sizes 3" to 6": 150# steel welding neck, ASA B16.5-1953 Use flat face where connected to cast iron flanges.
Unions	None
Valves	As shown on the drawings
Valve Packing	R-8-B, R-8-T, R-6
Bolts & Nuts	Carbon steel hex. head bolts and hex nuts MSS-SP-39-1949.
Gaskets	Compressed asbestos sheet 1/16 inch thick

PIPING CODE M23b (PUREX)

SERVICE	MAX. PRESSURE, PSI	TEMPERATURE ° F
Underground Water	Gravity	140

Pipe Size	4 Inches and Larger
Pipe	Schedule 40 steel; ASTM A 53-51T, Grade A seamless or welded; or ASTM A 106-51T, Grade A.
Pipe Joints	Welded or flanged. Flanged where called for on drawings only.
Fittings	Schedule 40 steel butt welding, ASA B16.9-1951.
Flanges	150# steel slip-on welding, ASA B16.5-1953.
Gaskets	Compressed asbestos sheet

DIVISION VI

RAILROAD TRACK

GENERAL

1. WORK INCLUDED

The work included under this division of the specifications consists of providing, complete and in place, all railroad track in connection with the Disposal Facility for Failed Equipment within the limits shown on the drawings.

Contractor shall make connection of new track to existing track as directed by the Commission. Ballast will be furnished to the Contractor by the Commission.

MATERIALS

2. TIES

Ties shall be of the size shown on the drawings and shall be new Douglas fir, No. 1 or higher quality ties as produced and graded under the "Grading and Dressing Rules No. 14" of the West Coast Lumberman's Association. Ties shall be pressure treated with creosote-petroleum solution, creosote-coal tar solution or creosote, in accordance with American Wood Preservers' Association Standard C6-54 for the Preservation Treatment of Crossties and Switch Ties by Pressure Processes.

3. RAILS AND ACCESSORIES

3.1 RAIL

Rail shall conform to American Railway Engineering Association (A.R.E.A.) Specification for Open-Hearth Steel Rails. Rail section shall be 90 pound RA-A Section as specified therein. Re-lay rail may be used for this work; however, such rail shall be free from visible defects and shall not show evidence of excessive wear.

3.2 JOINT BARS

Joint bars shall be of the "toeless" type (without extended flange), approximately 24 inches long. Material for joint bars shall be either high carbon steel or quenched carbon steel in conformance A.R.E.A. Specifications for Joint Bars. Joint bars with extended flange may be used only with the written permission of the Commission.

3.3 BOLTS AND WASHERS

Track bolts shall be carbon steel with elliptical shoulders and shall conform to A.R.E.A. Specifications for Heat-Treated Carbon Steel Track Bolts. Bolts shall be of the proper length to fit the specific joint bar to be used. Washers for track bolts shall conform to A.R.E.A. Specifications for Spring Washers.

3.4 SPIKES

Track spikes shall be 9/16 inches by 5½ inches in section and shall conform to A.R.E.A. Specifications for Track Spikes.

3.5 GAGE RODS

Gage rods shall be Bethlehem No. 855-F (non-insulated) or approved equal.

4. BALLAST

Ballast will consist of partially crushed gravel, sized from 3/4 to 1½ inches. Ballast will be furnished from Commission stockpiles.

WORKMANSHIP

5. LAYING TRACK

5.1 PLACING TIES

a. Ties shall be cared for in strict conformance with AWPA Standard M4-54, Instructions for the Care of Pressure-Treated Wood After Treatment. Damaged ties shall be replaced.

b. Ties shall be placed directly on 5 inches of ballast as shown on the drawings. Ties shall be placed to insure full end bearing against wall footings and shall conform to the grades shown on the drawings.

c. Ties shall be placed with heart side down at right angles to rails. They shall be spaced on 22 inch centers.

5.2 LAYING RAIL

a. Rails shall be unloaded without dropping and shall be placed with head up.

b. Rails shall be placed directly on ties without tie plates. Rail joints shall be staggered to locate each joint approximately opposite (within 5 feet) the midpoint of the other rail.

c. Rails shorter than 15 feet shall not be used.

d. Gage rods shall be installed in the track at each rail joint.

e. Rail joints shall be assembled and fully tightened before rail is spiked. A space of 1/8 inch shall be provided between lengths of rail. Holes in rails shall be drilled. Cutting of rails shall be done by sawing. Burning will not be permitted.

f. Rails shall be spiked with two spikes per rail per tie. Spikes shall be driven to insure full hold on rail.

5.3 PLACING BALLAST

Ballast shall be uniformly distributed to provide 5 inches of ballast under entire length of ties. Ballast shall be thoroughly tamped on both sides of each tie and shall be finished even with top of ties.

DIVISION VII

DOORS, MISCELLANEOUS METALS AND EQUIPMENT

GENERAL

1. WORK INCLUDED

The work included under this division of the specifications consists of providing, complete and in place, all doors, miscellaneous metal items, and mechanical equipment in connection with the Disposal Facility for Failed Equipment. The work includes, but is not limited to, the following:

a. Tunnel door with valve operator.

b. Tunnel door hoist and hoist enclosure.

c. Pump house door.

d. Handrail.

e. Steel ladders and platform.

f. Access opening covers.

g. Sand and lead fill in existing encasement.

h. Re-installation of hollow metal doors and steel handrail.

Hollow metal doors (with hardware) and handrail, from stairwell to be demolished, shall be re-installed in the new stairwell by the Contractor.

Painting and coating of doors, miscellaneous metals and equipment is covered under Division VIII, PAINTING AND COATING.

2. WORK NOT INCLUDED

Outside stairway over existing tunnel will be fabricated and installed by others.

3. SUBMISSION OF DRAWINGS

a. The Contractor shall furnish five complete sets of dimensional drawings, shop drawings, wiring diagrams, and specifications for the shielding door, door hoist and hoist covers to the Commission for approval prior to beginning fabrication.

b. After approval of drawings and specifications for shielding door and door hoist and before delivery of material, the Contractor shall furnish to the Commission the following:

(1) One complete set of reproducible dimensional drawings for hoist and shop drawings for door.

(2) Fifteen sets of spare parts lists for hoist.

(3) Fifteen sets of installation instructions and wiring diagrams.

(4) Fifteen sets of operation, maintenance and lubrication instructions for hoist.

MATERIALS

4. CARBON STEEL AND WELDING ROD

Structural steel shapes, steel plate and filler metal for tunnel door, access platforms and other uses shall conform in all respects to the American Institute of Steel Construction (AISC) Specification for the Design, Fabrication and Erection of Structural Steel for Buildings and shall be suitable for fusion welding.

5. TUNNEL DOOR HOIST

a. Tunnel door hoist shall be fabricated and assembled to conform to details shown on the drawings.

b. Tunnel door hoist shall be fabricated and assembled by an organization regularly engaged in the manufacture of hoists.

c. Standard manufacturers hoist components shall be used wherever possible.

6. TUNNEL DOOR HOIST COVERS

a. Steel covers shall be provided to protect door hoist drums and cable from weather. Covers shall be fabricated of minimum 16 gage steel and shall be readily removable from hoist for maintenance.

b. Provisions shall be made to mount covers securely in place and to furnish complete protection for hoist drums and cable.

7. STEEL LADDERS AND HANDRAILS

a. Steel ladders shall be fabricated of the material shown in Hanford Standard C-4-2a.

b. Ladder cage shall be fabricated of the material shown in Hanford Standard C-4-3.

c. Handrails shall be fabricated of the material shown in Hanford Standard C-4-1a.

8. HOLLOW METAL DOOR AND HARDWARE

a. Hollow metal door for pump house shall be a Detroit Steel Products "Fenestra" Type M door, or approved equal.

b. Hardware for pump house door shall be as follows, or approved equal:

Butts - Fenestra 5" No. 1643 with non-removable pins

Lockset - Fenestra cylinder lock without cylinder No. 1993 to take Corbin No. 253 lock cylinder. Lock cylinder will be furnished by others.

9. EXPANSION JOINT MATERIAL

Pre-molded expansion joint material for encasement fill shall be asphalt-impregnated fiber board, Celotex Corporation, "Flexcell", 1/2 inch thickness or approved equal.

10. FLOOR GRATING

Floor grating for access opening platform shall be Borden Metal Products Co., Type B, Size 5, pressure locked grating. Grating shall be furnished in factory applied black enamel finish.

11. PIG LEAD

Pig lead for filling existing encasement under tunnel shall conform to Federal Specification QQ-L-171a, lead, pig.

12. OIL

Oil for oiled sand fill shall be diesel fuel oil or approved equal.

WORKMANSHIP

13. TUNNEL DOOR AND HOIST

a. Tunnel door and hoist shall be fabricated and installed in conformance with details shown on the drawings. Unless shown otherwise on the drawings, fabrication and welding shall conform to the AISC Specification for the Design, Fabrication and Erection of Structural Steel for Buildings. Door shall be hydrostatically tested to 50 psi and shall be leak free at the test pressure.

b. Base plates for door hoist shall be located in accordance with lines and elevations shown on the drawings. Grouting shall be done as specified under Division II, CONCRETE.

14. STEEL LADDERS AND HANDRAILS

a. Steel ladders shall be fabricated and installed in conformance with Hanford Standard C-4-2a and C-4-2b unless shown otherwise on the drawings

b. Ladder cage shall be fabricated and installed in conformance with Hanford Standard C-4-3.

c. Handrails shall be fabricated and installed in conformance with Hanford Standards C-4-1 and C-4-4a.

15. ACCESS OPENING PLATFORMS AND COVERS

Access opening platforms and covers shall be fabricated and installed in conformance with drawing details. Grating shall be welded to structural frame.

16. SAND AND LEAD FILL IN ENCASEMENT

a. Oiled sand fill shall be mixed in a concrete mixer or by other approved method.

b. Lead shall be poured into existing encasement under tunnel as shown on the drawings. Procedure for placing lead fill shall be submitted to the Commission for approval prior to placing lead.

17. INSTALLATION OF DOORS AND HARDWARE

a. Doors shall be re-installed plumb and true with proper clearances, and shall swing smoothly and easily without warp or bind.

b. Hardware shall be attached to frames, with flat machine screws finished to match the hardware.

c. Hardware shall be carefully adjusted and left in perfect working order.

DIVISION VIII

PAINTING AND COATING

GENERAL

1. WORK INCLUDED

The work included under this division of the specification consists of all painting and chemical resistant coating work in connection with the Disposal Facility for Failed Equipment. The work, includes, but is not limited to, painting and coating of the following:

Painting:

a. Tunnel door interior

b. Tunnel door hoist and hoist enclosures

c. Ladders, platform and handrail

d. Access opening covers

e. Hollow metal doors and door frames

f. Railroad track support beams across drain sump

g. Equipment opening liners through tunnel roof

h. Exposed surfaces of embedded steel items

i. Exposed wood on door opening cover

Chemical Resistant Coating:

Exterior of tunnel door

MATERIALS

2. PAINTS

Paints for all work covered by this division of the specifications shall conform to the following:

Identification	Type	Use
Section 5.4.2 American Water Works Assoc. Standard D-102-53T with 2 pounds of dry litharge added to each gallon of paint.	Red-lead, linseed oil paint	Priming and finishing interior of tunnel door.
Federal Specification TT-P-86a Type II 5-4-49	Red-lead paint	Priming carbon steel.
Federal Specification TT-P-25a(1) 8-2-51	Wood primer	Priming exterior wood.
Federal Specification TT-E-489(1) Class A 7-26-48	Gloss enamel	Finishing metal and wood.
Federal Specification TT-E-291a(1) 8-2-51	Thinner; paint, Volatile mineral spirits	Thinning paints.
Federal Specification TT-T-306(2) 9-2-51	Thinner; synthetic enamel	Thinning synthetic enam

3. CHEMICAL RESISTANT COATING

Chemical resistant coating for exterior of shielding door shall be one of the following products in light gray color:

Amercoat No. 33
Amercoat Corp.
Southgate, California

Casey & Case Vinylcoat
Casey & Case Coating Co.
Maywood, California

Ucilon 400
United Chromium Inc.
New York, New York

Coro Guard 100
Minnesota Mining & Mfg. Co.
St. Paul, Minnesota

L-204
Andrew Brown Co.
Seattle, Washington

U. S. Royalguard
U. S. Rubber Company
Fort Wayne, Indiana

Pen-Kote 500
Saran Coating
Peninsular Chemical Prod. Co.
Van Dyke, Michigan

Corrosite
The Corrosite Corporation
New York, New York

Polyclad 33 D. G.
The Carboline Co.
St. Louis, Missouri

Neoprene Paint
Gates Engineering Company
Seattle, Washington

WORKMANSHIP

4. HANDLING AND STORAGE

a. All paint and coating materials shall be delivered to the jobsite in the manufacturers' original containers with labels intact and seals unbroken.

b. Paint and coating materials shall be carefully handled and stored in a well ventilated place where they will not be exposed to excessive heat, smoke, sparks, flame or direct rays of the sun.

c. Paints and coatings shall not be mixed within 25 feet of stored materials.

d. The Contractor shall take extraordinary precautions to prevent fires. Rags, waste, paper or other materials that have become spotted with paint, coatings, oil or solvents shall be placed in closed metal containers and disposed of each day.

5. SURFACE PREPARATION FOR PAINTING

Surfaces to be painted shall be prepared as specified below:

a. Shop coats damaged in shipment or storage shall be skillfully touched-up prior to application of succeeding coats.

b. All surfaces to be painted shall be dry and free from dirt, grease, oil, weld spatter, welding slag, rust scale, mill scale or other harmful substances before being painted.

c. Interior of tunnel door shall be sandblasted to remove material noted in b. above. Paint shall be applied as soon as possible after sandblasting. Sandblasted surfaces shall not be allowed to remain unpainted into the next shift. If rust forms on any sandblasted surface, the surface shall be re-blasted before applying paint.

d. Surface preparation shall be approved by the Commission before any paint is applied.

6. SURFACE PREPARATION FOR CHEMICAL RESISTANT COATINGS

a. Surfaces to receive chemical resistant coatings shall be thoroughly sandblasted to provide surfaces free of all mill scale, rust, grease, oil coatings, moisture or foreign matter. Sandblasting shall be performed in strict conformance with coating manufacturers recommendations. Coatings shall be applied as quickly as possible after sandblasting. Sandblasted surfaces shall not be allowed to remain uncoated into the next shift.

b. Surface preparation shall be approved by the Commission before any coating material is applied.

7. PAINT MIXING

a. Ready mixed oil paints, in original containers, shall be vibrated in a power-driven vibrator-type paint mixer for a period of from three to ten minutes, in order to remove all heavy sediment from the bottom of the can. The entire quantity shall then be boxed and strained through a fine wire screen or cheese-cloth before using.

b. Ready mixed enamels shall be thoroughly stirred in small quantities and sufficiently boxed for uniformity.

c. Paint shall not be mixed when the paint or surrounding temperature is less than 50° F.

c. Containers used for paint mixing shall be placed in a drip pan of sufficient size to confine dripping, splashing or spilling of ingredients while mixing by hand is in progress.

8. PAINTING

a. Paint shall be applied in conformance with the "Finish Schedule".

b. Painting shall not be done when the surrounding atmosphere is damp or dust laden or when surfaces are damp or frosty. Only thoroughly clean and dry surfaces shall be painted. A minimum of 24 hours shall elapse between coats of paint. All finished work shall be free from defective brushing or clogging of lines and angles.

c. All paint materials, shall be applied by skilled painters and spread with care, to a uniform and proper film thickness, showing no runs, sags, crawls, brush marks or other defects.

d. Finish hardware and other similar items shall be removed prior to painting and carefully reinstalled not sooner than 48 hours after the finish coat has been applied.

e. "Wet Paint" signs shall be posted to protect newly finished surfaces from damage.

f. Oily rags and waste shall not be permitted to accumulate anywhere inside of tunnel during working hours, or be left within any structure after working hours. All such waste shall be disposed of each day.

9. APPLICATION OF CHEMICAL RESISTANT COATINGS

a. Spraying and/or other application equipment for chemical resistant coatings shall be as recommended by the coating manufacturer or shall be approved equal.

b. Preparation and application of coatings shall be performed in strict conformance with coating manufacturers recommendations. The recommende number of coats shall be applied. For best results, properly prepared surfaces, care in application, proper drying time and close inspection between coats are essential. The coating manufacturers' instructions shall be strictly followed.

c. Hanford Works safety and fire prevention procedures and practices shall be strictly observed. Solvents in some coating materials are unsuitabl for breathing and are also inflammable. When the coating is to be appl in confined locations, forced air circulation shall be provided and personnel shall wear fresh air masks during application. No work shall be done near a source of ignition. Matches, torches, and smoking in th vicinity are prohibited. Air circulation must be maintained during application and curing.

e. Surface cracks or openings not covered or filled with first coating application shall be filled in accordance with manufacturers recommendations. Filled surfaces shall be coated same as remainder of surface.

f. Successive coats shall be applied in alternate colors to insure complet coverage and finishing with the desired finish color. Finish color sha be light gray.

10. FINISH SCHEDULE FOR PAINTING

Paints shall be applied in conformance with the Finish Schedule given below:

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FINISH SCHEDULE FOR PAINTING

Item to be Painted	Primer Identification	No. of Coats	Finish Paint Identification	No. of Coats	Color
Tunnel door interior	AWWA red-lead roof litharge	1	AWWA red-lead roof litharge	1	-----
All exposed carbon steel except tunnel door and hollow metal doors. Includes - ladders, handrail, door guides, access opening covers and platform; door frames, track support beams, opening liners through tunnel roof, embedded items, hoist covers.	TT-P-82a Type II	1	TT-E-489(1) Class A	2	To match existing adjacent facilities
Hollow metal doors	Previously painted or shop primed		TT-E-489(1) Class A	2	-----
Exposed wood on door well cover	TT-P-25a(1)	1	TT-E-489(1)	2	To match existing adjacent facilities

DIVISION IX

ELECTRICAL

GENERAL

1. WORK INCLUDED

The work included under this division of the specifications consists of providing, complete and in place, all electrical equipment and wiring in connection with the Disposal Facility for Failed Equipment, within the limits shown on the drawings. The work includes, but is not limited to the following:

a. Installation and wiring of door-hoist motor and brake.

b. Installation and wiring of door hoist switches.

c. Installation and wiring of pump motor and motorized valves.

d. Installation, connection and extension of ground conductor for motors.

e. Installation of new lighting fixture and re-location of existing lighting fixture.

f. Installation and wiring of 115 volt and 230 volt receptacles.

The Contractor shall terminate conductors from the above equipment where and as shown on the drawings.

2. WORK NOT INCLUDED

Power, control and grounding conductors will be extended, by others, to meet terminal points of Contractors wiring. Work by others will be performed concurrently with or prior to the Contractors portion of the electrical work.

3. STANDARDS FOR MATERIALS AND CONSTRUCTION

a. All materials shall be as shown on the drawings and bills of material, or approved equals. All materials shall be new and shall conform to NEMA Standards, if such standards have been established for the particular materials. In each case where materials of a given class or type have been examined and approved by Underwriters' Laboratories, Inc., for the intended service, the materials used shall bear the label of Underwriters' Laboratories, Inc., or shall be listed as having been examined and approved. Such standards shall be considered as minimum requirements for materials. When these specifications and/or drawings call for materials of better quality, the better quality shall be provid

b. All work shall conform with the latest edition of the National Electrical Code and revisions thereto.

4. WIRING METHODS

a. All equipment, materials, fixtures, conduit, etc., shall be installed as shown on the drawings. Suitable provision for mounting or support shall be made.

b. All conduit shall be reamed to remove burrs and shall be cleaned for prior to introduction of wires or cables. Immediately after installation all conduit ends shall be plugged or capped with standard conduit accessories until time for pulling wires.

c. All conduit field bends shall be made with standard bending devices ar shall have an inner edge radius not less than specified in Section 347 of the National Electrical Code. Excessive crushing of conduit will n be permitted. All conduit shall pass metal mandrels with hemispherica ends conforming to the following dimensions:

Size of Conduit	Mandrel Diameter	Mandrel Length
3/4 inches	0.62 inches	1.24 inches
1	0.78	1.57
1-1/4	1.03	2.07
1-1/2	1.20	2.42
2	1.55	3.10
2-1/2	1.85	3.70
3	2.30	4.60
4	3.00	6.00

d. All splices in conductors shall be made in a manner that conforms with recognized engineering practices and that:

(1) Where potential to ground exceeds 150 volts in wire sizes #8 AWG and smaller, splices shall be soldered or split-bolt type connectors shall be used.

(2) Where potential to ground does not exceed 150 volts in wire sizes #8 AWG and smaller, splices shall be soldered, or split-bolt type, connectors shall be used, or "Sta-Kon", Buchannan "Pres-SURE", or "Scotchloc" connectors may be used.

(3) Conductors larger than #8 AWG shall be soldered, or spliced by means of a mechanical connector of the screw pressure type.

e. Insulation on all splices shall be applied in an approved manner in accordance with established engineering practices. In no case shall the splice have an insulation rating of less than that of the insulation of the conductors.

f. Splices on wire #6 AWG and smaller on 120/240 volt and 480 volt circuit shall be insulated with rubber and friction tape, or with Scotch Electrical Tape #33.

g. One-hole pipe straps used for supporting conduit shall be equipped with clamp-backs. Where several conduits are supported in banks, Unistrut, Kindorff, or approved equal mounting devices shall be used.

h. All 480 volt, 3 phase wires shall be identified by colors:

Phase A - red Phase B - yellow Phase C - blue.

Where colored wire cannot be obtained the entire exposed portion of each conductor shall be marked with its proper color at all junction boxes and splices with non-conductive paint or other means of positive color marking such as Scotch #471 tape. Color identifications shall be carried to point of utilization.

i. Ground wedges shall be installed on all conduit connections where conductors carry in excess of 150 volts to ground. Double lock nuts and bushings may be used in lieu of ground wedges on all other conduit. Where the conduit enters concentric knock-outs, bonding conductors shall be used.

WIRING MATERIALS

5. WIRE

a. All power and control circuits shall be wired with G. E. Flamenol SI-58175 or approved equal. Lighting circuits shall be type TW building wire.

b. Conductors smaller than #12 shall not be used unless so noted.

6. CONDUIT AND FITTINGS

a. All wiring, except where otherwise allowed or noted, shall be in rigid metallic conduit. Conduit shall be hot-dipped galvanized or sherardized.

b. Outlet boxes shall be galvanized pressed steel in dry locations. Outlet boxes in wet locations and out of doors shall be cast "Feraloy", or approved equal, with screw hubs unless otherwise noted on drawings. The minimum size for pressed steel boxes shall be 4 inch octagon, unless otherwise noted.

c. All outlet boxes used for embedding in concrete shall be a minimum of 2-1/8 inches deep.

d. Flexible steel conduit, jumpered with a ground wire, may be used for final connection to motor or for similar short runs not subject to moisture or mechanical injury, provided the installation of rigid conduit in such a location is impractical. "Seal-tite" flexible conduit or approved equal shall be used in lieu of flexible steel conduit in wet locations.

7. MOTOR GROUNDING

a. A ground conductor shall be connected to the motor and extended to a point as shown on the drawings. The connection to each motor shall be by means of a bolt screwed into a threaded hole, not a bolt used for mounting or securing the equipment.

b. The methods of forming splices and taps of copper grounding conductors that are to be buried in earth or concrete are as follows:

(1) With two pressure type clamps made of copper, bronze, or brass.

(2) Or cast copper joints, "Cadweld Process" or approved equal.

(3) Or by brazing with silicon copper rod when using the oxy-acetylene process, or brazing with phosphor bronze or silicon copper using the carbon arc process and applying one pressure type clamp made of copper, bronze or brass.

DIVISION X

FENCING

GENERAL

1. WORK INCLUDED

The work included under this division of the specifications consists of providing, complete and in place, all chain link and woven wire security fencing in connection with the Disposal Facility for Failed Equipment.

MATERIALS

2. CHAIN LINK SECURITY FENCING

All materials for chain link security fencing shall conform to Hanford Standard Specification HW-4680, Chain Link Security Fence.

3. WOVEN WIRE FENCING

3.1 FENCE POSTS

a. Fence posts shall be of Douglas fir No. 1 Grade, as produced and graded under the West Coast Lumberman's Association, Grading and Dressing Rules No. 14, August 1, 1947. Line posts shall be 4 inch x 4 inch nominal dimension by 12 feet long. Gate posts shall be 8 inch x 8 inch nominal dimension by 12 feet long.

b. Posts may be either butt or full length treated with coal tar creosote. If butt treated, posts shall be processed by the hot and cold bath method, in accordance with the requirements of Specification C 7-51 of the American Wood Preservers' Association. Treated section of the posts shall extend from butt to not less than 6 inches above ground line. If full length treated, posts shall be pressure processed, in accordance with the provisions of Specification C 2-52 of the American Wood Preservers' Association.

3.2 EXTENSION ARMS

Extension arms for barbed wire shall be of Douglas fir, No. 2 Grade and shall be 2 inch x 4 inch approximately 2 feet - 6 inches long.

3.3 BRACES

Braces for all corner and pull posts shall be of Douglas fir, No. 2 Grade, as produced and graded under West Coast Lumbermans' Association, Rules No. 14. All braces shall be 4 inch x 4 inch nominal dimension.

3.4 GATES

Lumber for gates shall be Douglas fir, No. 1 Grade, as specified for fence posts. Other material for gates shall be as shown on the drawings.

3.5 FENCE FABRIC

Fence fabric shall be farm type, woven wire fabric of heavily galvanized steel wire. Top and bottom wires shall be not less than No. 10 Steel Wire Gage, all other wire shall be not less than No. 12-1/2 Steel Wire Gag Vertical wires of the fabric shall be uniformly spaced not more than 6 inches apart. Spacing of horizontal wires may vary but shall not exceed 9 inches. Fabric widths shall be chosen so as to provide finished fence height to top of fabric of 6 and 8 feet. If multiple widths are used to attain required height, the widths shall be securely clipped or wired together with ties spaced not more than 1 foot on centers in a manner appro by the Commission.

3.6 BARBED WIRE

Barbed wire shall consist of 2 galvanized steel wires not less than No. 12-1/2 Steel Wire Gage with 4 point barbs spaced approximately 5 inches on centers.

WORKMANSHIP

4. INSTALLING CHAIN LINK SECURITY FENCING

Chain link security fencing shall be installed in conformance with the drawings and Hanford Standard Specification HW-4680, Chain Link Security Fencing.

5. INSTALLING WOVEN WIRE SECURITY FENCING

5.1 SETTING POSTS

a. Excavation for fence posts shall be made with an approved post hole digger to keep size of hole as small as practicable, but of sufficient size to admit a tamping bar all around post.

b. Posts shall be set plumb and true to the lines shown on drawings. Posts shall be spaced not more than 10 feet on centers and shall be set not less than 36 inches into the ground. Posts shall be backfilled in layers not to exceed 6 inches in depth, loose measuremer Each layer shall be thoroughly tamped before placing additional ma

5.2 INSTALLATION OF EXTENSION ARMS

Extension arms on security fencing shall be recessed into posts approximately 1-1/2 inches and shall be securely nailed to posts with at least four 16d nails. Arms shall be installed to project upward and outward from top of fence fabric at an angle of 45 degrees.

5.3 BRACING POSTS

Each corner or pull post shall be diagonally braced by means of a 4 inch x 4 inch timber which shall extend from the corner pull post at top of fabric to first adjacent line post at a point approximately 6 inches above grade. Braces shall be installed both sides of corner and pull posts

5.4 GATES

Gates shall be constructed and installed in conformance with details shown on the drawings. Padlocks will be furnished and installed by the Commissio

5.5 INSTALLATION OF FABRIC

Fabric shall be stretched tightly between posts and shall be installed as close to grade as possible. Clearance between grade and bottom wire of fabric shall not exceed 2 inches. Low places in ground surface shall be filled to a distance of at least 2 feet each side of fence line to meet this requirement.

Fabric shall be securely fastened to all posts by means of 1-1/2 inch by No. 9 gage galvanized steel wire staples, spaced not more than 1 foot on centers.

5.6 INSTALLATION OF BARBED WIRE

Three equally spaced strands of barbed wire shall be stretched between extension arms and securely stapled to each arm. Wires shall be located so that top most strand is approximately 18 inches upward and outward from top of fence fabric.

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APPENDIX 2E

HWS-8262
SPECIFICATION FOR PUREX EQUIPMENT DISPOSAL
PROJECT CGC 964

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APPENDIX 2E

HWS-8262
SPECIFICATION FOR PUREX EQUIPMENT DISPOSAL
PROJECT CGC 964

This appendix contains Tunnel 2 Construction Specifications, HWS-8262, consisting of 35 pages.

HWS-8262

SPECIFICATION FOR

PUREX

EQUIPMENT DISPOSAL

PROJECT CGC 964

October 5, 1962

Prepared by Bovay Engineers

Prepared by

Checked by

Approved for General Electric Company

Wm C Armstrong

10/15/62
Date

UNCONTROLLED
COPY

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HWS-8262

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DIVISION I

EXCAVATION, BACKFILL, GRADING AND SITEWORK

GENERAL

1. SCOPE

This division covers excavation, backfill, grading and sitework.

2. WORK NOT INCLUDED

Temporary closure wall in existing tunnel will be removed by others.

3. PRECAUTIONS

Heavy construction equipment shall not be operated over tunnel structure at any time. A crawler-type tractor, not exceeding 14,000# gross weight may be used for finish grading over top of tunnel. Wheel-type equipment will not be permitted. No equipment will be permitted to operate over the metal tunnel until 24" or more of backfill has been placed.

WORKMANSHIP

4. EXCAVATION

a. Concrete tunnel section, eliptical tunnel section invert, ribbed arch footings and wall footings shall bear on undisturbed earth. No vehicle shall pass over any earth surface prepared to receive concrete. Depressions or holes below elevations shown on the drawings shall be filled with concrete, as directed by the Commission, at the Contractor's expe

b. Excavated material shall be kept clear of buildings, roadways, fences, electric power lines, fire hydrants and other existing facilities.

c. Excavation for all buried lines shall be true to line and grade as shown on the drawings. Trenches shall be of such depth as to allow placement of not less than 4 inches of sand backfill under the pipe.

5. SHORING

a. Shoring shall be required for all excavations in which the sloughing of sides would undermine adjacent structures or would create hazardous working conditions. Shoring may be omitted wherever the sides are sloped not less than one and one-half horizontal to one vertical and where existing facilities are not endangered.

b. All shoring shall be removed as backfill progresses.

c. Material for shoring may be steel or timber.

6. BACKFILL, STRUCTURAL CONCRETE TUNNEL

a. Backfill around the structural concrete tunnel section shall not be commenced until 7 days after the roof slab has been poured.

b. Frozen particles, stones greater than 8 inches in any dimension, vegetable matter and trash shall not be used in any backfill. Backfill material larger than 8" may be used at least 10' away from the structure.

c. Trash shall not be allowed in spaces to be backfilled.

d. Material for structural backfill shall be placed in layers not to exceed 24 inches loose measurement and thoroughly compacted. Compaction by loaded scrapers and/or tractors will be considered adequate for non-load-bearing compaction, subject to the restrictions specified in Section 3 above.

e. Care shall be exercised during backfilling to prevent excessive loads walls and to insure balanced loading on opposite walls.

f. Backfilling by means of sluicing or flooding will not be permitted.

7. BACKFILL, METAL TUNNEL, RIBBED ARCH DESIGN

Backfill and embankment around the ribbed arch design tunnel shall conform to Sections 6b except stone size within two feet of tunnel section shall be 3" minus.

8. BACKFILL, METAL TUNNEL, ELIPTICAL DESIGN

Backfill for the eliptical design tunnel shall conform to the following:

a. Zone 1 backfill shall consist of 3/4" minus material and shall be compacted by vibration to a density conforming to the following:

When tested in the field in accordance with AASHO (American Association of State Highway Officials) Designation T-147-49 "Field Determination of Density of Soil in Place," each layer of compacted embankment shall have a density not less than the following: (All equipment and labor for performing the tests shall be provided by the Contractor.)

(1) For clayey and silty materials - 90% of the "maximum density" as determined in accordance with AASHO Designation: T-99-49 "Standard Method of Test for the Compaction and Density of Soils." The moisture content of the material shall be uniform throughout the layer and shall be such that the specified density can be obtained. In no case shall the moisture content vary more than 3 percentage points above or below the optimum moisture content as determined by AASHO Designation T-99-49.

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(2) For cohesionless free-draining material - such as sands and gravels, 70% relative density as determined by the Standard U. S. Bureau of Reclamation relative density tests for cohesionless free-draining soils. The relative density of cohesionless free-draining soil, expressed as a percentage, is defined as its state of compactness with respect to the loosest and most compact states at which it can be placed by laboratory procedures. The relative density will be based on the following formula, wherein the maximum density is the highest unit weight of the soil, minimum density is the lowest unit weight of the soil and in-place density is the unit weight of the soil in place. Tests for moisture content are made on the materials and unit weights are expressed in terms of oven-dry weights.

$$\text{Relative density} = \frac{\text{max. den.} \times (\text{in-place den.} - \text{min. den.})}{\text{in-place den.} \times (\text{max. den.} - \text{min. den.})} \times 100$$

The particular test to be used, depending on the type of soil, shall be as determined by the Commission.

b. Zone 2 backfill shall consist of 3" minus material and shall be brought up evenly on each side of the structure in 12" lifts and shall conform to the compaction specified in Section 8a of this division.

c. Zone 3 backfill and embankment shall conform to Sections 6b, c, d and e of this Division, except that material shall be 3" minus within 2' of the tunnel.

d. Load bearing backfill shall be compacted by vibration.

9. BACKFILL, UNDERGROUND PIPING

a. Pipes shall rest on a sand cushion at least 4 inches thick.

b. After necessary line testing has been accomplished, backfill for piping shall be carefully placed around pipe. The first 12" of backfill shall be sand.

c. The remainder of the backfill shall conform to Section 6 of this division.

10. FINISH GRADING

a. Areas around and adjacent to all facilities constructed shall be bladed to provide reasonably smooth, uniform surfaces.

b. Finish grading shall be carried to elevations shown on the drawings. Surface shall consist of a 4 inch leveling course of predominantly coarse gravel to retard wind erosion. The leveling course may be formed by depositing gravel or by scarifying, dragging, raking or otherwise working to obtain the desired surface and to leave the area reasonably free of stones larger than 3 inches in diameter. Equipment for grading on top of new tunnel shall conform to Section 3 of this division. No live loads shall be imposed upon the top of the existing concrete tunnel.

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DIVISION II

CONCRETE AND MASONRY

GENERAL

1. SCOPE

This division covers concrete and masonry.

MATERIALS AND WORKMANSHIP

2. CONCRETE, REINFORCING STEEL AND EMBEDDED ITEMS

a. Concrete work and reinforcing steel shall conform to Hanford Standard Specifications HW-4798-S, Placing Reinforced Concrete. Embedded ite shall be as shown on the drawings.

b. Concrete shall not be placed until forms have been inspected and ap by the Commission, and pour slips have been approved by the Commissi

c. All foundations shall be poured on undisturbed soil. Areas that have been over-excavated for foundations shall be brought to proper grade with mass concrete.

d. Reinforcing steel shall be welded to existing reinforcing steel as shown on the drawings.

e. Existing dowels shall be cleaned of all rust, scale and deleterious material.

3. GROUT

Grout shall be "Embecco" as manufactured by the Master Builders, Inc., or approved equal, and shall be applied in strict conformance with the manufacturer's published instructions.

4. PRECAST CONCRETE

4.1 DESIGN

The member shall be designed in accordance with the latest recommendations of the Joint ACI-ASCE Committee 323 on prestressed concrete. The design shall be such that the camber of the precast member will provide for the deflection due to all dead loads.

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c. Hydrated lime shall conform to ASTM C-6-49.

d. Sand shall conform to ASTM C-144-52T. 100% of the sand shall pass a No 8 sieve and not more than 30% shall pass a No 50 sieve.

e. Hollow concrete blocks of the sizes shown on the drawings, shall be Grade A blocks conforming to ASTM C-90-52. Blocks shall be damp cured for at least 7 days. Blocks shall be manufactured of sand and gravel aggregate.

f. Solid concrete blocks and concrete brick of the sizes shown on the drawings, shall be Grade A brick or blocks conforming to ASTM C-145-39. Block and brick shall be damp cured for at least 7 days and shall be manufactured of sand and gravel aggregate.

g. Mortar shall consist of 1 part portland cement and 4 parts sand tempered with 1/2 part of hydrated lime by volume.

h. Reinforcement for concrete block walls shall be of standard manufacturer designed specifically for such use.

5.2 MIXING MORTAR

a. Mortar materials shall be accurately measured by volume and thoroughly mixed in a batch mixer. Mixing shall continue for at least two minutes after all ingredients have been added.

b. Mortar shall be mixed in quantities not greater than required for immediate use.

c. Retempering of mortar will not be permitted.

d. The use of anti-freeze admixtures will not be permitted without approval of the Commission.

5.3 LAYING CONCRETE MASONRY UNITS

a. Masonry units shall be kept dry at all times. Units shall be stored on suitable dunnage or pallets and shall not be allowed to rest on the ground. Units shall be completely covered during storage to prevent absorption of water.

b. Whenever masonry laying is stopped, the tops of uncompleted walls shall be covered with suitable material to prevent the entrance of water into the units.

c. Hollow blocks shall be laid with air cells vertical and with the main bearing webs in proper relation for bearing on the webs of blocks immediately below.

d. Units shall be laid in a full bed of mortar. Courses shall be kept level.

4.2 SHOP DRAWINGS

Shop drawings shall be prepared for all members and shall be submitted with complete calculations in conformance with the Special Conditions. Shop drawings and calculations shall bear the seal of a registered professional engineer.

4.3 MATERIAL

Materials shall conform to the following:

Prestressing Strands	ASTM A416-57T
Reinforcing Bars	ASTM A15-57T & A305-56T
W W Mesh	ASTM A185-56T
Aggregate: Sand and gravel (hardrock)	ASTM C33-57
Cement	ASTM C150-56

Concrete. The concrete shall have a unit weight of not greater t 150 lbs/cu ft for sand and gravel (hardrock) concrete, the strength shall be sufficient to carry the design l

4.4 DIMENSIONAL TOLERANCES

The size of the members shall be as shown on the plans with cross-section dimensional tolerances not to exceed ± 1/4".

Length dimensional tolerance not to exceed ± 1/4". Camber not to exceed ± 1/4" of the design camber.

4.5 FABRICATION, TRANSPORTATION AND ERECTION

a. The members shall be fabricated, transported and erected by methods which are in accordance with the PCI Standards for Prestressed Concrete Plants, STD-103-58T, Chapters 1 through 6.

b. The fabricator of the members shall have had previous experience in the construction and design of prestressed members.

5. MASONRY

5.1 MATERIAL

a. Water shall be clean and free from oil, acids, salt or injurious substances and shall be handled in clean containers.

b. Portland cement shall conform to ASTM C-150-56, Type II.

e. Units shall be laid in running bond pattern with vertical joints in adjacent courses staggered and vertical joints in alternate courses accurately lined up.

f. Wall reinforcement shall be placed as shown on the drawings with a minimum lap of 6" at all splices.

g. Joints shall be finished with a concave pointing tool applied so as to compact setting mortar and form a close and continuous contact with the masonry units.

h. Masonry units shall not be laid when the temperature is 35°F or lower. If the temperature drops below 35 F during the curing of the mortar, adequate temporary heat shall be supplied to hold the temperature surrounding the walls above 35 F for a period of 7 days.

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DIVISION III

STEEL TUNNEL

GENERAL

1. SCOPE

This division covers a steel tunnel. The contractor has the option of using either the ribbed arch or eliptical design, but not a combination of the two.

MATERIAL

2. RIBBED ARCH DESIGN

2.1 RIBS

Ribs shall be fabricated to the geometry shown on the drawing in conforma with the requirements of Division V of this Specification.

2.2 LINER PLATE

Liner plate shall be deformed four flange steel liner plate and having the following dimensions:

a.	Thickness	3/16"
b.	Length	37 - 11/32" (arc length)
c.	Width	16"
d.	Flanges	2"
e.	Radius	90"

The end flanges shall be bent straight, not radial. The steel shall conform to ASTM A-283-58, Grade C.

2.3 FASTENERS

Liner plates shall be fastened to the ribs with 3 - 5/8" bolts at each end. Liner plates shall be fastened to each other with 4 - 5/8" bolts. Bolts shall conform to ASTM A-325-61T.

3. ELIPTICAL DESIGN

3.1 SECTION

The section shall be constructed with No 3 gage eliptical steel corrugated sectional plate. Steel shall conform to ASTM A-283-58, Grade C. Corrugations shall have a 6" pitch and shall be 2" high.

3.2 FASTENERS

a. The circumferential seam shall have a lap of 4" and shall be fastened with a single row of 3/4" bolts spaced 9 19/32" on center.

b. The longitudinal seam shall have a lap of 4 3/4" and shall be fastened with 2 rows of 3/4" bolts. The 2 rows shall be 2" on center with holes staggered. The holes in each row shall be 6" on center.

c. Bolts shall conform to ASTM A 325-61T.

WORKMANSHIP

4. INSTALLATION

a. The ribs, liner plate and sectional plate shall be erected in conformance with the lines shown on the drawings.

b. On the elliptical section varying lengths of sections shall be installed so that staggered circumferential seams result.

c. No openings will be permitted large enough to permit more than fine sand seepage except for the 1" weep holes.

5. STRUTTING (Eliptical Liner Only)

Strutting shall be provided and installed during backfilling operation to prevent permanent deformation to the cross section exceeding 3% of the nominal dimensions. All strutting connections to the tunnel section shall be removed and damaged coating shall be repaired.

The contractor shall submit a sketch detailing his temporary strutting method in accordance with the provisions for Shop Drawings in the contract Special Conditions.

DIVISION IV

RAILROAD TRACK

GENERAL

1. SCOPE

This division covers railroad track and appurtenances.

MATERIALS AND WORKMANSHIP

2. GENERAL

Railroad track, ties, ballast and appurtenances shall conform to the applicable sections of Hanford Standard Specification HWS-5722-S and Hanford Standard AC-7-4 as modified by the details on the drawings. Track slips and anchor bolts required for anchoring the track to the concrete floor shall be as detailed on the drawings.

3. COMMISSION FURNISHED MATERIAL

The Commission will furnish the following materials as stated in the Special Conditions:

a. 90# ARAA Rails
b. 72# CNW Rails
c. Ties
d. Joint bars
e. Track bolts
f. Tie plates
g. Rail anchors
h. Gage rods
i. Turnout less ties and including switchstand.
j. Ballast

All other material, including but not limited to bumper, track spikes, anchor bol compromise joints shall be furnished by the Contractor.

DIVISION V

STRUCTURAL AND MISCELLANEOUS STEEL

GENERAL

1. SCOPE

This division covers structural and miscellaneous steel.

2. GENERAL

The current rules and practices set forth in the Code of Standard Practice for Steel Buildings and Bridges, and the Specifications for the Design, Fabrication, and Erection of Structural Steel for Buildings of the American Institute of Steel Construction (AISC) and seismic provisions of the Uniform Building Code, Zone 2, shall govern this work, except as otherwise specified herein.

3. SHOP DRAWINGS

Fabrication shop drawings of all members shall be submitted for approval in conformance with the requirements of the Special Conditions.

MATERIALS

4. STRUCTURAL AND MISCELLANEOUS STEEL

Structural and miscellaneous steel shapes shall conform to the requirements of ASTM A7-38T unless noted otherwise on the drawings, or herein.

5. GRATING

Grating shall conform to the requirements of Federal Specification RR-[illegible]-661a, Type I. Grating shall have the bar size and spacing as shown on the drawings.

WORKMANSHIP

6. FABRICATION AND ERECTION OF STRUCTURAL AND MISCELLANEOUS STEEL

Structural and miscellaneous steel shall be fabricated and erected in conformance with the AISC Specifications for the Design, Fabrication, and Erection of Structural Steel for Buildings, and the following:

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a. The contact surfaces of connected parts shall be free from paint.

b. Connections shall be as shown on the drawings.

c. All welding shall be in accordance with the "Code of the American Welding Society for Arc and Gas Welding in Building Construction."

d. Shop holes shall be provided in members to permit connecting the work of other trades when noted on the drawings.

e. New holes required for connections to steel in the field shall only be made by drilling except by written permission of the Commission.

DIVISION VI

WATER FILLED DOOR AND HOIST

GENERAL

1. SCOPE

This division covers one water filled door and one hoist assembly.

2. SHOP DRAWINGS

Shop drawings, spare parts lists, lubrication and maintenance instructions, shall be prepared and submitted to the Commission for approval in conformance with the Special Conditions.

MATERIALS

3. CARBON STEEL AND WELDING ROD

Structural steel shapes, steel plate and filler metal for tunnel door, access platforms and other uses shall conform in all respects to the American Institute of Steel Construction (AISC) Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings and shall be suitable for fusion welding.

4. TUNNEL DOOR HOIST

Tunnel door hoist shall be a standard product of an organization regularly engaged in the manufacture of hoists of this capacity and type. Hoist shall be deck mounted and shall be suitable for out of door use. Hoist shall have a rated capacity of 25 tons at a speed of not less than 8 feet per minute.. Lift travel shall be 25'. The hoist shall be driven by a 440 volt, 3 phase, 60 cycle single speed motor. The hoist shall be equipped with brakes which will prevent lowering of the load except by power of the hoisting motor or by a spring set power released brake. The load hook shall be carried by a multiple sheave block and the cable reeving shall be arranged so that the load block will travel vertically without a tendency to twist or travel laterally. If multiple cables are used, they shall be arranged so that the stresses are equallized among all load lines. All bearings shall be of the anti-friction type. All gears shall be cut, totally enclosed and running in oil. The hoist shall be equipped with two limit switches each. Each limit switch shall be single pole, double throw. One limit switch shall be a slack cable limit switch and the other limit switch shall stop the travel 6" before mechanical blockage.

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WORKMANSHIP

5. TUNNEL DOOR

a. Tunnel door shall be fabricated and installed in conformance with the details shown on the drawings. Unless otherwise shown on the drawings fabrication and welding shall conform to the AISC Specification for the Design, Fabrication and Erection of Structural Steel for Buildings.

b. Door shall be hydrostatically tested in place to 25 psig measured at the bottom of the door. All joints to be tested shall be painted with a mixture of powdered blue chalk and water which shall be allowed to dry prior to the application of the hydrostatic test. Leaks shall be repaired and the door shall be retested until found leak free. Upon completion of the test all chalk shall be removed. All equipment, facilities and labor for performing the hydrostatic tests shall be furnished by the Contractor.

6. INSTALLATION OF HOIST

Door hoist shall be installed as shown on the drawings and the approved shop drawings. Base plates for door hoist shall be located in conformance with the lines and elevations shown on the drawings. Grouting shall be as specified under Division II, CONCRETE AND MASONRY.

DIVISION VII

PIPING

GENERAL

1. SCOPE

This division covers piping and a pump.

2. SUBMISSION OF DATA

The following pump information shall be submitted in conformance with the Special Conditions.

a. Certified performance characteristic curve based on actual test of pump showing head in feet, efficiency and horsepower plotted against discha in U.S. gallons per minute from 0 to 200 gpm.

b. Complete pump and motor specifications including motor efficiency.

c. Complete dimensional drawings.

d. Spare parts list.

e. Installation instructions.

f. Operation, maintenance and lubrication instructions.

MATERIALS

3. PIPE AND FITTINGS

a. Pipe and fittings shall be as specified in the piping code except as noted on the drawings.

b. Pipe fittings shall conform to the requirements of the American Society for Testing Materials (ASTM), and the American Standards Association (ASA) as specified herein and in the piping code

c. Swivel joints shall be the size and style shown on the drawings as manufactured by Chicksan Company or an approved equal.

4. MOTORIZED VALVES

4.1 VALVE M-6

Three inch rotary bonnet, double seated, flanged end, motorized valve, Minneapolis-Honeywell Mod 2922-R, with small size motor or an approved equal. Valve shall be equipped with limit switch whose contacts close when motor field contact "B" closes. Closed contacts indicate closed valve. The valve shall operate in the following sequence:

When selector switch connects "R" to "B", motor runs, driving valve and switch cams. After the shaft has turned 30°, Contact "B" opens and Contact "R" closes. Motor continues to run until shaft has turned 180° at which time Contact "W" closes, Contact "R" opens and motor stops. When selector switch connects "R" to "W", current flows through Contact "W" to motor and similar action is repeated for second half of revolution.

4.2 VALVE M-7

Same as Valve M-6 except 4" size.

4. HOSE VALVE

Hose valve shall be as shown on the drawings.

5. HOSE

5.1 DOOR "C" HOSE

Door "C" hose shall be 2 - 50' lengths of 2 1/2" UL approved dacron filled double jacket, cotton rubber-lined hose with National Standard fire hose couplings.

6. PUMP

6.1 DESIGN CHARACTERISTICS

The pump shall be vertical deepwell turbine pump of the water lubricated type and shall deliver not less than 100 gallons per minute at 35 ft T.D.H. measured at the pump discharge assuming the water level is 1 foot above the pump suction.

7.2 CONSTRUCTION

a. Discharge Head - The discharge head shall be of heavy construction made of cast iron, designed for above-ground discharge with a suitable centering ring to receive a complete vertical hollow shaft motor drive. The discharge connection shall be flanged to receive a 2 1/2 discharge pipe.

b. Column shall consist of three parts; the outer column of the screwed butt joint type, the column spiders with inserted bearings, and a drive shaft of suitable strength to transmit the full horsepower required by the pump. The column shall be of Schedule 40 black steel pipe with screwed butt joint type connections, in sections not to exceed 10' in length. It shall be of 4" nominal diameter. The column spiders shall be of bronze with center hubs accurately bored to receive synthetic rubber bearings. The bearings shall be securely locked in place. The lineshaft shall be precision turned, ground and polished stainless steel not less than 1" in diameter. All threads shall be lathe cut. The ends shall be machine finished and undercut for proper butting of the shafts. Bearing intervals shall not be more than 10' center-to-center. The lineshaft shall be protected at each bearing by a sleeve.

c. Bowls shall be of heavy, close-grained cast iron, accurately machined and fitted to close tolerances, free from blow holes, sand holes, and all other faults. Outside diameter shall not exceed 6 inches.

d. Impellers shall be of bronze, semi-open type, accurately machined and finished and statically and hydraulically balanced.

e. The impeller shaft shall be of stainless steel. It shall be precision turned, ground and polished and supported by water-lubricated synthetic rubber bearings on both sides of each impeller.

f. The drive motor shall be as follows:

(1) Motor characteristics such as horsepower, rating, speed, etc. shall fit the requirements of the pump without overloading motor at any point on the pump curve. Drip-proof, ball bearing, squirrel cage induction motor, normal starting torque with non-reverse ratchet.

(2) 440 volt, 3 phase, 60 cycle AC.

(3) Motor shall conform to the latest applicable standards of the American Institute of Electrical Engineering (AIEE), the National Electric Manufacturers Association (NEMA), and the American Standards Association (ASA). The AIEE Standards shall have precedence in cases of disagreement.

WORKMANSHIP

8. PIPE WELDING

8.1 WELDER QUALIFICATION

a. All welding of carbon steel pipe shall be done by welders who have been qualified in accordance with the applicable test requirements of Hanford Standard HW-4900-S, Specifications for Qualifying Welders. A welder will be qualified only on the type of material and form of material he will weld and on the welding process which he will use to perform the work.

b. Radiographic examinations of test welds will not be required.

8.2 WELDING STANDARDS

Welding of carbon steel pipe shall be done in conformance with Hanford Standard HW-4926-S, Specification for Welding Carbon Steels. Sectioning of radiography of welds will not be required.

9. INSTALLATION OF PIPING

a. All piping shall be installed in accordance with the sizes, locations, slope and elevations shown on the drawings and the piping codes.

b. Interior of pipe, fittings and valves shall be kept free from dirt or foreign matter at all times. At all times when installation of pipe is not in progress, the open ends of pipe already laid shall be closed to prevent entry of dirt or foreign matter.

c. All joints and connections shall be water-tight at the specified test pressure.

10. HYDROSTATIC TESTING

Piping installed shall be hydrostatically tested in conformance with the following:

a. All instruments, facilities and labor required to conduct the tests shall be furnished by the Contractor.

b. Before application of the pressure, all air shall be expelled from the pipe and all joints shall be chalked in conformance with Section 5b of Division VI of this Specification.

c. Each test section of the piping shall be slowly filled with water and the specified test pressure shall be applied.

d. Duration of the test shall be at least 30 minutes without appreciable loss of pressure as determined by the Commission.

e. All piping, fittings, valves and joints shall be carefully examined during the open trench test.

f. All tests shall be made to the satisfaction and under the direction of the Commission. Any defective pipe, and wleds, fittings or valves revealed during the test shall be replaced at the Contractor's expense.

g. Test pressures shall be 125 psi.

11. PIPING CODES

Piping material, fabrication and installation shall conform strictly to the following Piping Code:

PIPING CODE

Pipe	Black steel pipe, seamless or welded per ASTM A-120-61T, Schedule 40.
Fittings	Steel butt welding per ASA B16.9-1958 150#

The exterior surface of underground pipe and fittings shall be cleaned, primed and coated with coal-tar enamel with a bonded asbestos felt wrapper. Materials and application shall conform to AWWA C204-57, together with Section A2 and A3.1 of the appendix of AWWA C204.

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DIVISION VIII

VENTILATION

GENERAL

1. SCOPE

This division covers the ventilation system.

2. SUBMISSION OF DATA

The following fan information shall be submitted in conformance with the Special Conditions.

a. Certified performance characteristic curve showing static pressure, efficiency and horsepower plotted against cubic feet per minute.

b. Complete fan and motor specification including motor efficiency.

c. Complete dimensional drawings.

d. Spare parts list.

e. Installation instructions.

f. Operation, maintenance and lubrication instructions.

MATERIAL AND WORKMANSHIP

3. GENERAL

The ventilation system shall be constructed as shown on Drawing H-2-58134.

4. MOTOR

The motor shall fit the requirements of the fan without overloading the motor at any point on the fan curve. The motor shall be a TEFC, ballbearing, squirrel cage induction motor rated at 440 volt, 3 phase, 60 cycle AC.

5. BELT GUARD

A belt guard conforming to Hanford Standard M-4-6 shall be installed over the fan drive.

DIVISION IX

PAINTING AND COATING

GENERAL

1. SCOPE

This division covers painting and coating.

MATERIALS

2. PAINT MATERIALS

Paint materials shall conform to the following specifications:

Identification	Type	Use
Fed Spec TT-P-86a(1)	Paint; red-lead-base, ready-mixed	Priming miscellaneous steel and field touch up and finish on water-filled door
Fed Spec TT-P-641b	Primer, paint; zinc dust-zinc oxide	Priming galvanized surfaces where required.
Fed Spec TT-E-489c	Enamel, alkyd, gloss	Finish on miscellaneous steel, identification lettering.
Sec 5.4.2 AWWA D102-55T	Red-lead, linseed with 2 pounds of dry litharage oil paint added to each gallon of paint.	Interior surfaces of water filled doors.

3. COATING MATERIALS

a. The exterior surface of water-filled door - and certain concrete surfaces shall receive coating system MV-3 conforming to Hanford Specification HWS-5961.

b. The interior and exterior surfaces of the steel tunnel shall receive a 35 mil coating of Coating Compound, Bituminous, Solvent Coal Tar Base conforming to Mil Spec MIL-C-18480 (Docks) (Am.1).

WORKMANSHIP

4. SHOP PAINTING

a. All steel, except galvanized and unless otherwise noted on the drawings or specified herein, shall be shop painted.

b. Painting shall not be done when the surrounding atmosphere is damp or dust laden or when surfaces are damp or frosty. Painting shall not be done when the ambient temperature is less than 40 F. Only thoroughly clean and dry surfaces shall be painted. A minimum of 24 hours shall elapse between coats of paint.

c. All paint materials shall be spread with care, to a uniform film thickness, showing no runs, sags, crawls, brush marks, or other defects.

5. HANDLING AND STORAGE

a. All paint shall be delivered to the job site in the manufacturer's original containers with labels intact and seals unbroken.

b. Paint shall be carefully handled and stored in a well ventilated place where it will not be exposed to excessive heat, smoke, sparks, flame, direct rays of the sun or freezing temperatures.

c. Paint shall not be mixed within 25' of stored flammable materials.

d. All necessary precautions shall be taken to prevent fires. Rags, waste, paper or other materials that have become spotted with paint, oil or solvents shall be placed in closed metal containers, and removed from the building at the close of each day's work.

6. PAINT MIXING

a. Ready mixed oil paints, in original containers, shall be vibrated in a power-driven, vibrator type paint mixer for a period of from three to ten minutes to remove all heavy sediment from the bottom of the can. The entire quantity shall then be "boxed" and strained through a fine wire screen or cheese cloth before using.

b. Ready mixed enamels shall be thoroughly stirred in small quantities and sufficiently "boxed" for uniformity.

c. Paint shall not be mixed when the temperature of the paint or surrounding atmosphere is less than 40 F.

7. SURFACE PREPARATION

a. Surfaces to be painted shall have all rust, scale, dirt, oil, grease, old paint, and weld spatter removed by wire brushing, grinding, or scrubbing with solvents, as required.

b. Shop coats on steel items shall be "touched up" after erection but prior to application of finish coats. Touch-up paint shall be as used for shop painting.

8. PAINTING

a. All necessary precautions shall be taken to protect surfaces not to be painted from paint splash or drip.

b. Surfaces to be welded after erection shall not be painted. Any paint within a distance of 2" from the joint shall be completely removed before welding.

c. Structural steel to be encased in concrete shall not be painted.

d. After erection, bolt heads, welded joints, and all other unpainted surfaces except otherwise specified shall be painted a touch-up coat.

e. All steel shall then be given a complete field coat of primer unless otherwise specified.

f. Surfaces inaccessible for painting after erection shall be given necessary field coats of paint prior to erection.

g. Painting shall not be done when the surrounding atmosphere is damp or dust laden or when surfaces are damp or frosty. Painting shall not be done when the ambient temperature is less than 40 F. Only thoroughly clean and dry surfaces shall be painted. A minimum of 24 hours shall elapse between coats of paint.

h. All finish work shall be free from defective brushing or clogging of lines and angles. Edges of paint adjoining other colors or materials shall be clear and sharp without overlap.

i. "Wet Paint" signs shall be posted to protect newly finished surfaces from damage.

j. All paint materials shall be spread with care, to a uniform film thickness, showing no runs, sags, crawls, brush marks, or other defects.

k. Spray painting is permitted on finish coats only. Only equipment which is capable of properly applying the paint shall be used. It shall be operated as recommended by the manufacturer for the material being sprayed. The equipment shall have traps or separators to remove oil and condensed water from the air. These traps or separators shall be drained periodically during operations. The air from the spray gun impinging against the surface shall show no condensed water or oil.

9. APPLICATION OF COATING SYSTEMS

a. Surface preparation and application of coating system MV-3 - to the exterior surfaces of the water filled doors - shall conform to Hanford Specification HWS-5962.

b. Surface preparation and application of the Bituminous coating system to the interior and exterior surfaces of the steel tunnel shall conform to the coating manufacturers published instructions. The system shall be a two coat system, each coat not less than 18 mils, making a total dry film thickness of not less than 35 mils.

10. FINISH SCHEDULE

Colors refer to Federal Standard 595.

Surfaces	Prime Coat No. Coats	Prime Coat Material	Finish Coat No. Coats	Finish Coat Material	Color
Misc steel not imbedded in concrete & not included in the following items.	1	TT-P-86a	1	TT-E-489c	14241 Gray
Ventilation unit framework	1	TT-P-86a or if galvanized TT-P-641b.	1	TT-E-489c	14241 Gray
Interior surfaces of water filled doors.	1	Sec 5.4.2 AWWA-D-102	1	Sec 5.4.2 AWWA-D-102	
Interior & exterior surfaces of steel tunnel, including ribs, curb angles and tunnel parts.		Bituminous, coal tar base, MIL-C-18480			
North face of Door "C", concrete floor of tunnel, lower 18" of interior surface of concrete tunnel wall.		System MV-3 HWS-5961 & HWS-5962			
Remainder of exterior of Door "C".	1	TT-P-86a	1	TT-E-489c	14241 Gray
Junction box and machinery numbers 1" high.			1	TT-E-489c	Black
Piping identification		per HW-5311-S			Green

DIVISION X

ELECTRICAL

GENERAL

1. SCOPE

This division covers electrical work.

2. CODES

The work shall conform to the National Electrical Code (NEC) 1962. Recommended methods and materials for installation of work as described in the above codes shall be mandatory unless otherwise specified herein or otherwise shown on the drawings or referenced Hanford Standards.

MATERIALS

3. MOTOR CONTROLLERS

Motor controllers shall be the size and type shown on the drawings or an approved equal.

4. ADDITIONS TO MOTOR CONTROL CENTER

Circuit breaker, door and operating mechanism shall match the existing motor control center. Circuit breaker shall have the rating shown on the drawings. The existing unit is a Square D Co. No. SJ-2092.8, Type CCP-2, Drawing C 3672 NW.

5. ANCHOR

Anchor shall conform to Hanford Standard D-4-1a, Concrete Cone Anchor.

6. GUY STRAND

All guy strand shall be galvanized steel as specified on Hanford Standard D-4-1d.

7. LINE HARDWARE

All line hardware for guy and anchor shall be galvanized and shall be as shown or noted on Hanford Standard D-4-1d, or approved equals.

8. RACEWAYS, FITTINGS AND BOXES

a. Rigid steel conduit shall be hot dipped galvanized, zinc metalized, or sherardized conduit, and shall conform to Federal Specification WW-C-581c. Conduit shall be furnished with an antifriction finish on the internal surfaces.

b. Liquid-tight flexible conduit shall be the type with a built-in ground conductor.

c. Unless shown otherwise on the drawing, the minimum size of conduit shall be 3/4 inch.

d. Boxes used in the pump house shall be aluminum, galvanized steel, cast iron or cast aluminum.

e. Boxes used in all other locations shall be cast steel or cast iron with corrosion resistant finish, threaded hubs and gasketed covers. Boxes shall conform to the Joint Industry Conference Electrical Standards for Industrial Equipment specifications for seal-tight fittings.

9. CONDUCTORS

9.1 GENERAL

Wire and cable shall be of the type specified herein. Size and number of conductors shall be as shown on the drawings.

9.2 BUILDING WIRE - 600 VOLT

a. Thermoplastic insulated wire shall conform to Hanford Standard Specifications HWS-8002-S, Thermoplastic Insulated Wire and Cable. The insulation thickness of Type TW wire shall be in accordance with the Insulated Power Cable Engineers Association (IPCEA) Standard S-19-81, Feb. 1951, Appendix I, Table I, as follows:

Size AWG or MCM	Thickness in 64th Inch
18-9	3
8	4
7-2	4

b. The minimum wire size for lighting and power circuits shall be No. 12 AWG. Unless otherwise specified, wire sizes No. 8 and larger shall be stranded and No. 10 and smaller may be solid, except that all control wire and equipment grounding conductors shall be stranded. All conductors shall be copper, unless shown otherwise on the drawings.

9.3 DIRECT BURIAL CABLE

Direct burial cable shall be Type UF and shall have the number of conductors and size shown on the drawings.

9.4 GROUNDING CONDUCTORS

Grounding conductors shall be stranded bare copper wire of the size shown on the drawings.

10. SOLDERLESS CONNECTORS

Pressure type solderless connectors and terminal lugs for use with building wiring not exceeding 600 volts between conductors, shall be the following or approved equals:

For Conductors No. 8 AWG and Smaller	
(1) Ideal Industries, Inc.	- Ideal Set Screw Type
(2) Burndy Engineering Co.	- "Hydent"
(3) Minnesota Mining & Mfg. Co.	- "Scotchlok"

For Conductors No. 6 AWG and Larger	
(1) Burndy Engineering Co.	- "Hydent" or Screw Pressure Connectors
(2) Erico Products, Inc.	- "Cadweld" connections

WORKMANSHIP

11. INSTALLING GUY AND ANCHOR

a. Backfill around anchors shall be thoroughly compacted throughout the entire depth of the hole.

b. Down guy shall be run at an angle of 45 degrees. Guy rod set in earth shall be in line with the strand and shall have not less than 6 inches nor more than 12 inches of rod length exposed. All anchor rod shall have double thimble eyes. Down guy shall be provided with steel guy guards.

c. Guys and anchors shall be installed according to Hanford Standard D-4-1d.

12. INSTALLING BUILDING GROUNDING SYSTEMS

12.1 UNDERGROUND ELECTRODES AND CONNECTIONS

a. Grounding shall be by means of an existing ground system, the buried tunnel liner and an underground water pipe in accordance with the drawings.

b. All grounding conductors shall be the size shown on the drawings.

c. Buried grounding cable shall be protected against all mechanical damage before and during backfill. Backfill material within one foot of the cable shall not contain rocks larger than two inches in diameter.

d. Splices and taps in grounding conductors that are to be buried in earth or concrete shall be made by the Thermite fusion process.

e. The resistance of ground system joints and taps shall not be greater than the resistance of the same length of continuous conductor.

12.2 SYSTEM AND EQUIPMENT GROUNDING

a. Grounding methods shall be according to the following Hanford Standard

D-20-10	Basic Requirements and Conductors
D-20-10a	Services, Panels and Conduits
D-20-10c	480 and 277/480 Volt Systems

b. Soldered connections shall not be used. Cadweld or brazed ground connections are permitted.

c. In this division and the drawings, the term "equipment" shall be understood to mean all exposed metal parts of a wiring system including conduit, raceways, metal armor of cables, cabinets, motor frames, motor controllers, etc.

d. The grounding conductor shall in no case be the system neutral or any current carrying conductor.

e. All conduits, and the armor of armored cable shall be connected at each end of the grounding conductor or firmly attached at each end, with a good electrical contact, to a grounded connection box. Ground connections must be made to the grounding conductor at each box.

13. IDENTIFYING EQUIPMENT

The motor starters, junction boxes, and limit switches shall be identified after installation by means of lettering on, or by nameplates attached to such equipment. This identification shall include the designation, use, voltage, and number of phases.

14. INSTALLING CONDUITS

a. Conduits shall be run parallel to or at right angles with the lines of the building. All bends shall be made with standard conduit ells, field bends, or screwed jointed conduit fittings.

b. All conduit field bends shall be made with standard bending devices and shall have an inner edge radius not less than specified in the National Electrical Code. All bends shall be free of dents or flattening.

c. All conduit shall be cut square, reamed, burrs removed, and cleaned before the introduction of wires or cables. Immediately after installation, all conduit ends shall be plugged or capped with standard conduit accessories until wires are pulled.

d. Conduit joints shall be set up tight. Hangers and fastenings shall be secure and of a type appropriate in design and dimensions for the particular application. Maximum distance between supports shall be 7 ft for 3/4 inch conduit or smaller and 10 ft for one inch conduit and larger. Runs shall be straight and plumb. Elbows, offsets and bends shall be uniform and symmetrical.

e. Couplings, connectors and fittings shall be approved types and shall be installed to provide a rigid mechanical assembly and positive electrical conductivity.

f. Galvanized steel locknuts and bushings shall be used for attachment to enclosures unless a threaded hub is provided. In addition, ground wedges or bushings shall be installed as required by the grounding standards referenced in paragraph 13.2 "System and Equipment Grounding." Threadless fittings are not permitted. Ericson type couplings shall be used where required. Running threads are not permitted.

g. One-hole pipe straps used for supporting conduit shall be equipped with clamp-backs.

h. Conduits shall be run without moisture traps where possible. Where dips are unavoidable, a pull box or condulet with drilled hole shall be placed at each low point to provide a means of escape for moisture.

i. Liquid-tight flexible conduit is permitted in sections three feet or less to make connections to motors or other equipment where the use of rigid conduit is impractical.

15. INSTALLING CONDUCTORS

a. Wire smaller than No. 12 AWG shall not be installed unless specifically indicated on the drawings.

b. Circuit conductor color coding shall be:

Single-Phase	Three-Phase
Hot No. 1 - Black	A Phase - Red
Hot No. 2 - Red	B Phase - Yellow or Orange
Neutral - White	C Phase - Blue or Black
Ground - Green or Bare	Neutral - White
	Ground - Green or Bare

Pressure-sensitive plastic colored tape may be used to identify the conductors in lieu of colored insulation. Tape marking shall be applied at each junction and outlet box and shall be a minimum of two inches in width. Color coding shall be maintained throughout each wiring system to the connection box at the point of utilization.

c. Powdered soapstone or other approved manufactured compounds shall be used where a lubricant is required for pulling in wire and cable.

d. All control conductor terminations shall be marked with a number to correspond to the wiring diagram. The marking shall be by means of imprinted tubular plastic wire markers.

16. INSTALLING DIRECT BURIAL CABLE

Cables, where specifically shown on the drawings as direct burial runs, shall be buried a minimum of 18 inches deep, embedded in a sand cushion, and covered with 1 by 8 inch pressure creosote-treated boards before backfilling. The sand cushion shall be a minimum of 3 inches in thickness on all sides of the cable. Underground runs shall be permanently marked with marker posts conforming to Hanford Standard D-15-48.

17. MAKING SPLICES, TAPS AND CABLE TERMINATIONS

a. Splices and taps in 600 volt building wire No. 8 AWG and smaller shall be made mechanically strong, soldered and taped except that any of the solderless connectors described under Section 10, "SOLDERLESS CONNECTORS", may be substituted. For conductors No. 6 and larger, joints shall be made with connectors, tees, lugs, etc. as described under the above paragraph.

b. Solderless connections shall be used according to the manufacturer's instructions. For connector types, which require installation tools, the proper tool made especially for the connector shall be used. Connectors without insulating covers shall be taped.

c. Plastic insulating tape made especially for electrical work shall be used for all splices and taps on circuits up to 600 volts. The thickness of insulating tape shall be at least equal to that of conductor insulation. Where a bolted splice or connection presents an irregular surface, an insulating putty, "Scotchfill" or approved equal, shall be applied to the joints before taping.

18. LOCATION OF EQUIPMENT

Unless locations of pull boxes, switches and other equipment are dimensioned on the drawings, such locations shall be considered as approximate. The Contractor shall verify critical dimensions as shown on the drawings and shall take all field measurements necessary to prepare shop drawings as required for installation of the work. Note that the locations of all limit switches are critical.

19. INSTALLING BOXES

a. Boxes shall be sized and installed in accordance with the National Electrical Code, unless larger sizes are shown on the drawings.

b. Boxes shall have only the required openings to accommodate the conduits or cables entering the box.

20. INSPECTION AND TESTING

20.1 GENERAL

a. All electrical equipment and wiring installed under this division shall be inspected and tested by the Contractor before any attempt is made to operate the equipment. Resistance, current and voltage measurements may be made as the work progresses. The Contractor shall maintain a systematic record by using a schedule or chart of all the tests and measurements. Space shall be provided to record readings, dates, and witnesses. All tests shall be witnessed by the Commission.

b. The Contractor shall correct, to the satisfaction of the Commission, all abnormal or incorrect conditions.

20.2 MOTORS

a. All safety hazards to men and machinery shall be corrected. Frames of motors shall be grounded.

b. Voltage, frequency and number of phases of power supply shall correspond with those required for the machine.

c. The electrical connections shall be checked for tightness and proper insulation.

d. Leads to motors and power wiring shall be checked for proper numbering and color coding in accordance with drawings and specifications. Color coding shall be as follows:

Phase A - Red
Phase B - Yellow or Orange
Phase C - Blue or Black
Neutral - White
Ground - Green or Bare

e. Bearings shall be inspected for proper lubrication.

f. The shaft end play and freedom of rotation shall be checked by hand where practical.

g. Belts shall be checked for the correct tension.

h. The voltage and current under normal operating load shall be measured and recorded.

20.3 WIRING SYSTEMS

a. All conduits and devices shall be checked for secure mountings and proper attachment.

b. Condulets and junction boxes shall be checked for loose or missing covers.

c. Conduit connections shall be checked for tightness.

d. All wiring connections shall be checked for proper installation.

e. The proper color coding for all wire and cable shall be verified. All insulated ground conductors shall be checked for green color identificatio

f. All wiring and cable shall be tested phase to phase and phase to ground with a 500 volt megger. The instrument manufacturer's instruction pamphlet, accompanying the instrument, will provide the detailed instructions for methods of conducting the tests. Any device not capable of withstanding the voltage and current of a megger test (such as relays and lamps) shall be disconnected or by-passed before the test is made.

20.4 MOTOR STARTERS

a. Each starter shall be checked for proper nameplate identification.

b. Equipment and devices shall be checked with the drawings and schedules to assure that they are correctly mounted and wired. The size and rating of fuses and overload heaters shall be verified.

c. Wire tag numbers, terminal strip markings and wiring shall be checked with the drawings. Wiring shall be checked for standard color coding of phases.

d. Door fit and door handle interlocking features shall be checked to assure that door cannot be opened when unit it houses is energized. Operating handle linkages shall have a minimum of slack or play. Handle shall be lockable in either the "on" or "off" position. The switch or breaker position marker shall be checked for correct indication, i.e., switch is "open" or "closed."

e. All switch and starter mechanisms shall be checked to see that nuts and bolts are in place and tight, that no pins or keys have worked out of place and that all cotter pins have sufficient spread. Mechanism rods and moving parts shall not bind and shall be in proper working order.

f. Motor starters shall be operated several times to check for bindfree operation of moving parts, proper contact area and pressure of main and auxiliary contacts, and correct operating coil voltage.

g. Control transformers shall be checked for proper voltage ratio. Fuses for the transformers shall be removed and checked for correct size and condition. All connections and mounting bolts shall be tight.

h. Pilot light shall be checked to assure proper indication of motor operation. Push button shall be checked for connections and operability.

i. Insulation tests shall be made before energizing the control center by meggering all buses, internal cabling, breakers and starters to ground.

20.5 CONTROL SYSTEM

The control system shall be checked for proper operation of all functions of Door C.

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APPENDIX 2F

STORAGE TUNNEL CHECKLIST

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STORAGE TUNNEL CHECKLIST

PART 1: CONCURRENCE AND APPROVAL TO PERFORM STORAGE TUNNEL TRANSFER

_____ Date _____

Originator

CONCURRENCE:

_____ Date _____

Manager PUREX Engineering

_____ Date _____

Manager PUREX Operation

APPROVAL:

_____ Date _____

PUREX Plant Manager

STORAGE TUNNEL CHECKLIST

PART 2: EQUIPMENT DESCRIPTION AND DANGEROUS WASTE CONSTITUENTS

I. EQUIPMENT DESCRIPTION

Name _____ ID Number _____

Fabrication drawing(s)/ revisions(s) _____

Length _____ Width _____ Height _____ Volume _____ cu. ft.

Estimated gross weight _____ Insulation material _____

Liquid capacity _____ Heel volume _____

Date removed for disposal[a] _____

Combustibles (description and amount) _____

_____

Remarks: _____

_____

II. DANGEROUS WASTE CONSTITUENTS

Constituent(s) _____

MSDS number(s) _____

Waste code(s) _____

Physical description _____

_____

Quantity _____ Determined by _____

pH final rinstate _____ Lab analysis no. _____ (copy attached)

Remarks _____

[a]If equipment contains dangerous waste, it (or its dangerous waste component once removed) must be transferred to an approved RCRA facility within 90 days of this date.

STORAGE TUNNEL CHECKLIST

PART 3: RAILCAR DESCRIPTION, LOADING AND TRANSFER PLAN

I. RAILCAR DESCRIPTION

Railcar no. _____ Type _____ Length (coupler to coupler) _____

Load capacity of railcar _____

Disabled: South coupler _____

Brakes _____

Verified journal housings are filled with lubricant _____

Modifications: Decking Drawing(s) Number _____

Cradle[a] Drawing(s) Number _____

Placarded[b] _____

Remarks _____

_____

_____

II. RAILCAR LOADING AND TRANSFER PLAN WITH PROPOSED SCHEDULE[c]

Estimated total volume of equipment on railcar _____

Estimated total weight of equipment on railcar _____

Documentation of equipment location[d] _____

Estimated Total Combustibles loaded on railcar _____

_____

Remarks _____

_____

---

[a]Preferred orientation, if applicable, to be addressed in railcar loading and transfer work plan.

[b]Identification of dangerous waste and characteristics only.

[c]Prepared by PUREX Plant Planner/Scheduler on a job-specific basis.

[d]Document equipment location on loaded railcar by means of video tape, photographs, sketches, etc. as appropriate.

STORAGE TUNNEL CHECKLIST

PART 4: RADIOLOGICAL DATA

ACTUAL RADIATION DATA (SURVEYS ATTACHED)

Loaded railcar _____ mrem/hr at _____ ft

PUREX railroad tunnel (after preparation) _____

PUREX railroad tunnel (after transfer) _____

PUREX railroad tunnel (after decontamination) _____

Remarks _____

_____

_____

_____

STORAGE TUNNEL CHECKLIST

PART 5: MISCELLANEOUS DATA

I. LIST OF ATTACHMENTS

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

II. POST TRANSFER

Evaluate transfer activities and provide information to PUREX Plant operation management for improvement to procedures and methods to upgrade the Checklist for the next tunnel transfer. Summarize remarks below.

_____

_____

_____

_____

_____

9 2 1 2 4 3 9

STORAGE TUNNEL CHECKLIST

PART 6: VERIFICATION STORAGE TUNNEL TRANSFER COMPLETED

Date railcar placed in tunnel _____ position _____ Date _____

Date railcar removed from tunnel _____ position _____ Date _____

DOCUMENT VERIFICATION:

_____ Date _____

Manager, PUREX Operations

_____ Date _____

Manager, PUREX Engineering

_____ Date _____

Manager, Quality Assurance / Quality Control

9 1 2 4 1 7 4 0

APPENDIX 3A

CLASSIFICATION OF RESIDUAL TANK HEELS IN THE PUREX STORAGE TUNNELS

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APPENDIX 3A

CLASSIFICATION OF RESIDUAL TANK HEELS IN THE PUREX STORAGE TUNNELS

This appendix contains 8 pages of the Classification of Residual Tank Heels in the PUREX Storage Tunnels (Correspondence Number 12152-89-101).

Westinghouse
Hanford Company

Internal
Memo

From: PUREX Regulatory Compliance 12152-89-101
Phone: 373-1792 S5-80
Date: November 29, 1989
Subject: CLASSIFICATION OF RESIDUAL TANK HEELS IN THE PUREX STORAGE TUNNELS

To: R. J. Landon B2-19

cc: D. K. Bailey S6-08
J. D. Bauer B3-15
J. R. Bellamy H4-57
R. V. Bowersock S5-80
R. C. Bowman H4-57
L. G. Garner H4-50
S. D. Godfrey S5-80
P. F. Kison S5-66
K. M. Leonard R2-73
D. L. Parker H4-57
M. A. Payne S5-66
S. M. Price H4-57
J. R. Rapoza S5-65
W. E. Ross S5-66
GJL/File/LB

Attached for your review and concurrence is a white paper entitled "Classification of Residual Tank Heels in the PUREX Storage Tunnels." This paper addresses the potential need to permit the residual liquid heels in failed process vessels that are stored in the tunnels as dangerous waste.

Based upon the logic and factual data presented, it can be concluded that the residual liquid heels currently in the PUREX Storage Tunnels do not constitute dangerous waste. If you concur, please sign and date page 7 (original) and return it to me by Tuesday, December 12, 1989.

G. J. LeBaron, Manager
PUREX Regulatory Compliance

no

Attachment

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CLASSIFICATION OF RESIDUAL TANK HEELS

IN THE PUREX STORAGE TUNNELS

I. INTRODUCTION

Several large vessels and other miscellaneous equipment that have been removed from the PUREX Plant are stored within the PUREX Storage Tunnels. This used equipment has either failed or become obsolete and, due to the high radiation levels associated with the equipment, it has been deemed not feasible to repair or modify this equipment. Some of the equipment has been in storage for nearly thirty years, and is scheduled to remain in storage until closure of the facility.

The PUREX Storage Tunnels have an interim status permit with Washington State Department of Ecology (Ecology). This permit covers storage of mixed wastes containing elemental lead, elemental mercury and silver nitrate as the dangerous waste component. The question has been raised if residual liquid heels in any of these vessels constitute a dangerous waste and, therefore, must be identified as such in a revision to the Part A Dangerous Waste Permit Application to Ecology?

II. HISTORIC BACKGROUND

The PUREX Storage Tunnels are an integral part of the PUREX Plant. The tunnels are used for interim storage of failed process equipment that are too radioactive and bulky for removal from the PUREX Plant. Failed equipment selected for storage in the storage tunnels is loaded onto old railroad cars that serve both as a transport and storage platform while the equipment is in storage. A remote-controlled, battery-powered locomotive (Little Toot) is used to position the rail car into the storage tunnel. The failed equipment, along with the transporter rail car, remains in the storage tunnel until significant radioactive decay has occurred to justify its retrieval for preparation/packaging for permanent disposal (e.g. burial). Theoretically, each piece of equipment is retrievable. However, since the equipment is stored on a single, dead end, rail spur per storage tunnel; equipment can only be removed in the reverse order to that of being placed into storage, (i.e., first in, last out).

Construction of Tunnel 1 was completed in 1956 as part of the PUREX construction project. The first failed equipment item to be placed in the storage tunnel was an HA Column which was approximately 41 feet long. Due to its length, two rail cars coupled together were required as a transporter. This failed HA column, along with a box of miscellaneous pipe jumpers, were placed in Tunnel 1 in June, 1960. The remaining six positions (total capacity eight rail cars) were filled between June, 1960 and January, 1965 at which time the water-fillable entry door was sealed closed and door opening hoists were deactivated electrically, as was the tunnel exhaust system.

Tunnel 2 was constructed in 1964. The first storage position was filled in December, 1967. As of October 1, 1989, a total of 17 rail cars have been

stored within Tunnel 2. Tunnel 2 has a storage capacity of forty, 40 foot long rail cars.

Although the PUREX Storage Tunnels are an integral part of the PUREX Plant, their operation is under a separate dangerous waste unit of the permit application with the Washington State Department of Ecology (Ecology). The Part A permit application (Form 3) for the storage tunnels was submitted to Ecology December 3, 1987. This permit application lists elemental lead, elemental mercury, and silver nitrate as being the only dangerous waste components of mixed wastes stored in the PUREX Storage Tunnels.

There are a total of 17 vessels currently stored within the PUREX Storage Tunnels that could contain dangerous waste heels. A breakdown as to type of vessel and storage location is given in Table 1.

TABLE 1.

VESSELS STORED IN THE PUREX STORAGE TUNNELS

	Tunnel 1	Tunnel 2*	Total
Concentrators	5	5	10
Dissolvers	0	3	3
Tanks	0	2	2
Centrifuges	1	0	1
Columns	1	0	1
	7	10	17

* Through September 1989

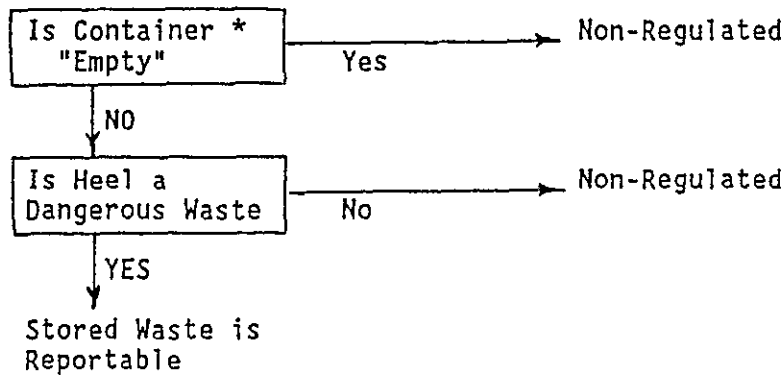
Documentation as to actual volume and chemical composition of the liquid heel remaining in each vessel at its time of storage is not available. High radiation levels within the tunnels prevents entry to make direct measurements or take samples of any residual heel that may remain today.

III. DISCUSSION

The purpose of this paper is to present the available, pertinent information concerning the equipment in the tunnels so a decision can be made as to whether heels in the vessels constitute dangerous waste as defined by the State of Washington Administrative Code WAC 173-303.

To resolve the residual heel question concerning the vessels currently in storage, the following logic diagram is utilized.

DECISION LOGIC



In accordance with WAC 173-303-160(2a), a container is "empty" when:

- "All waste in it has been taken out that can be removed using practices commonly employed to remove materials from that type of container," (e.g., pumping, aspirating).

AND

- The volume of waste remaining in containers of capacity greater than one hundred ten gallons "is no more than 0.3 percent of the container's total capacity."

Table 2 lists the jet heels associated with each of the 17 vessels currently in the PUREX Storage Tunnels.

* The PUREX Storage Tunnels are currently permitted as a container storage system (S01). Each of the rail cars is considered to be a "container" due to its portability. A revision to Form 3 is being proposed that would change the process code from S01 (container storage) to S05 (miscellaneous units) per 40 CFR 264 Subpart X. This change, however, should not affect the "container" characteristics applicable to the discarded process equipment being stored on the rail car.

TABLE 2

VESSEL HEELS

	Number	Total Capacity	Jet Heel	% Full	"Empty"
Concentrators					
E-F6	4	2167 gal	~5 gal	0.24	Yes
E-F11	2	2590	~15	0.58	No
E-H4	3	2678	113	4.22	No
E-J8	1	3738	~9	0.24	Yes
	10				
Dissolvers					
A-3	2	4745	20	0.42	No
C-3	1	5055	20	0.40	No
	3				
Tanks					
F15	1	5130	2.3	0.04	Yes
J5	1	368	1	0.27	Yes
	2				
Centrifuge					
G-E2	1	192	2.2	1.15	No
Column					
HA	1	1850	4	0.22	Yes
	17				

Of the 17 vessels in storage, eight may be considered to be "empty" since the heel is <0.3 percent of capacity. Therefore, 8 of the 17 vessels in the storage tunnels are non-regulated because they are "empty."

The second step in the logic network is to identify if the heel in the non-empty vessels constitute a dangerous waste. Table 3 presents the most probable composition of the residual heel in each vessel assuming the vessel was removed from service at the end of its normal operating cycle and received no further rinsing in preparation for storage.

TABLE 3.

VESSEL HEEL COMPOSITION

	Number	Heel	% Full	Composition*	Corrosive**
Concentrators					
E-F11	2	~15 gal	0.58	Bottoms NH_4OH trace	No
E-H4***	3	~113 gal	4.22	HNO_3 8.3M U 20-30 G/L Pu .005-.007 G/L	Yes
Dissolvers					
A-3/C-3	3	~20 gal	0.42	Heel Dilution Solution OH^- $1.1x10^{-3}$ M F^- $5.7x10^{-4}$ M	No
Centrifuge					
G-E2	1	~2.2 gal	1.15	Rinse Water	No

* Reference PUREX flow sheets: SK-2-23920 Rev. 2
SK-2-28921 Rev. 2
SK-2-23939 Rev. 3

** Within the corrosive pH range $\leq 2 \geq 12.5$ as defined in WAC 173-303-090(6a)

*** Locations of E-H4 Concentrators:

Location		Date Stored
Tunnel 1	Pos 5	Jan 1961
Tunnel 2	Pos 2	Mar 1969
Tunnel 2	Pos 10	Aug 1983

None of the chemical constituents of the potential heels shown in Table 3 are listed as dangerous waste in the discarded chemical products list, WAC 173-303-9903 or the dangerous waste constituents list, WAC 173-303-9905. Except for 8.3 M nitric acid, the equivalent concentrations of the other constituents are not toxic as defined under WAC 173-303-084(5). For nitric acid solutions, the characteristic of corrosivity is more restrictive than its toxicity; therefore, corrosivity was used as the measure to define if the waste is regulated. Six of the nine vessels listed in Table 3 do not contain a heel that is corrosive as defined in WAC 173-303-090(6a); therefore, these heels are non-regulated.

Of the 17 vessels stored in the PUREX Storage Tunnels, eight vessels do not contain dangerous waste heels because they are "empty" and six vessels do not contain a heel that is a dangerous waste. Therefore, only three vessels (all E-H4 concentrators) might contain a corrosive heel unless the vessels were adequately rinsed prior to storage or the residual heel has evaporated to eight gallons or less, "empty". Although documentation as to actual flushing procedures followed for these specific concentrators are not available, it has been common practice to thoroughly flush failed equipment to reduce the plutonium content to <15 grams as indicated by analysis of successive flush solution samples prior to removal at the equipment from the canyon (PUREX Control Manual WAC-CM-5-24 p. 15-69). However, to reduce a 113 gallon heel of 8.3M HNO_3 to <0.01M HNO_3(pH~2) or to <0.0007M HNO_3 (to account for re-concentration of the residual acid on evaporation to "empty"), would require multiple flushing varying from three, 100 percent of vessel

capacity flushes, to six to eight flushes using a flush volume at only 10 percent of vessel capacity. This degree of flushing would far exceed that which would be required to reduce the plutonium content to <15 grams, the prevailing criteria at the time the vessels were prepared for storage. Without hard evidence as to flushing procedure followed or chemical or pH analysis of the final flush solution, it must be assumed that the residual heel remaining at time of storage was corrosive (pH<2).

Is must be determined if it is reasonable to assume that the residual heels have evaporated. The bottom footnote of Table 3 gives the dates the three E-H4 concentrators were placed into storage. The concentrator in Position 5 of Tunnel 1 has been in storage for nearly 29 years, the first four of which took place when the tunnel exhaust system was in use. For the concentrators in Positions 2 and 10 of Tunnel 2, the storage time has been 20.5 years and 6 years respectively. Tunnel 2 exhaust system has been in operation the full time.

It is common practice to plug or cap the nozzles that would be on the down side when the vessel is positioned on the rail car. This is done to prevent spillage of any liquid remaining in the vessel thus minimizing the spread of radioactive contamination during transport of the vessel to the storage position within the storage tunnel. It is also common practice to leave up side nozzles and particularly large openings, such as tube bundle ports, uncovered. Since considerable time has taken place since the E-H4 concentrators have been placed in storage, and since the vessels were not sealed closed, it is reasonable to assume that any residual heel left in vessel at the time of storage has evaporated.

IV. CONCLUSIONS

Based upon the logic and factual data presented above, it can be concluded that of the 17 vessels stored within the PUREX storage tunnels:

- 8 vessels had such small residual heels that they may be considered to be "empty" as defined in WAC 173-303-150(2a).
- 6 of the "non-empty" vessels had residual heels that would not be corrosive as defined in WAC 173-303-090(6a).
- 3 of the "non empty" vessels probably had corrosive residual heels at the time of storage, but due to evaporation over the years, these final three vessels have joined the "empty" category.

Therefore, there are no residual liquid heels currently in the PUREX storage tunnels that constitute being a dangerous waste.

V. FUTURE RESIDUAL HEELS

Operating procedures for preparation of failed equipment selected for storage within the PUREX Storage Tunnel will be revised to require adequate flushing, as verified by sample analysis, to assure any residual heel is not corrosive as defined in WAC 173-303-090(6a). Documentation of the flushing procedure followed and laboratory analysis obtained will be included as part of the storage records.

Prepared by: Robert V. Bowersock
R. V. Bowersock, Principal Engineer
PUREX Regulatory Compliance

Concurrence: G. J. LeBaron
G. J. LeBaron, Manager
PUREX Regulatory Compliance
27 Nov 89
Date

Roger J. Landon
R. J. Landon, Manager
Regulatory Analysis
1/19/90
Date

Approval: M. A. Payne
M. A. Payne, Manager
PUREX Facility
1/22/90
Date

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APPENDIX 7A

EMERGENCY PLAN FOR PUREX FACILITY

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APPENDIX 7A

EMERGENCY PLAN FOR PUREX FACILITY

This appendix contains the PUREX emergency plan consisting of 172 pages.

9 2 1 2 4 1 4 1 7 5 2

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ACRONYMS USED IN WHC-IP-0263-202A, EMERGENCY PLAN FOR PUREX FACILITY

AMU	Aqueous Make-up
ASD	Ammonia Scrubber Discharge
BED	Building Emergency Director
CAD	Cell Arrangement Drawings
CAM	Continuous Air Monitor
CAS	Criticality Alarm System
CSL	Chemical Sewer Low Level
CWL	Cooling Water Low Level
DOE-RL	Department of Energy Field Office, Richland
EACT	Emergency Action Coordination Team
EB	Exhaust Back-up facility
EC	Exhaust Canyon (Main Stack)
ECC	Emergency Control Center
EDO	Emergency Duty Officer
EGE	Exhaust sample Gallery room East
EGW	Exhaust sample Gallery room West
ELE	Exhaust Laboratory East
ELW	Exhaust Laboratory West
EHE	Exhaust sample gallery Hood East
EHW	Exhaust sample gallery Hood West
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
EP	Exhaust Product Removal Room
ET	Exhaust storage Tunnel #2
EW	Exhaust White room
FDC	Fire Department Connectors
GEA	Gamma Energy Analysis
GTE	General Telephone Electric Incorporated
HEPA	High Efficiency PArticulate
HMRT	Hazardous Material Response Team
HPT	Health Physics Technician
IEFD	Instrument Engineering Flow Diagrams
JSA	Job Safety Analysis
LCS	Limiting Control Setting
MCC	Motor Control Center
MFRAM	Moving Filter Radioactive Aerosol Monitor
MRP	Management Review Procedures
NPO	Nuclear Power Operator
ONC	Occurrence Notification Center
ORNL	Oak Ridge National Laboratories
OSHA	Occupational Safety Health and Administration
PAX	Public Address System
PCB	Poly Clorinated Biphenyl
PDD	Process Distillate Discharge
PIV	Pulser Infinitely Variable
POC	Patrol Operations Center
PR	Product Removal
P&O	Pipe and Operating
PNL	Pacific Northwest Laboratory

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1	PRV	Pressure Reducing Valve
2	PUREX	Plutonium URanium EXtraction
3	ROD	Record of Decision
4	REM	Radiation Equivalance Man
5	RR	Railroad
6	RPR	Radiation Protection Response
7	RWP	Radiation Work Permit
8	SCBA	Self-Contained Breathing Apparatus
9	SCD	Steam Condensate Discharge
10	S&PM	Surveillance and Preventive Maintenance
11	SWP	Special Work Permit
12	UO_3	Uranium Oxide
13	WAC	Washington Administrative Code
14	WHC	Westinghouse Hanford Company
15		

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1.0 INTRODUCTION

1.0.1 REFERENCE DOCUMENTS

The following are documents referenced in this PUREX Facility Emergency Plan, WHC-IP-0263-202A:

DOCUMENT NUMBER	DOCUMENT NAME
DOE Order 5000.3A	Occurrence Reporting and Processing of Operations Information. To establish a system for reporting of operations information related to DOE-owned or operated facilities and processing of that information to provide for appropriate corrective action.
DOE Order 5480.5	Safety of Nuclear Facilities. Establish nuclear facility safety program requirements.
DOE Order 5480.19 and NPO-85-017	Conduct of Operations. Defines 18 specific chapters of good operating practices based upon the "Guidelines for Conduct of Operations"-INPO-85-017.
WHC-IP-0684-202A	PUREX Facility Emergency Response Organization Phone listing. Provides an up-to-date name, phone number, and location, list of facility emergency response organization members.
DOE Order 5500.2A	Emergency Notification, Reporting, and Response Levels
DOE-RL EMERGENCY PROCEDURES MANUAL	Contains procedures for use by DOE-RL and contractor personnel to respond to declared emergencies involving facilities and property on DOE-RL Hanford Site.
WHC-CM-4-1	Westinghouse Hanford Company Emergency Plan. Contains an Emergency Preparedness plan to protect onsite personnel, public health and safety, and the environment in the event of operational, natural phenomena, and/or safeguards and security events at WHC facilities.
WHC-CM-4-10	Radiation Protection
WHC-CM-4-12	Operational Health Physics Practices Manual
WHC-CM-4-13	Operational Health Physics Procedures Manual
WHC-CM-4-15	Radiation Work Requirements and Permits Manual, Administrative Practices/Controls.

1.0.1 Reference documents, Cont'd.

DOCUMENT NUMBER	DOCUMENT NAME
WHC-CM-4-29	Nuclear Criticality Safety Manual.
WHC-CM-5-9	PUREX/UO3 Plant Administrative Manual. Provides administrative procedures specific to the requirements at PUREX/UO3 facilities. Categories of areas covered include Safety Directives, Administration, Operations, Material Control, Work Control, etc.
WHC-CM-5-24	PUREX Process Control Manual. Provides an audit link between the Operational Safety Requirements (OSRs) and process documents.
WHC-CD-CP-SSP-007	PUREX/UO3 Plant Standby Operations Subprogram Plan. Includes the activities necessary to maintain the Plant in Standby condition during Standby Operations period.
WHC-SP-0479	PUREX Technical Manual. Documents the technical bases of the PUREX process and provides a description of the Plant and equipment.
WHC-SP-0631	PUREX/UO3 Plant Standby Program Management Plan. This manual contains the overall direction for the transition to and maintenance of a safe and environmentally sound standby condition.
WHC-IP-0692 (new)	Health Physics Procedures Manual (old manual # WHC-CM-4-13)

1.0.2 FACILITY NAME

U. S. Department of Energy Hanford Site PUREX Facility
(Eastern Portion of 200 East Area, including Building 202A)

1.0.3 FACILITY LOCATION

The PUREX Facility is placed on the 560 sq mi, U. S. Dept. of Energy (DOE) Hanford Site in southeastern Washington State. The PUREX Facility is located in the southeastern portion of the 200 East Area near the center of the Hanford Site.

1.0.4 OWNER/OPERATOR

U. S. Department of Energy
Field Office, Richland
Federal Building
825 Jadwin Avenue
Richland, Washington 99352

Co-Operator

Westinghouse Hanford Company
P. O. Box 1970
Richland, Washington 99352

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1.0.5 INTRODUCTION TO THE PUREX FACILITY EMERGENCY PLAN

The PUREX facility emergency plan has been designed to provide a system of responses which will minimize risks to personnel, buildings, environment and equipment in the event of an emergency situation at the PUREX facility during its current standby condition. This emergency plan is applicable to personnel and equipment located in:

(i) PUREX Plant (202A) and all other buildings and trailers enclosed inside the double security fence (203-A, 211-A, 271-AB, 291-A, 2701-AB, etc.)

(ii) trailers enclosed by the double security fence (MO-023, MO-035, MO-323, MO-409, MO-666, and MO-707) and

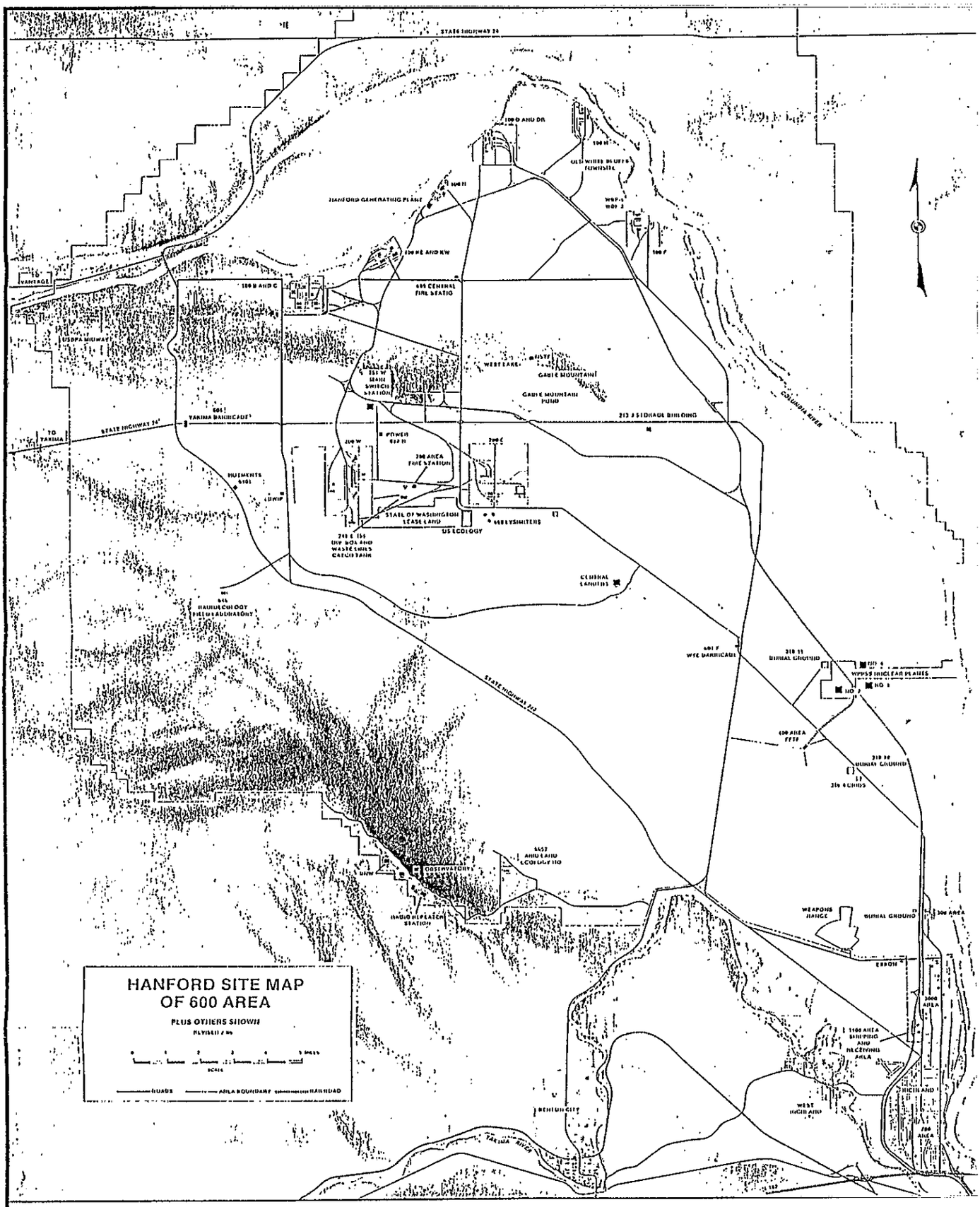
(iii) trailers located outside the double security fence, associated with the PUREX facility (MO-273, MO-347, MO-355, MO-405, and MO-946).

This facility emergency plan is part of the WHC Emergency Response Plan. The overall response plan is comprised from the DOE-RL Emergency Plan and Procedures Manuals, the WHC Emergency Plan (WHC-CM-4-1), and this document. Copies of the existing coordination agreements are located in the stated documents and as such are not contained or discussed in detail in this document (see section 1.1). Emergency situations at PUREX during standby condition may take the form of the following:

- Criticality
- Fire
- Explosion
- Spill/release of hazardous material

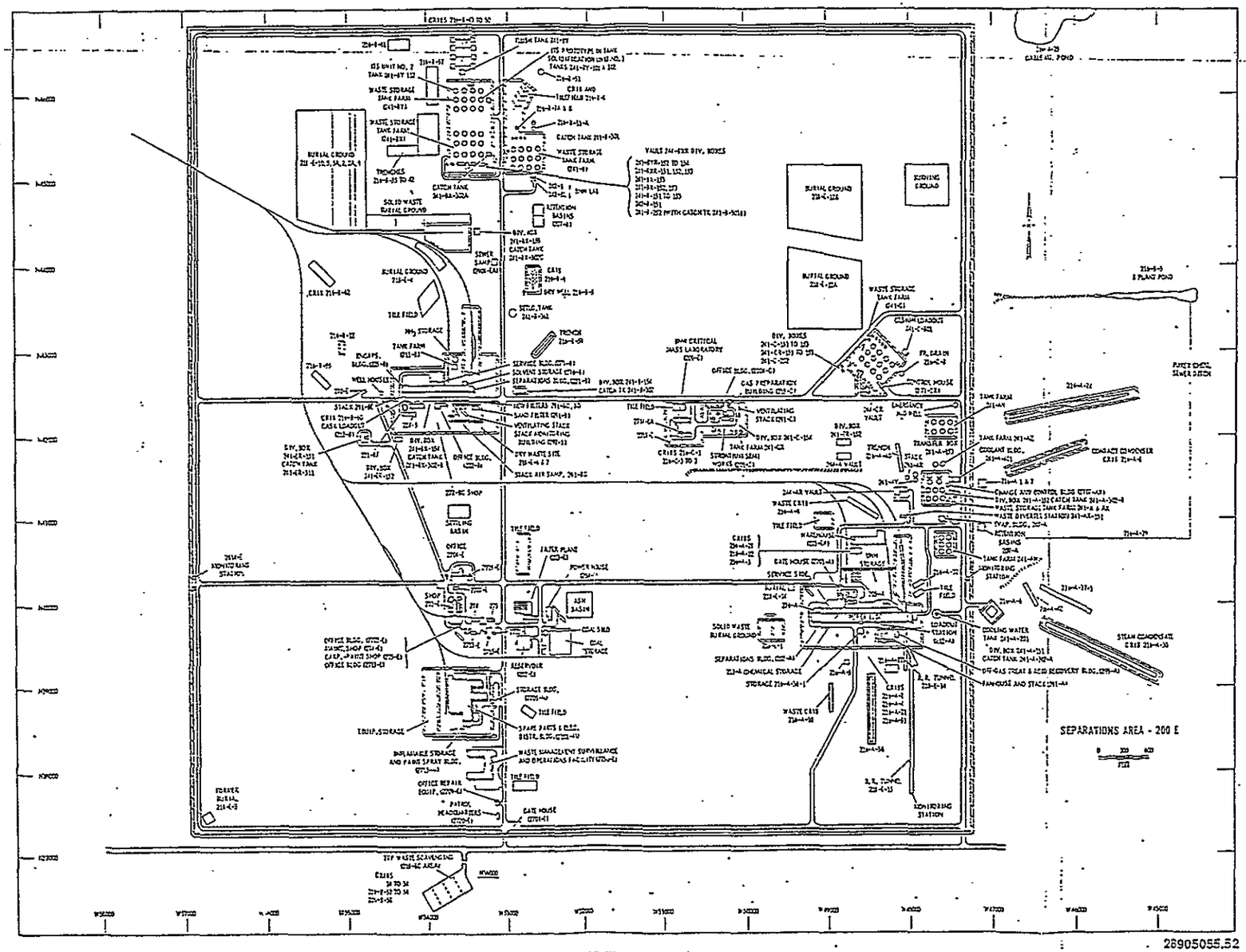
Planned responses are those activities which are intended to control a fire, to minimize the immediate effects of an explosion or criticality, and to contain a spill or release. These responses include, for example; notification of personnel, emergency organizations, and the Building Emergency Director. This Plan also provides planned responses for notifying personnel to take cover, evacuate, or other action, which is determined by the particular circumstances. The planned responses also provide for, in most cases, formal notification and reporting, investigation of the incident, cleanup, and restoration.

Benton County, Washington buildings/facilities covered by this plan are: Hanford Reservation (Figure 1), and Eastern Portion of 200 E Area (Figure 2).



HANFORD SITE MAP OF 600 AREA

Hanford 200 East Area



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WHC-IP-0263-202A
PUREX Facility Emergency Plan
Figure: 2

1.0.6 INTRODUCTION TO THE PUREX FACILITY

PUREX facility was placed in a maintenance outage during the third quarter of 1990. DOE has directed that the facility remain in this standby mode pending the outcome of an Environmental Impact Statement (EIS) on the alternatives for disposition of the Hanford irradiated fuel. Processing of the irradiated fuels at the PUREX facility is one of the alternatives under review. Before the facility was directed to maintain a standby mode, its mission was to reprocess irradiated fuels for the recovery of uranium and plutonium. The final EIS and Record of Decision (ROD) are not expected for approximately three to five years.

Presently, processing activities at the PUREX facility have been curtailed. However, periodic special operations of specialized equipment during the standby period is vital to maintain the operability of the Plant.

The objective of the PUREX facility, until the final Environmental Impact Statement and Record of Decision for restart is reached, is to assure continued preservation of the facility, equipment, administrative systems, and maintain the PUREX Plant (202A building) in a safe and environmentally sound condition during and after its maintenance outage. The PUREX/UO3 Standby Program Management Plan, contains overall direction for the transition to and maintenance of a safe and environmentally sound standby condition.

The 202-A building, consists of three main structural components: (1) a thick-walled, heavily shielded concrete portion called the canyon which contains remote process cells and equipment; (2) a section comprised of three gallery levels parallel to and isolated from the canyon; and, (3) a steel transite annex to the north of the gallery section which houses offices. In addition to these structures, the laboratory, and a number of building service areas are encompassed in the PUREX facility (See Figure 3 and 4).

The structures in the 202 building are built to safely handle materials of varying degrees of radioactivity. The canyon structure with below-grade, isolated chemical processing cells was selected as being most appropriate for a bulk radiochemical separations operation. Structures built prior to 1968, which include the 202A canyon and most of the other structures handling highly radioactive materials, were designed for typical static vertical live and dead loads in accordance with uniform building codes, Hanford Facility Standards, and other applicable design documents in effect at the time of construction. Structures built after 1968, with the exception of the third PUREX filter, were designed for the most severe possible combination of dead, live, and operating loads appropriate for the given criteria. Seismic provision is made in the load calculations for a maximum credible earthquake producing a 0.25g horizontal ground acceleration and a 0.17g vertical acceleration.

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1.0.7 INTRODUCTION TO PUREX FACILITY OPERATIONS

Before the PUREX facility was placed in a standby condition, its mission was to reprocess irradiated fuels for the recovery of uranium and plutonium. The program to design and construct the PUREX Plant (202A building) and the associated support facilities was initiated in 1952 by the U.S. Atomic Energy Commission (now DOE). The PUREX Plant is one of the mainstays in the United States' nuclear fuel separations program, processing irradiated production reactor fuels for the recovery of uranium and weapons- or fuels-grade plutonium. From the first operation in 1956 to shutdown in September 1972 and from its restart in 1983 to being standby in 1990, refinements were made in the Plant to upgrade Safety and Process equipment, achieve process versatility, and adapt to changing feed material.

Hanford's PUREX Facility was designed and constructed to provide supplemental fuel reprocessing capability to separate plutonium and uranium products from irradiated fuel. The facility is operated by Westinghouse Hanford Company (WHC) under the direction of the U. S. Department of Energy (DOE). The PUREX process, developed at Oak Ridge National Laboratory (ORNL), Oak Ridge, Tennessee, was used as an improvement over the REDOX process.

The PUREX facility and process was originally designed to reprocess aluminum-clad uranium metal fuel to recover weapons-grade plutonium and natural enchriched uranium, but later modified to reprocess zirconium alloy (Zircaloy) clad fuel from N-Reactor to recover plutonium and uranium. This process assisted programs, such as research, reactor development, safety, and the United States defense; plus, provide uranium for fuel in reactors generating electricity and plutonium.

Since its first process using spent fuel in 1956, a variety of fuels have been reprocessed. The fuel enrichments have varied from 0.72% to 2.1% ^{235}U; fuel exposures have varied from 300 to 3,000 MWd/t U; and cooling times have varied from 120 days to 7 years. Aluminum-clad and zirconium-clad fuels have been processed at the PUREX facility. Types of fuels processed include uranium metal, uranium and plutonium oxides (Pu and Al alloys), and thoria targets. During operations, improvements were made to increase production rates, provide diverse capability to handle various fuels, provide higher quality products, decrease environmental releases, and improve the safety of the operation. Additional changes were made while the plant was on standby between September 1972 and November 1983. More are being developed and implemented during the facility's present standby condition.

A complete description of the PUREX process, flow diagrams, chemical reactions and internal arrangement of the building is contained in the PUREX Technical Manual, WHC-SP-0479.

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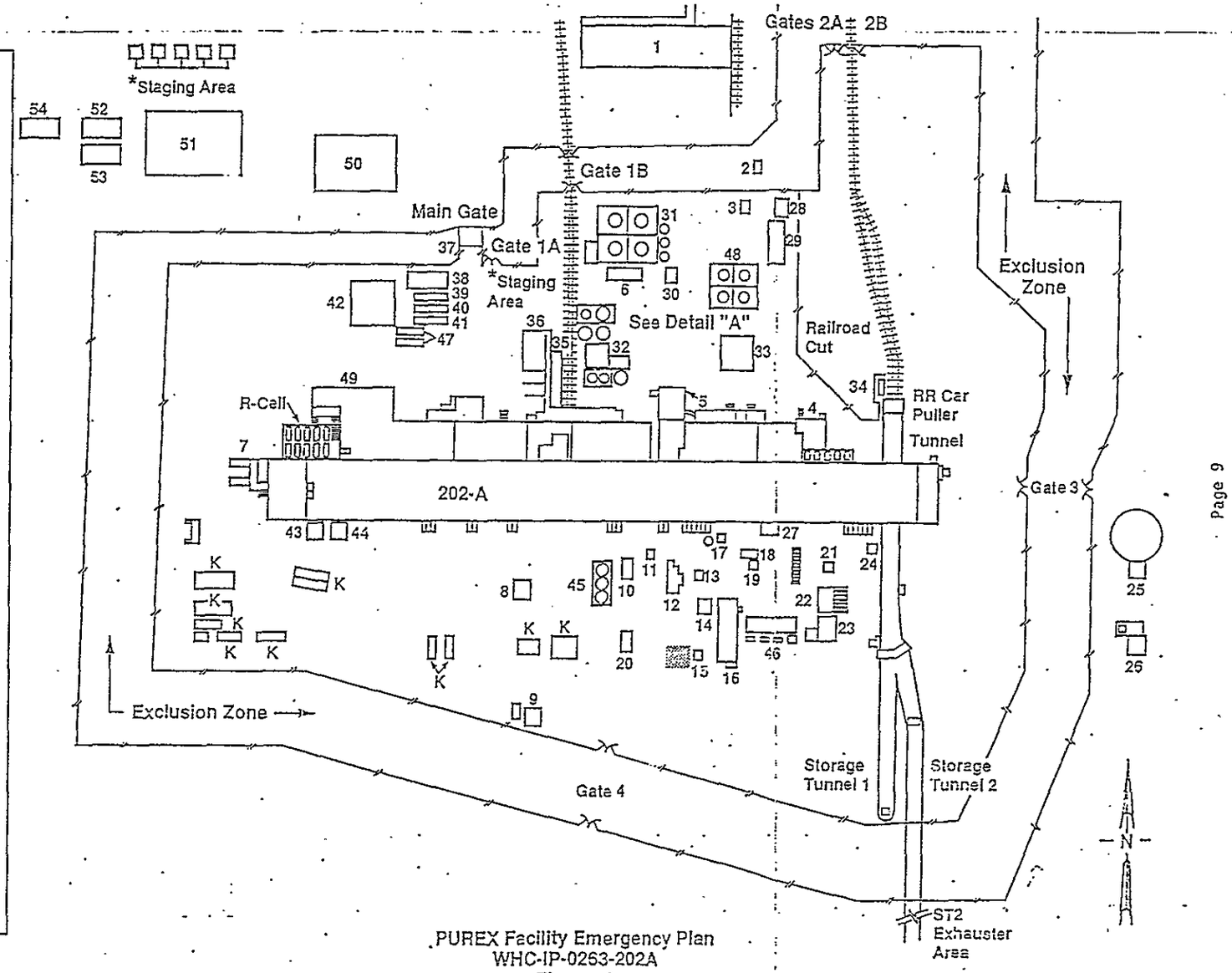
PUREX Facility Plot Plan

Legend

1. 275-EA Warehouse
2. CSL PIT
3. 295-AC CSL (Chem. Sewer)
4. 205-A Fractionator
5. Laboratory Sample Receiving Dock
6. 203-A UNH Pump House/Control Room
7. PR-Dock
8. 295-AB PDD (Process Distillate Discharge)
9. A-4 PIT/PDD PIT
10. 213-A Reg. Maint. Workshop
11. 291-AB Sample Shack
12. Shielded Valve Pit
13. 291-AC Instrument Shack
14. 291-AG Instrument Shack
15. 291-AJ Instrument Shack
16. 291-AE #4 Filter Bldg.
17. 295-AA SCD (Steam Condensate Discharge)
18. 291-AH Ammonia Off Gas Filter Bldg.
19. 291-AH Ammonia Off Gas Sampler Bldg.
20. South End Change Shack
21. 294-A Instr. Shack
22. 293-A Dissolver Off Gas Bldg.
23. 292-AB Main Stack Bldg.
24. 295-A ASD (Ammonia Scrubber Discharge)
25. 201-A Pump PIT
26. 295-AD CWL (Cooling Water Line)
27. 212-A Load Out
28. 252-A
29. 281-A Emergency Generators
30. MO-332
31. 203-A Storage Area
32. 211-A Demineralizer Bldg.
33. MO-409 Laboratory Trailer
34. Railroad Storage Shed
35. 214 A, B, C, D
36. 2714-A
37. 2701-A Badge House
38. MO-035 Material Control Trailer
39. MO-707 Maintenance Engineering Trailer
40. MO-323 Internal Surveillance Trailer
41. MO-666 All Crafts Trailer
42. MO-023 Unoccupied
43. 2711-A-1
44. 2712-A
45. Empty Tanks
46. 291-A Exhaust Fans
47. 292-A-1 Storage Unit
48. Sodium Hydroxide Tanks (Empty)
49. 271-AB
50. MO-273 PUREX/UO3 Administration/Engrs. Trailer
51. MO-405 PUREX/UO3 Programs Trailer
52. MO-355 Quality Assurance Trailer
53. MO-347 Training Trailer
54. MO-346 Technical Training Trailer



PUREX Facility Emergency Plan
WHC-IP-0263-202A
Figure: 3

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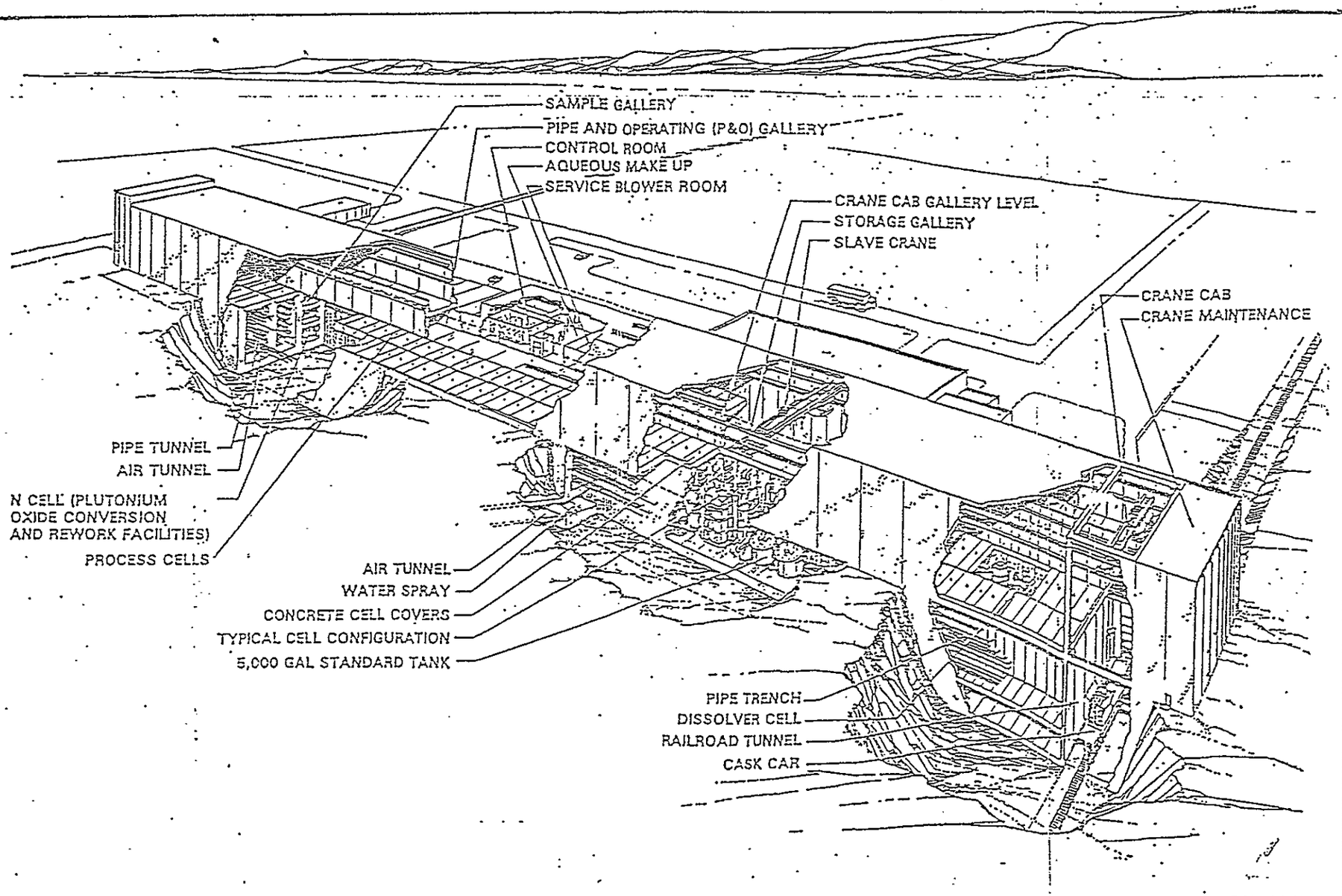

PUREX PLANT (202-A Bldg.) CROSS-SECTION

PUREX Facility Emergency Plan
WHC-IP-0263-202A
Figure: 4

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1.1 BUILDING EVACUATION ROUTES

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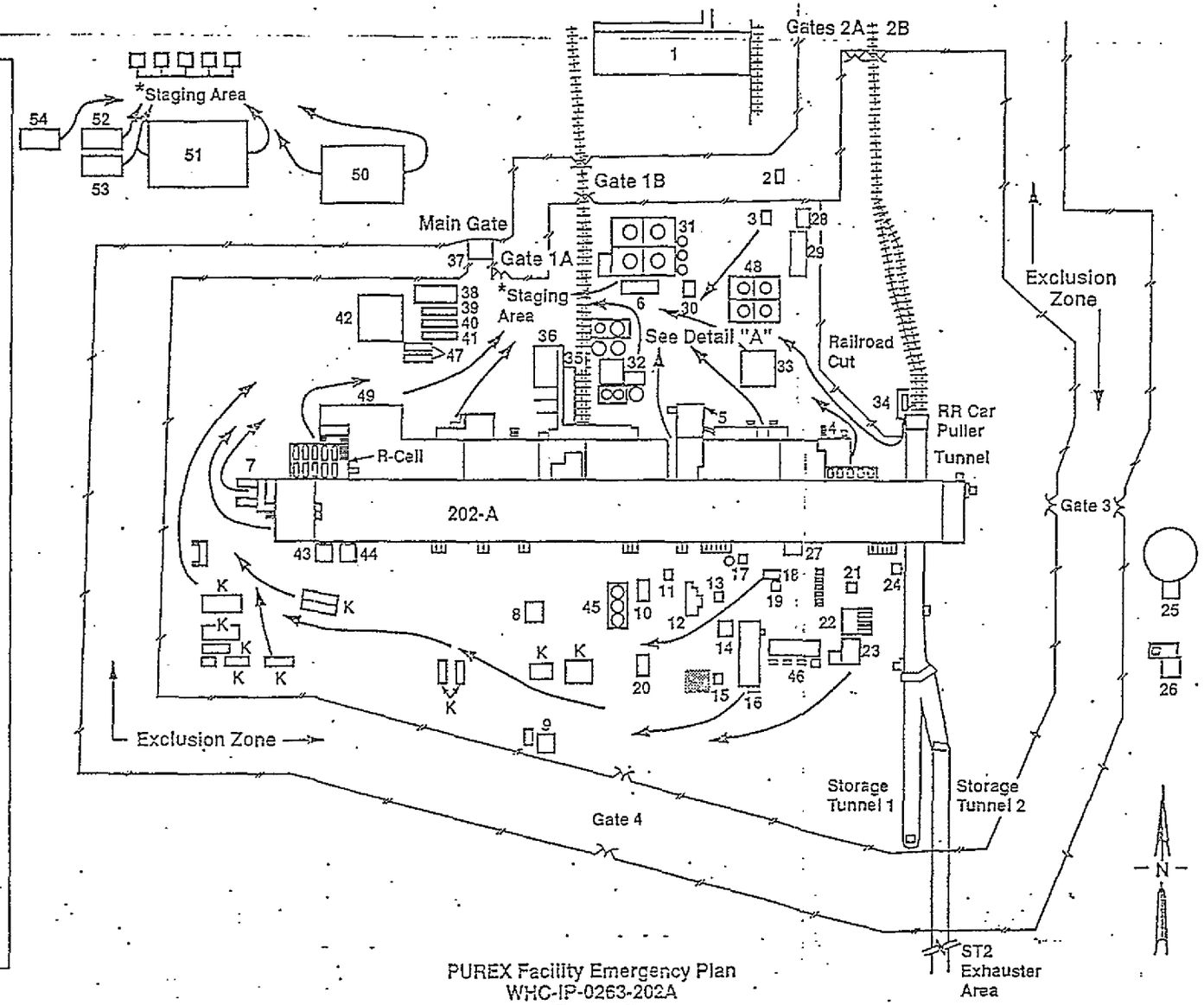
PUREX Facility Evacuation Routes

Legend

1. 275-EA Warehouse
2. CSL PIT
3. 295-AC CSL (Chem. Sewer)
4. 206-A Fractionator
5. Laboratory Sample Receiving Dock
6. 203-A UNH Pump House/Control Room
7. PR-Dock
8. 295-AB PDD (Process Distillate Discharge)
9. A-4 PIT/PDD PIT
10. 213-A Reg. Maint. Workshop
11. 291-AB Sample Shack
12. Shielded Valve Pit
13. 291-AC Instrument Shack
14. 291-AG Instrument Shack
15. 291-AJ Instrument Shack
16. 291-AE #4 Filter Bldg.
17. 295-AA SCD (Steam Condensate Discharge)
18. 291-AH Ammonia Off Gas Filter Bldg.
19. 291-AH Ammonia Off Gas Sampler Bldg.
20. South End Change Shack
21. 294-A Instr. Shack
22. 293-A Dissolver Off Gas Bldg.
23. 292-AB Main Stack Bldg.
24. 295-A ASD (Ammonia Scrubber Discharge)
25. 201-A Pump PIT
26. 295-AD CWL (Cooling Water Line)
27. 212-A Load Out
28. 252-A
29. 281-A Emergency Generators
30. MO-332
31. 203-A Storage Area
32. 211-A Demineralizer Bldg.
33. MO-409 Laboratory Trailer
34. Railroad Storage Shed
35. 214 A, B, C, D
36. 2714-A
37. 2701-A Badge House
38. MO-355 Material Control Trailer
39. MO-707 Maintenance Engineering Trailer
40. MO-323 Internal Surveillance Trailer
41. MO-366 All Crafts Trailer
42. MO-323 Unoccupied
43. 2711-A-1
44. 2712-A
45. Empty Tanks
46. 291-A Exhaust Fans
47. 202-A-1 Storage Unit
48. Sodium Hydroxide Tanks (Empty)
49. 271-AB
50. MO-273 PUREX/UO_3 Administration/Engrg. Trailer
51. MO-405 PUREX/UO_3 Programs Trailer
52. MO-355 Quality Assurance Trailer
53. MO-347 Training Trailer
54. MO-946 Technical Training Trailer



PUREX Facility Emergency Plan
WHC-IP-0263-202A
Figure: 5

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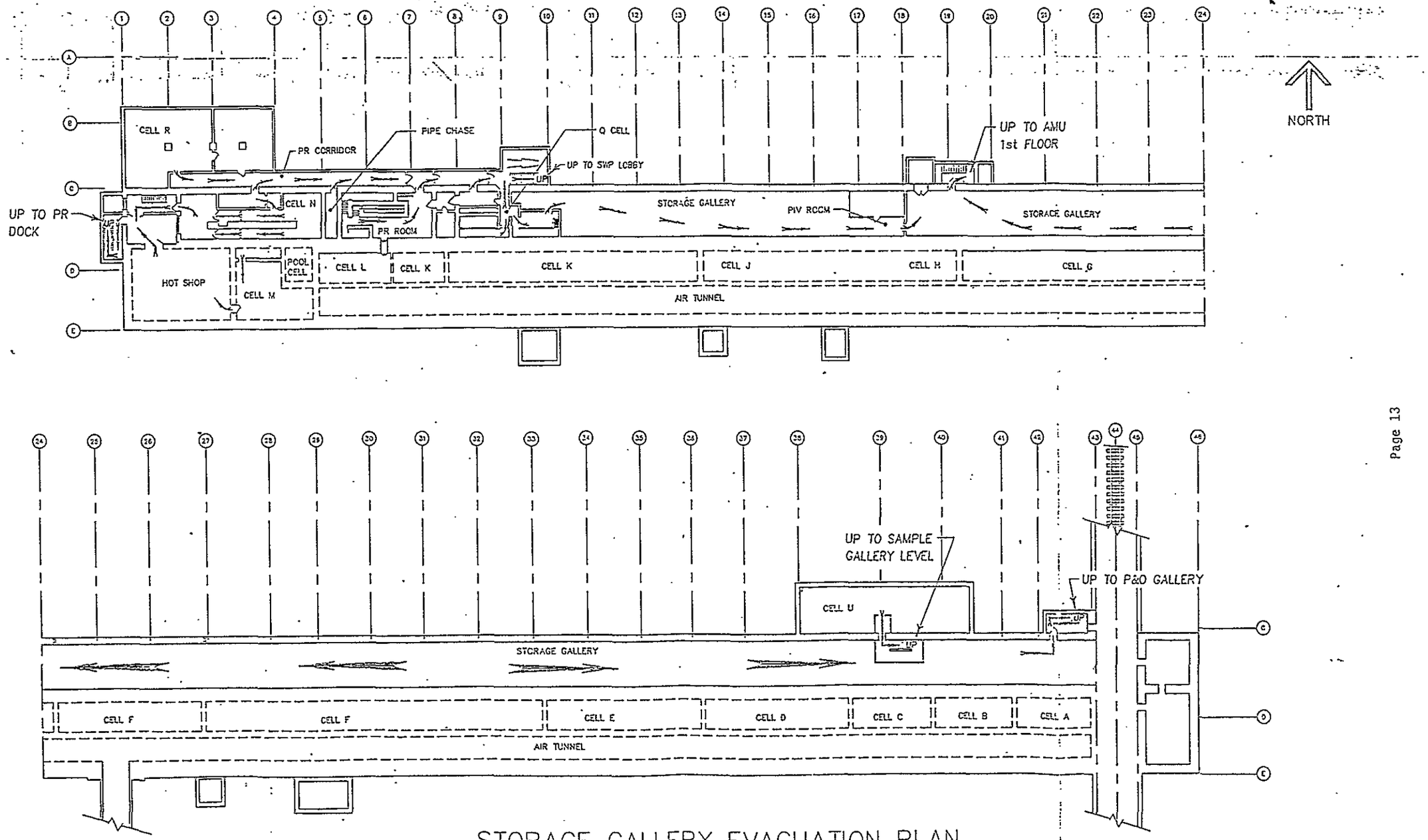

STORAGE GALLERY EVACUATION PLAN

ELEVATION – 673'-4"

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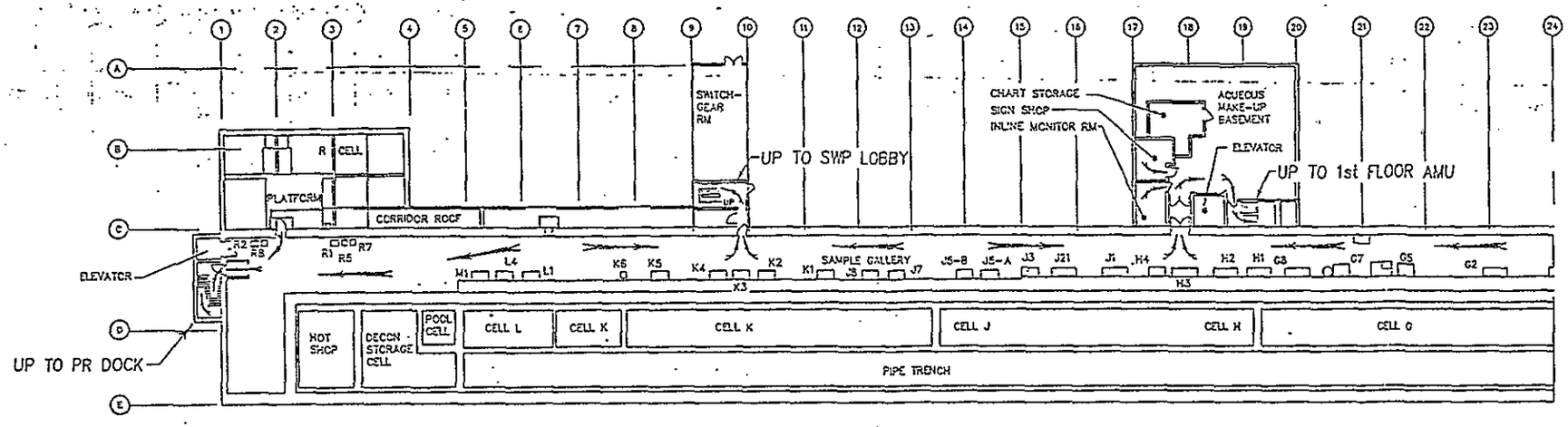

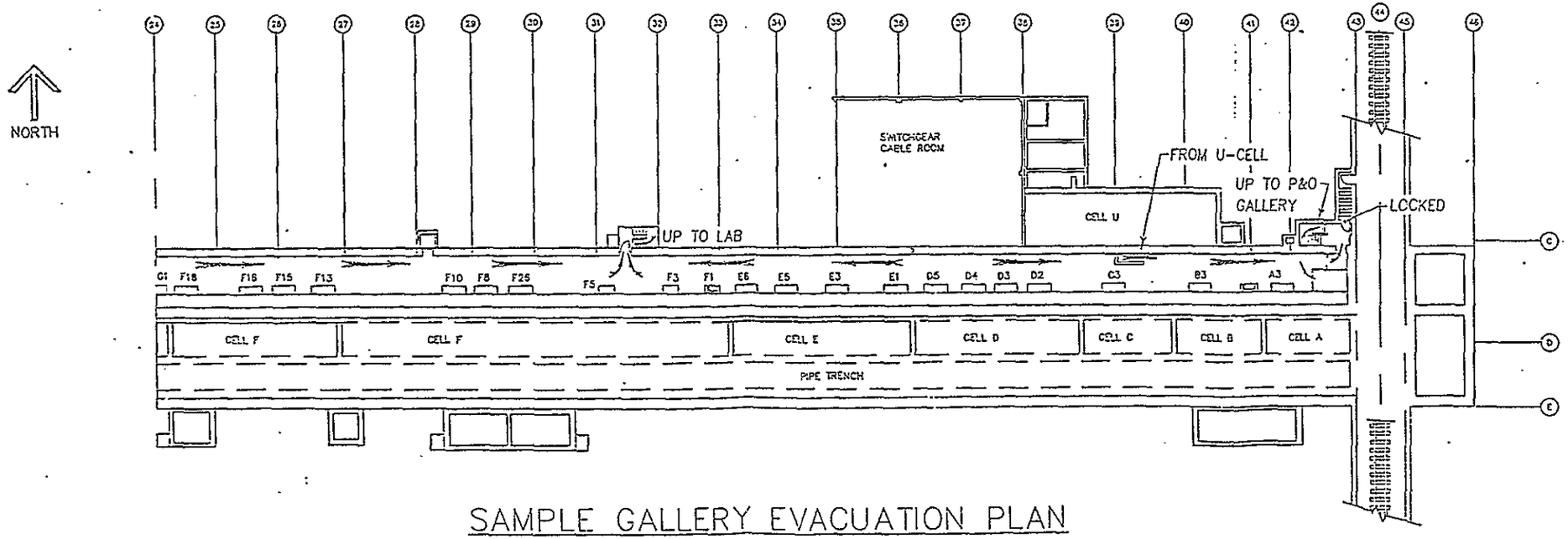

SAMPLE GALLERY EVACUATION PLAN
ELEVATION – 700'-3"
Fig. 6.1.d

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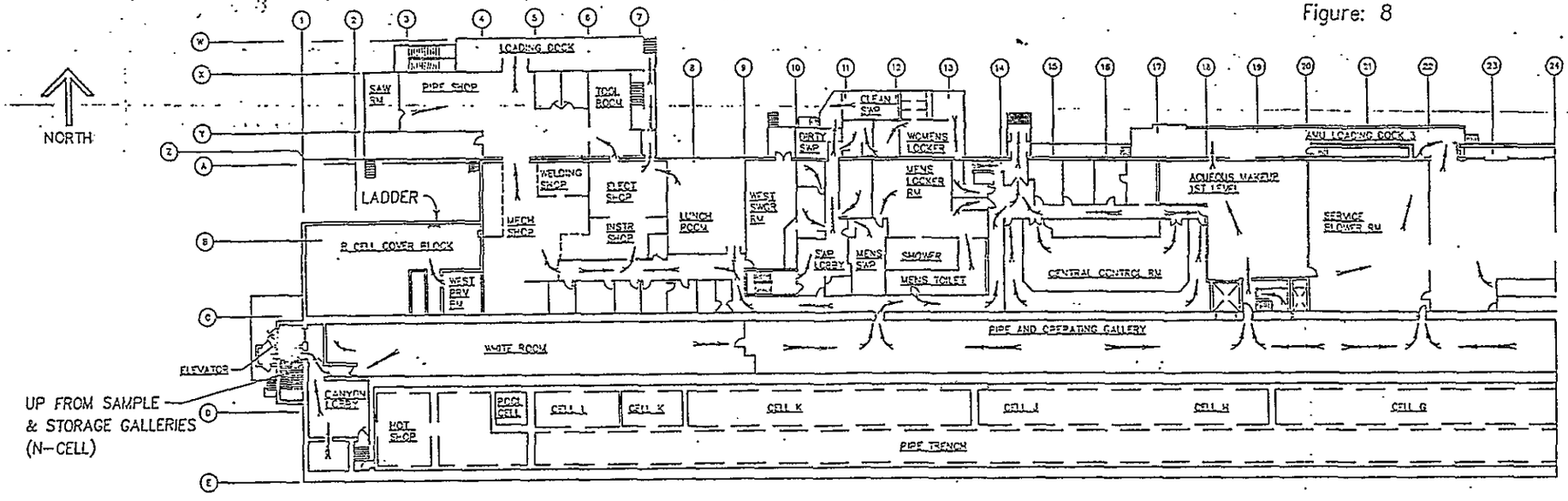
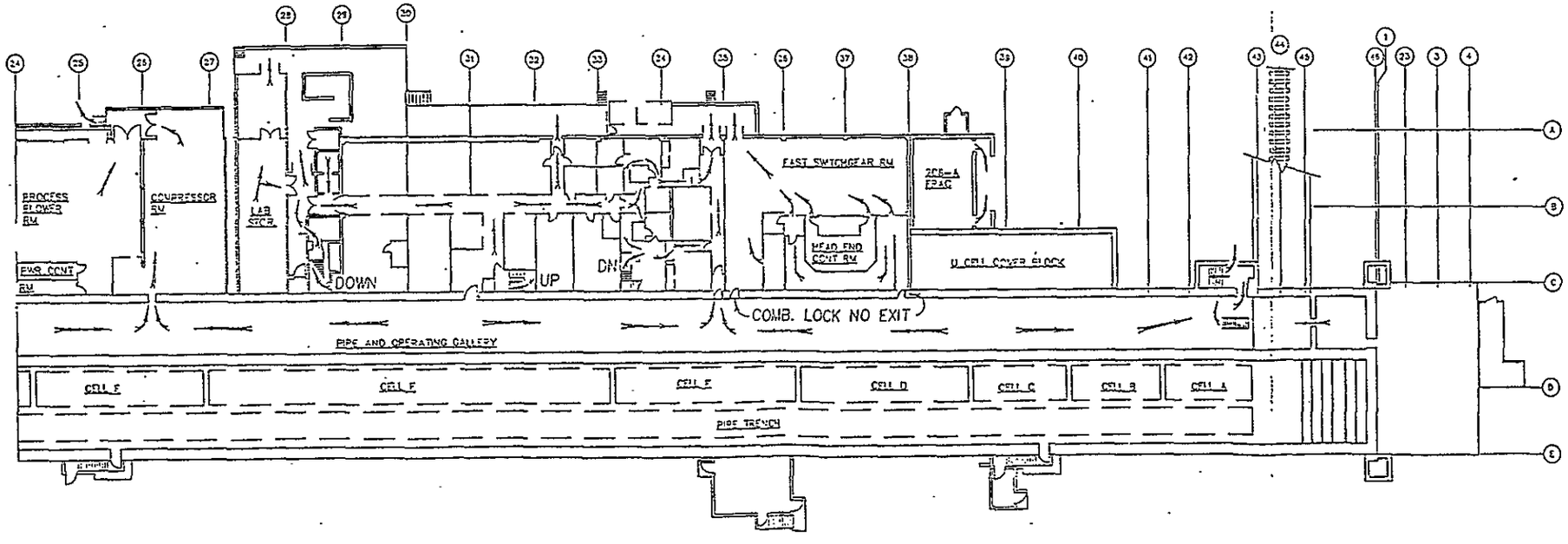


NOTE: ALL P & O GALLERY FLOOR PLAN EXITS GO TO GROUND LEVEL OUTSIDE OF BUILDING 202-A



P & O GALLERY EVACUATION PLAN

ELEVATION - 712'-0"

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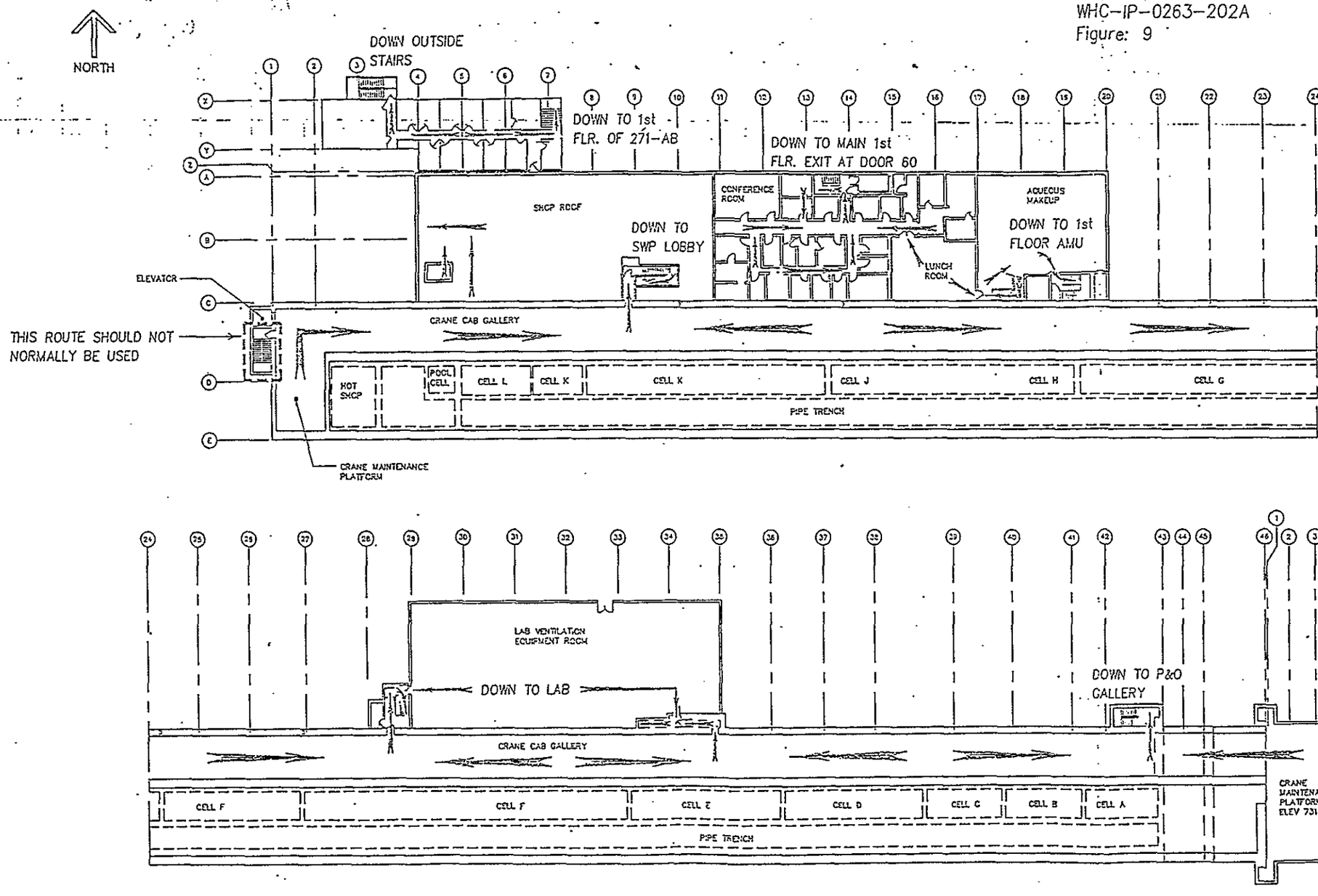

CRANE CAB GALLERY LEVEL EVACUATION PLAN

ELEVATION – 732'-6"

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1.2 TRAILERS EVACUATION ROUTES

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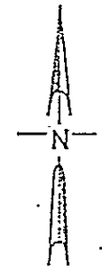
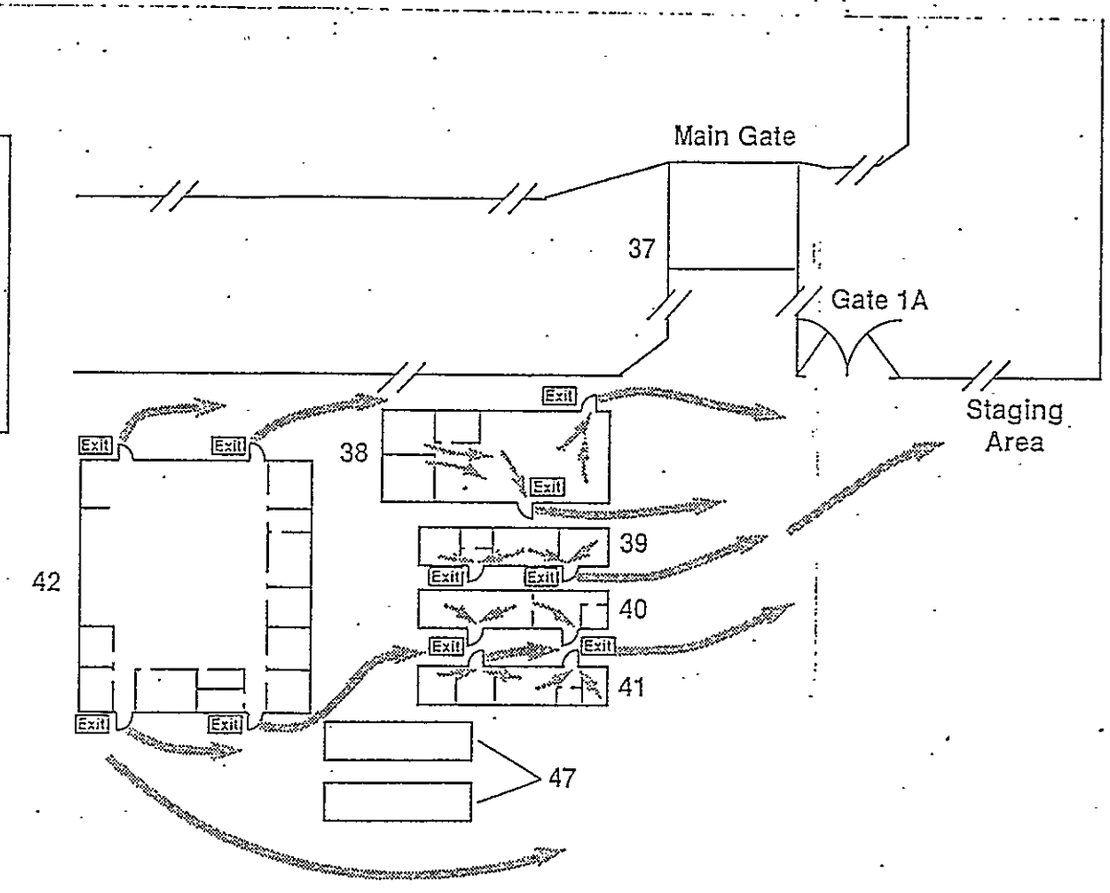
MO-023, MO-035, MO-323, MO-666 and MO-707 Evacuation Routes

Legend

37. 2701-A Badge House
38. MO-035 Material Control Trailer
39. MO-707 Maint. Engr. Trailer
40. MO-323 Internal Surv. Trailer
41. MO-666 All Crafts Trailer
42. MO-023 Unoccupied
47. 202-A-1 Storage Units

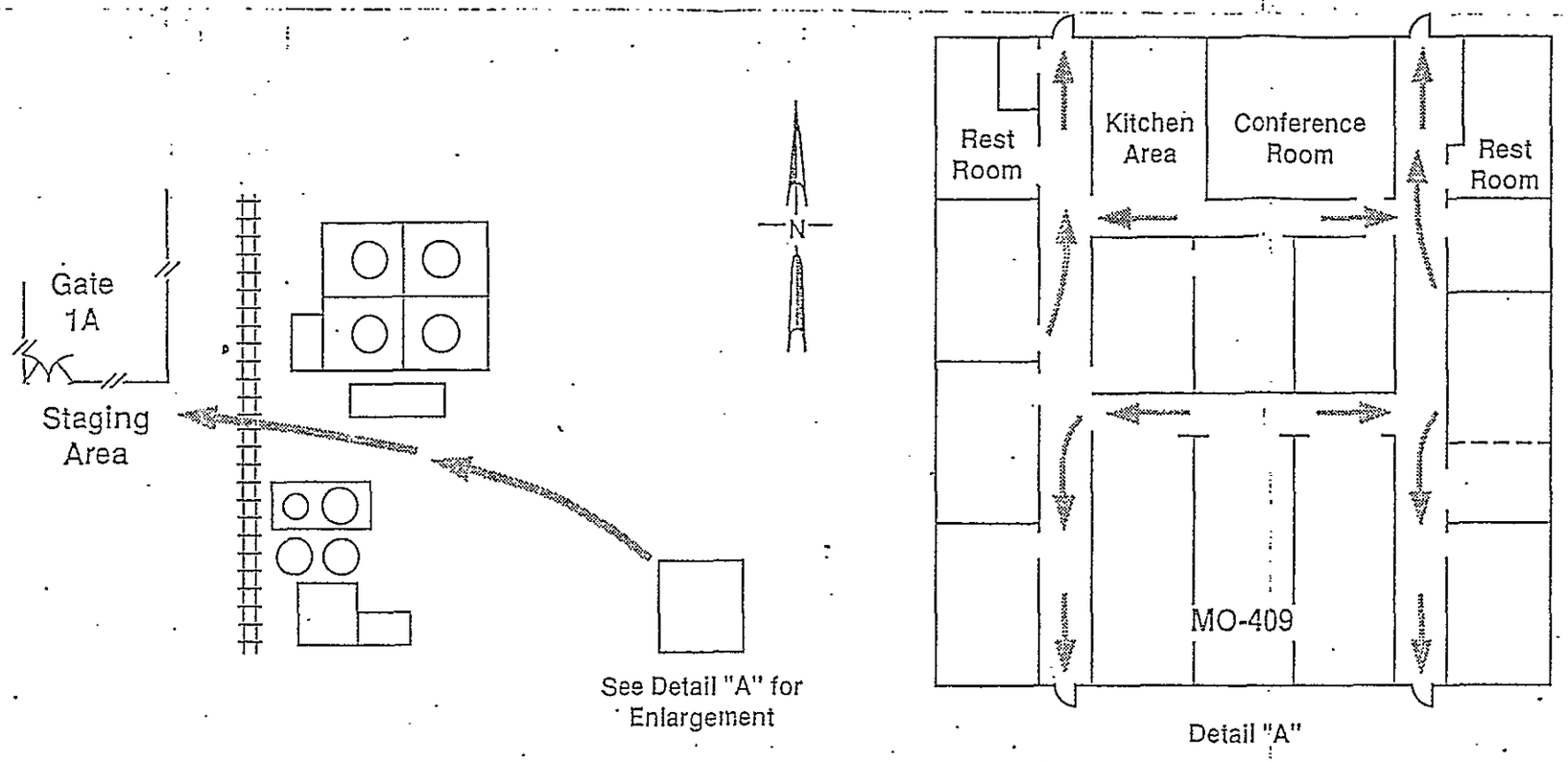




PUREX Facility Emergency Plan
WHC-IP-0263-202A
Figure: 10

29106006.19

MO-409 Evacuation Routes

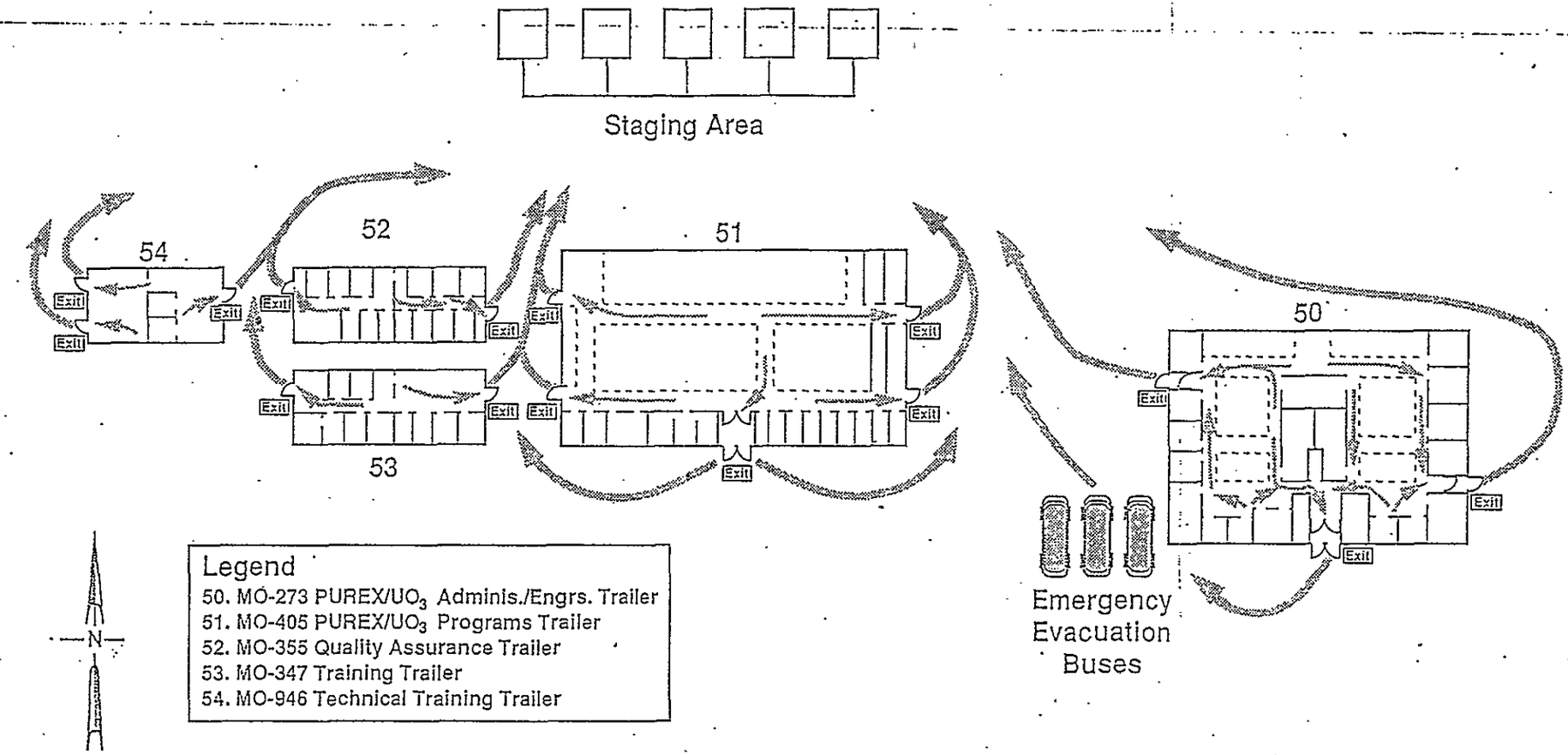


PUREX Facility Emergency Plan
WHC-IP-0263-202A
Figure: 11

29106006.20

9 2 1 2 4 1 . 1 7 7 9

MO-273, MO-347, MO-355, MO-405 and MO-946 Evacuation Routes

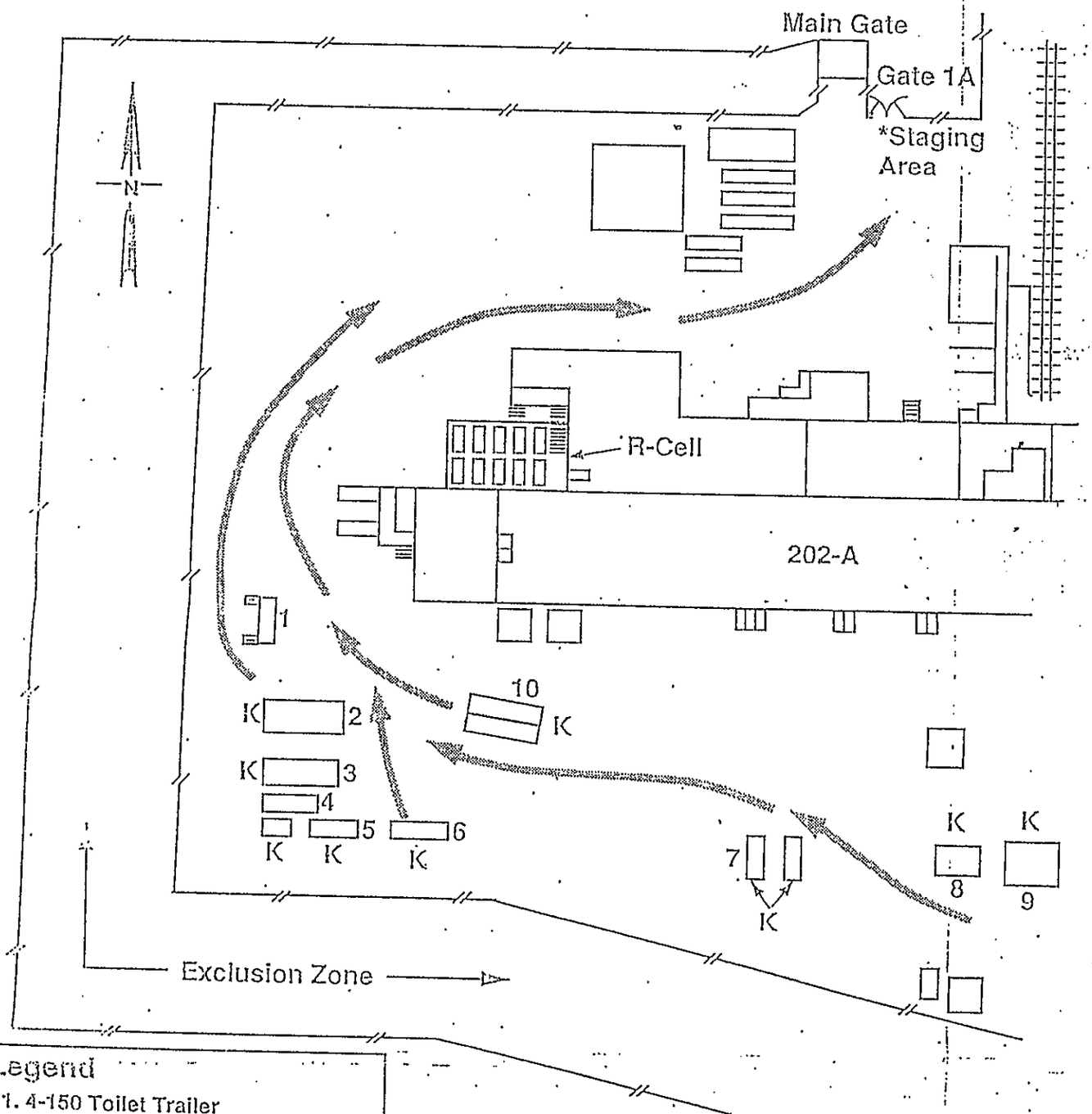


PUREX Facility Emergency Plan
WHC-IP-0263-202A
Figure: 12

29103006.18

9 2 1 2 4 1 . 7 7 9

Kaiser Trailers Evacuation Routes



Legend

1. 4-150 Toilet Trailer
2. 64-15011 All-Craft Trailer
3. MO-112 Superintendent's Trailer
4. 64-12658 Electrical Trailer
5. Electrical Shop
6. 64-15342 Fitters Office
7. 64-15016 Sheetmetal Shop
8. E-6 Filters Storage Shack
9. Pipefitters Shop
10. 64-15341 Electrical Stores Trailer

PUREX Facility Emergency Plan
WHC-IP-0263-202A
Figure: 13

29106006.21

2.0 PURPOSE AND TRAINING

2.0.1 PURPOSE OF THE PUREX FACILITY EMERGENCY PLAN

The purpose of this emergency plan is to provide employees and visitors information necessary to react to emergency situations in order to:

- Maximize personnel safety, minimize the risk to life, and provide prompt and efficient treatment for injured persons.
- Ensure continuity of leadership at all times and in all emergency situations.
- Minimize the effects of an accident on the health and safety of the general public and the environment.
- Minimize property damage.
- Ensure prompt internal and external communications with appropriate, responsible authority.

This Facility emergency plan addresses responses to different emergency situations: drawings of evacuation routes, emergency equipment locations, hazardous waste regulated areas, etc. are included to provide a simple response plan to all emergencies. A matrix listing the hazardous waste regulated areas (Appendix 1) refers to sections of the emergency plan or other procedures describing the appropriate response to various credible events.

2.0.2 TRAINING REQUIREMENTS FOR PERMANENT FACILITY EMPLOYEES/VISITORS

All PUREX facility managers are required to review this emergency plan and discuss applicable topics with their employees (as applicable to their position) on an annual basis. Annual review of the emergency plan must be completed within one month of its issue date. Employees assigned to the facility past this issue date are required to receive the training within 30 days of their assignment. Documentation of the plan review must be made on the Facility Emergency Plan Review Checklist (54-6000-369), see Figure 14. The new course number for PUREX Facility Emergency Plan Review is 03E024 (old number was 02028E).

General topics, examples listed below, should be covered as part of the training:

- Identifying and notifying the Building Emergency Director/Operations shift surveillance manager,
- Emergency notifications, emergency alarms* and their responses,
- Building exits, staging areas, and evacuation routes to staging area,
- Personnel accountability requirements and employee responsibilities,
- Location of fixed/portable emergency equipment, who should use it,
- Emergency Response Organization assignments, i.e., accountability aide, Bomb Search Team, Evacuation Bus Driver, etc.,
- Hazards associated with facility and responses to emergency events.

* The standard Hanford emergency signals can be heard by calling 3-2345.

TRAINING COMPLETION RECORD (FORM A)
BUILDING EMERGENCY PLAN REVIEW CHECKLIST

Records Use Only
WHC-IP-0263-202A
FIGURE 14

PUREX BUILDING

EMERGENCY PLAN

EMPLOYEE (Who has successfully completed training)

Last Name _____ Initials _____ Payroll No _____

TRAINING

Course Title Building Emergency Plan Review Checklist Course No 03E024

Date Completed _____

Bldg Emergency Plan Reviewed

WHC-IP-0263-(202A) WHC-IP-0603-(NA)

INSTRUCTIONS: Review the applicable Building Emergency Plan and discuss the following topics Mark all items discussed N/A items not applicable

DISCUSSED	N/A		
☐	☐	1	Identify the Building Emergency Director/Building Warden and how to notify him/her
☐	☐	2	Discuss Emergency Notifications (B11, 3-3800)
☐	☐	3	Discuss applicable emergency alarms and response to them. (Listen to the emergency signals tape 3-2345.)
☐	☐	4	Identify building exits and evacuation routes
☐	☐	5	Identify building staging areas and evacuation routes to staging area
☐	☐	6	Discuss personnel accountability requirements and employee responsibilities
☐	☐	7	Discuss location of fixed and portable emergency equipment, and who should use it
☐	☐	8	Discuss emergency organization assignments, i e , Accountability Aide, Bomb Search Team, Evacuation Bus Driver, etc
☐	☐	9	Discuss hazards associated with Building, and responses to emergency events

BUILDING EMERGENCY ORGANIZATION REVIEW

☐	☐	1	Members of the Building Emergency Response Organization have reviewed the entire Building Emergency Plan as applicable to this facility

SAMPLE

SIGNATURES/DATES

A Building Emergency Plan Review has been conducted and the items so indicated on the checklist have been discussed

(Employee Signature) _____ (Date) _____

(Manager Print Name) _____ (MSIN) _____

(Manager Signature) _____ (Date _____

Distribution: White – Training Records, H0-10 Yellow – Manager

54-6000-369 (03/90)

3.0 POTENTIAL EMERGENCY CONDITIONS

PUREX is a complex facility with many different activities ongoing at any given time. Although the facility exists in standby condition, several different types of emergencies might occur. This emergency plan is intended to provide appropriate responses for any of the following:

- Operational Emergencies such as: Industrial Accidents, special process operation malfunctions, criticality, or loss of utilities.
- Natural Catastrophes such as: seismic events, volcanic ashfall, high winds, or range fire.
- Releases/spills/leaks/fires from items such as: Non-radiological hazardous materials, dangerous/extremely dangerous/mixed waste.
- Releases/spills/leaks of items such as: Radioactive liquid or gaseous materials.
- Terrorist activities/bomb threats

Job Safety Analysis (JSA), Radiation Work Procedures (RWP) and/or Material Safety Data Sheets (MSDS) provide the bases for safe use of the materials in the work place. Each employee is trained to take the appropriate actions in case of a spill or unwanted release.

3.0.1. ASSESSMENTS

In the PUREX facility an assessment of an emergency, made by the Building Emergency Director, will consider the potential for:

- Spread of fire,
- Explosion or further chemical reaction,
- Increase in spill volume,
- Generation of new compounds and their hazards,
- Generation or spread of toxic, irritating, or asphyxiating gases,
- Previously unidentified exposure and/or release pathways,
- Criticality,
- Effect of exposure and appropriate safety precautions,
- Contaminated run-off from spilled chemicals, response chemicals and/or fire, explosion, or reaction residues,
- Impacts beyond the immediate area involved, and
- Need for additional assistance.

After identifying the source and nature of the incident, the Building Emergency Director will assess any potential hazards to human health or the environment using the following criteria:

- origin of the leak, fire, or explosion, if known,
- conditions of the source, example, controllable or uncontrollable leak or fire, easily moved, immovable.
- materials involved.
- physical state of the material, example, solid, liquid, or gas,
- evidence of reaction(s), example, fuming, flaming, gas evolution, and
- odor and color of material.

This information, in conjunction with the detailed information acquired in determining the material involved, will provide the Building Emergency Director with adequate data to assess potential hazards and to determine the appropriate response actions necessary.

3.0.2 SAMPLING

In cases involving soil contamination, sampling must be performed to determine the lateral and vertical extent of contamination. The Building Emergency Director is responsible for coordinating onsite characterization activities which will be performed by Hanford Site organizations, and the Hazardous Material Response Team (HMRT) who are trained and equipped to conduct the work. These activities should be coordinated with the WHC Environmental Department.

General steps for determining the extent of soil contamination are as follows:

- The Building Emergency Director ensures that steps are taken to isolate the area and stabilize the soil surface to prevent the spread of contamination by wind or runoff from precipitation;
- The Building Emergency Director determines, with the assistance of the PUREX Facility Emergency Response Organization (Attachment A of this document) and the Health and Safety Organization, the level of protective equipment required to protect workers from the types of contamination present;
- Representative soil samples will be taken only by personnel trained to the appropriate sections of WAC (Washington Administrative Code) 173-303-110 and/or SW-846 (EPA 1986);
- Sample integrity and traceability will be ensured by proper preservation and packaging and following established chain-of-custody procedures;
- The Building Emergency Director ensures that the samples are properly transported to and analyzed by an analytical laboratory in accordance with appropriate procedures.

3.0.3 EVACUATION AND TAKE COVER

Evacuation alarms (steady siren) at the PUREX facility may be activated for the following reasons:

- Release of hazardous material (radioactive or non-radioactive) at this or another facility impacting PUREX facility.
- Loss of utilities.
- Protective response to emergencies affecting ability to inhabit the facility, and
- facility bomb threat.

Take cover alarms (wavering siren) at the PUREX facility may be activated for the following reasons:

- Release of hazardous material outside of a facility impacting PUREX facility.
- Attack by hostile factions, and
- Protective response to emergencies affecting the facility or personnel.

3.1 POTENTIAL OPERATIONAL EMERGENCIES

3.1.1 BOMB THREAT

Any employee who answers any phone or opens any mail is vulnerable to a bomb threat. A Bomb Threat Information Form (Form BD-9100-201) should be placed by every telephone. If you are a receiver of a bomb threat, fill out the bomb threat information form as best as you can. Notify your manager and the Building Emergency Director. TELL NO ONE ELSE.

3.1.2 INDUSTRIAL ACCIDENTS

Industrial accidents are covered in various other sections of potential emergency conditions.

3.1.3 LOSS OF ELECTRICITY

Normal electric power is supplied to the PUREX facility by two 13.8 kV lines from the 251-W substation. If one line is impaired, the load is automatically switched to the other line. A third 13.8 kV line is also available, but requires manual switching at the Plant. A separate 2,400 V line from the 251-W substation provides emergency power. The voltage is reduced within the plant to usable levels.

During a loss of power to the electric exhaust fans the steam turbine at 291-A will activate to provide ventilation exhaust capabilities to the canyon.

Three standby diesel generators are located in 281-A. They will supply backup power to essential loads until normal electrical service is returned.

3.1.4 LOSS OF WATER

The PUREX facility is supplied with raw water and sanitary (or filtered) water. Water disruption to the facility will be caused by a break in the line or export water failure. This event will be reported by the power operator to the Building Emergency Director.

At normal consumption rates, lag storage capacities maintain an emergency supply of 50,000 gallons of water.

3.1.5 LOSS OF VENTILATION

The PUREX ventilation system is a fail-safe system which comprises four separate systems: canyon, sample gallery, service areas, and laboratory. Electrically driven supply and exhaust fans supply the ventilation. Adequate pressure differentials are automatically maintained via the fail-safe features on the system. The ventilation system is controlled from the Power Control Room. Alarms in the Power Control Room would indicate a system failure.

If a power failure occurs in the canyon, a steam driven fan and the supply fan dampers automatically start up. If the canyon pressure increases, supply fans shut down with the dampers open so the pressure can be reduced.

Five electrical motor-driven fans in five streams through HEPA filters supply air to areas surrounding the Sample Gallery. There is a sixth fan is maintained for backup purposes.

Two air supply fans along with Booster Supply Fans (to increase air flow) supply air to Service areas. Service areas are considered to be uncontaminated areas and have the least potential for becoming contaminated. Radiation detection devices automatically shut off the fans if radioactive material is drawn in the air.

Two air supply systems supply air to the Laboratory area. This system is largely independent of other building ventilation systems. Normally, one is operating and the other is in standby mode, but both are connected to the emergency supply. If one of the normal power supply is interrupted, one of the fans will be automatically switched to emergency power. The fan must be manually switched back to normal power when ventilation is restored.

Schematic diagrams of all four ventilation systems can be seen in WHC-SP-0479, PUREX Technical Manual, Section 2.

3.1.6 LOSS OF STEAM

Steam is used for heating building ventilation air. Steam is also used to operate the steam turbine which exhausts air from the canyon during an electrical outage. The Powerhouse (284-E Building) supplies steam to the PUREX facility.

The loss of steam to the facility may be indicated by the low pressure header alarms in the Head End control room, Central control room, and the Power control room, or by notification from the Powerhouse of an anticipated emergency outage. If the steam demand causes the supply pressure to drop, other flows are throttled manually to raise the supply pressure.

3.1.7 LOSS OF AIR

Process and instrument air is provided at the PUREX facility by a set of four compressors.

Process air is used for vacuum jets, air spargers, jet air blows, concentrator tube bundle pressurization, tank cooling coil pressurization, sampling jets and other miscellaneous uses.

Instrument air is used for pneumatic instrumentation, vessel weight factor and specific gravity dip tubes, and as an actuating force for ventilation dampers and air-operated valves.

3.1.8 FIRE

A fire alarm signal at the PUREX facility is a gong. Fire alarms around the PUREX facility are automatically or manually activated alarms that indicate actual or suspected presence of a fire within the building.

Areas containing large amounts of organic solvent are equipped with temperature activated automatic sprinkler foam systems. Detection of fire in these areas is by rate-compensated thermal detectors that sound alarms locally in the building and at the central fire station located between the 200 East and 200 West areas.

Releases, spills, leaks, explosions of items such as non-radiological hazardous materials, dangerous waste, extremely dangerous waste, or mixed waste may be a cause of fire at the PUREX facility. Other fire protection systems are peripherally mounted spray nozzles controlled by manual gate valves, smoke detectors, close-head automatic sprinkler systems, etc.

3.1.9 MAJOR PROCESS UPSET

Not Applicable. Since the facility is in standby mode, there are no potential emergencies related to process disruptions.

3.1.10 PRESSURE HAZARDS

Not Applicable. Since the facility is in standby mode, there are no potential emergencies related to pressure hazards.

3.1.11 SECURITY EVENT

Security event emergencies at the PUREX facility are handled by WHC Safeguards and Security. Examples of security related events are, security threat, attempted entry, attempted sabotage, theft or loss of special nuclear material, etc. Appropriate emergency alarms, Evacuation or Take Cover, will be sounded throughout the facility.

9 2 1 2 4 7 9 7

3.2 NATURAL HAZARDS EMERGENCIES

3.2.1 SEISMIC EVENT

Moderate seismic ground motions should be expected to cause site-wide effects, and some emergency response efforts may be delayed because resources have been allocated for the most urgent needs first.

The WHC Emergency Organizations' primary role in a Seismic Event is to coordinate the initial response to injuries, fires or fire hazards, and to take measures to contain or control radioactive and/or toxic material releases that may have an adverse impact.

3.2.2 VOLCANIC ERUPTION/ASHFALL

Volcanic eruptions and ash fallout from several Cascade mountains are a possibility. Notification to the PUREX facility in the event that ash fallout is imminent would be through the 200 Area crash alarm system. Appropriate emergency alarms will be sounded throughout the facility.

3.2.3 HIGH WINDS/TORNADO

High winds in the 70 to 90 mi/hr range at the PUREX facility are predicted with reasonable accuracy by the weather service and the Pacific Northwest Laboratory meteorology staff.

Tornadoes are unlikely to occur on the PUREX Site. While tornado warnings are rare, they usually occur during severe thunderstorms as predicted by the National Weather Service.

3.2.4 FLOOD

A Columbia River flood is extremely unlikely to affect the PUREX facility, but could cause a need for response for facilities adjacent to the Columbia River. Floods may cause damage to water intakes or discharge points and pumping stations along the river. It may be necessary to shut down pumping stations or discharge points in the event of a Columbia River flood. A flood condition is normally reported to the Patrol Operations Center by the Pacific Northwest Laboratory meteorological staff. The Patrol Operations Center notifies the Emergency Duty Officer and DOE-RL of impending conditions, and WHC takes necessary steps to protect WHC personnel and facilities. Appropriate emergency alarms will be sounded throughout the facility.

3.2.5 RANGE FIRE

Range fires occur frequently on Hanford Site, and the Hanford Fire Department is responsible for response to this identified emergency condition. If you spot a range fire nearby the PUREX facility, call 811 OR 3-3800, and identify the location. The central fire station located between the 200 East and 200 West areas responds to all fires within the area.

3.3 HAZARDOUS MATERIALS AND HAZARDOUS WASTE/MIXED WASTE SPILLS/RELEASES

Spill and/or release of nonradioactive hazardous material, as well as hazardous waste and mixed waste (radioactively contaminated hazardous materials) are likely to occur at the facility. Spills or releases may result in the following conditions:

- Toxic fumes
- Corrosive liquid or fumes
- Chemical/Thermal reactions
- Fire/Explosion

All hazardous materials are identified and classified in categories on OSHA Hazard Class Labels. They are identified as oxidizer, acid, radiation hazard, etc., and classified in an index rating guide for the "degree of hazard for each category" as minimal, moderate, severe hazard, etc.

Hazardous materials in containers are coded with numbers from 1 to 4, 4 being a severe hazard and 1 being a minimal hazard, in a "hazardous index ratings for container labeling." Hazardous wastes and mixed wastes are identified by EPA hazardous waste stickers as well as secondary label(s) which identify the major hazards within a container (i.e., radioactive, corrosive, toxic, flammable, etc.)

3.3.1 SPILL OF HAZARDOUS MATERIALS

Discovery of a hazardous material/waste spill may be made by anyone. Notification of personnel who are trained to respond to the spill is vital to minimize injury and damage. Emergency equipment such as, spill kits, respiratory equipment, and other personnel protective equipment are located throughout the facility. ONLY properly trained individuals are allowed to used the appropriate emergency equipment. If you discover a spill and are not trained to use specific emergency equipment, DO NOT USE the equipment. Instead notify your manager and the Building Emergency Director immediately. In the case of a spill, the following actions should be taken:

- Stop the cause of the spill if possible.
- Warn others in the area and notify the Building Emergency Director.
- Isolate the immediate spill area.
- Minimize personnel exposure.
- Stop or redirect ventilation.
- Clean the spill.

3.3.1.1 CONTAINER SPILLS AND LEAKAGE

If any containers or drums stored in the PUREX facility leak during filling, loading, transport, unloading, or storage, any other containers in immediate proximity will be moved from the spill area. The leaking container will be placed in a compatible overpack container, which will be packed with absorbent material, properly labeled, and closed. The overpack container will then be stored in the appropriate area.

3.3.1.2 TANK SPILLS AND LEAKAGE

Tanks used for storing or treating dangerous or hazardous wastes are located inside of buildings. Tanks located outdoors are surrounded by concrete dikes to contain any releases. There is one diesel underground tank which is used for the generators.

3.3.2 FIRES/EXPLOSIONS INVOLVING HAZARDOUS MATERIAL

Explosions may be the cause or result of a fire or may be totally unrelated to a fire. A "fire hazard and reactivity index rating" on OSHA labels contains information on the flammability and combustibility properties of hazardous materials. Extreme caution should be taken in responding to fires and explosions involving hazardous material. Special chemical hazards are addressed in the "Pre-Fire Plans" of the Fire Department which are located in the Main Lobby of the PUREX Building (202-A).

3.3.3 TOXIC FUMES HAZARDS

Discovery of a hazardous material toxic fume release may be made by anyone. Rapid communication is a vital part of warning personnel and notifying appropriate response personnel. The person discovering the toxic fumes shall take the following immediate actions:

- Assume a fume release is TOXIC UNLESS It is absolutely known to be harmless.
- Avoid inhaling smoke, fumes, or vapors even if no hazardous waste is involved.
- Do not assume that gases or vapors are harmless because of lack of smell.
- Contact the Operations Shift office immediately. Provide as much information as possible without personal risk.
- Keep people away from the area of the release and should stay upwind of the fumes.

3.3.4 REACTIVE CHEMICAL/CORROSIVE MATERIALS HAZARDS

Different types of hazardous materials are stored and used in the PUREX facility. Nonradioactive hazardous materials are stored and used throughout the facility. The primary areas where hazardous materials are in use are:

Aqueous Make-Up (AMU)	Chemical solutions are prepared to be used in special process operations such as tank and line flushes, waste tank neutralizations, etc.
Pipe & Operating Gallery	Chemical solutions are transferred during special process operations.
Sample Gallery	After the chemical solutions are prepared and transferred, samples are taken for conformance to special process operations

3.3.5 THERMAL REACTIONS/HAZARDS

A thermal reaction hazard involves chemicals, ignition of liquids such as oil, gas, etc. The use of hazardous material is controlled by Plant Operating Procedures and Material Safety Data Sheets (MSDS) which are located in the Operations Shift office, MO-273 (Administration/Process Engineering Trailer), Maintenance Office Area, and the Laboratory Supervisor's Office. MSDSs are also available in specific work locations wherever the chemicals are used. Central files of MSDSs are located in Room 113 of the 202-A Building. Several kinds of emergency equipment are available to respond to thermal reactions of hazardous material. However, extreme caution should be used when using specific kits due to incompatibility of the kits to the thermal hazard.

3.3.6 FLAMMABLE MATERIAL/LIQUIDS HAZARDS

Flammable gases are stored at, and used from, the southwest corner of 271-AB and on Dock 6 by the laboratory entrance. The primary storage areas are 211-A for liquids, and 2714-A solids. PUREX facility has two diesel tanks, one above ground and one underground. The above ground diesel tank is used for the compressors and the underground diesel tank is used for the generators.

3.3.7 ASBESTOS RELEASE

Discovery of damage to insulation resulting in suspected asbestos exposure or release may be made by anyone. A vital part of warning and protecting personnel against possible asbestos releases is prompt communication, notification of appropriate response personnel, and awareness of asbestos labeling. The purpose for labeling is to ensure that individuals working in an area are aware of the products that contain asbestos. Asbestos signs clearly stating warnings in bold letters with a contrasting background are to be treated as asbestos containing, unless proven otherwise.

In addition to this labeling, thermal system insulation (e.g. pipe lagging and boiler covers) that contain asbestos should be colored PINK when encapsulated. Non asbestos replacements should be colored GREEN.

The person discovering the suspect asbestos exposure or release shall take the following immediate actions:

- Assume the damaged insulation is asbestos.
- Avoid inhaling asbestos fibers or getting them on the body or clothing.
- Contact the Operations shift surveillance manager immediately. Provide as much information as possible without personal risk.
- Keep people away from the area of the suspect asbestos.

3.4 RADIOACTIVE MATERIALS

Radioactive materials are present, used, and stored in locations designated as "Radiation Area," "Radioactive Materials Area," or "Surface Contamination Area" areas. Radioactive materials are controlled by containment barriers and air flow maintained by the HVAC systems. Facility personnel working with radioactive materials are administratively controlled by Radiation Work Procedures (RWPs) which are located in the Health and Safety Office, at entrances to all radioactive zones, and by specific Plant Operating Procedures. Spills or releases could result in contamination spread. High radioactive discharges are classified into three classifications as indicated below.

3.4.1 GASEOUS EFFLUENT DISCHARGES (STACK RELEASES)

All potentially contaminated PUREX gaseous effluent discharges are continuously monitored and/or periodically sampled to determine radioactivity. Alarms are activated in the dispatcher's office and/or in the central control room for continuously monitored streams. The PUREX facility radioactive gaseous discharge points are listed below:

Stack Numbers	Location	PUREX Identification Code
291-A-1	Main Stack (Canyon and Dissolver Offgas)	EC
296-A-1	PR Room, Q-Cell, N-Cell	EP
296-A-2	West Sample Gallery Hoods	EHW
296-A-3	East Sample Gallery Hoods	EHE
296-A-5A	Laboratory Hoods (West)	ELW
296-A-5B	Laboratory Hoods (East)	ELE
*296-A-6	East Sample Gallery and U-Cell	EGE
*296-A-7	West Sample Gallery and R-Cell	EGW
*296-A-8	White Room	EW
*296-A-10	Storage Tunnel #2	ET
*293-A-14	293-A	EB

* Record Sample Only - No CAM

3.4.2 LIQUID EFFLUENT DISCHARGES (PANEL RELEASES)

All potentially contaminated liquid effluent streams released to the environment from the PUREX facility are continuously monitored and proportionally sampled for radioactivity. Listed below are the liquid effluent streams and diversion capability.

Stream Identification	Stream Description	Diversion to 216-A-42 Basin	Verification Sample
CWL	Cooling Water	Yes	Yes
CSL	Chemical Sewer	Yes	Yes
SCD	Steam Condensate	Yes	Yes

Alarms for the continuous monitors are located in the Central Control Room and the Dispatcher's office.

3.4.3 SIGNIFICANT CONTAMINATION SPREAD/RELEASES

Special process operations conducted at the PUREX facility can result in high level contamination spread/releases. Some areas in the facility are hazardous due to storing of significant quantities of fissionable materials, for example, Sample Gallery, N-Cell, and 203-A. Personnel at the PUREX facility should be acutely aware of CAM (Continuous Air Monitors) bell alarms and the correct immediate response.

3.5 CRITICALITY

Special process operations involving cleanup of locations where significant quantities of fissionable materials were stored or handled can still present a radiation hazard and a criticality accident can occur. Such locations have Gamma sensitive detectors, CASs (Criticality Alarm Systems), which provide an audible warning to personnel in the facility.

Criticality prevention methods used in the PUREX Plant are: concentration control, which involves processing solutions of compositions that cannot become critical under any possible process condition; geometrically favorable shapes, which involves handling materials in equipment of such shape and size that enough free neutrons escape for criticality to be impossible in any foreseeable incident; batch limits, which involves handling materials in isolated batches that contain less material than the minimum amount that will become critical under the most favorable conditions expected; and, poison control, which involves the addition of strong neutron absorbers such as cadmium to absorb free neutrons.

3.6 EXPLOSIVE MATERIALS/MUNITIONS HAZARDS

Potential fire and explosion hazards in the facility arise primarily from the use of moderately flammable organic solvent. Other potentially hazardous materials, besides the solvent, are hydrogen and ammonia gases.

Munitions hazards are not applicable to PUREX facility operations.

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4.0 DESCRIPTION OF WHEN/HOW EMERGENCY PLAN WILL BE IMPLEMENTED

4.0.1 IMPLEMENTATION OF THIS FACILITY EMERGENCY PLAN

The provisions in this facility emergency plan will be implemented when the Building Emergency Director determines that the severity of an incident is such that there is a potential danger to human health or the environment. The emergency plan will be implemented by the PUREX Building Emergency Director by declaring a facility emergency, which is, whenever there is an imminent threat of, or an actual incident. The declaration of a facility emergency shall be made through the Dispatcher's office by making an appropriate announcement per the Operations shift surveillance manager on the PUREX Public Address (PAX) System.

The Operations shift surveillance manager is the Building Emergency Director until relieved by the primary Building Emergency Director (Facility Manager).

Declaration of a facility emergency by the Building Emergency Director, or a manual or automatic activation of an emergency signal will automatically implement the provisions in this plan. Manual or automatic activation of an emergency signal will also activate the PUREX Facility Emergency Response Organization, (Section 5.1, and Attachment A), which is directed by the Building Emergency Director.

The PUREX Facility Emergency Response Organization should proceed directly to the primary PUREX Emergency Control Center, the Operations Shift Office, Room 9, 202-A Building, or the Material Control Trailer (MO-035) as the alternate PUREX Emergency Control Center.

NOTE: During off-shift hours, the key to the Material Control Trailer is available in the Operations Shift Office.

During off-shift hours, the Operations shift surveillance manager shall determine whether a facility emergency exists. After this determination, the Operations shift surveillance manager will then declare a facility emergency, will contact the primary Building Emergency Director (Facility Manager) or his alternate, and will activate the Emergency Response Organization. (Refer to WHC-IP-0684-202A, PUREX Facility Emergency Response Organization phone listing.)

4.1 IDENTIFICATION OF HAZARDOUS MATERIALS

In an emergency the Building Emergency Director must determine quickly, the identification of one or more hazardous materials (spilled, released, leaked, etc.). The options, as listed, offer sources available which can provide the needed information. Hazardous or dangerous materials can be identified by location from the PUREX Technical Manual. Hazardous waste can be identified from the following:

9 2 1 2 4 7 9 4

- The PUREX Facility Emergency Plan, WHC-IP-0263-202A, Hazardous Waste Locations and Emergency Response Matrix (Appendix 1).

- The designated hazardous waste coordinators for the PUREX facility should be contacted for additional information as required:

PUREX Laboratory	Room 67, 202-A	3-4503
PUREX TRU Waste	MO-273	3-3680
All other PUREX Waste	MO-273	3-1782

  Names of hazardous waste coordinators can be obtained from the Operations Shift Office or by referring to WHC-IP-0684-202A, which is a current phone listing of the PUREX Facility Emergency Response Organization.

- Questioning witnesses or individuals familiar with the operations or area where the incident occurred or is occurring;

- Checking the label or placard on the container or tank, if it is visible from a safe distance;

- Noting the location of a container, if in a waste accumulation area, and checking that location against the facility's 90-day accumulation area weekly inspection report, chemical waste disposal analysis letter file, hazardous waste manifest file, or the satellite accumulation area log sheet located at the specific satellite accumulation area (the log & files are maintained in MO-273).

If the wastes cannot be identified by the above methods, the Hazardous Materials Response Team (HMRT) must be called, 811 or 3-1311. The HMRT will take various actions up to and (as a last resort) obtaining samples for analysis. Hazardous Material Response Team members will suit up in Level A protective clothing which includes a fully encapsulated protective suit equipped with self-contained breathing apparatus (SCBA); Samples of the waste will be taken in accordance with sampling and testing methods specified in WAC 173-303-110 and/or SW-846 (EPA 1986); Following proper chain-of-custody procedures, the samples will be packaged and transported to an analytical laboratory for analysis and identification.

4.2 EMERGENCY DOSE LIMITS

The following radiation protection standards apply only in an emergency. Every effort will be made to maintain doses as low as reasonably achievable. In the Type of Emergency listed below, the responsibility for authorizing entry rests with the Building Emergency Director, along with the concurrence of the Area Westinghouse Emergency Director.

Type of Emergency	Maximum Single Dose (Whole Body) Dose Equivalent
Save a human life	100 rem
Recovery of deceased victim	10 rem
Protection of health and property (see WHC-CM-4-1, Section 9.1.3, WHC Emergency Plan, for guidelines)	10 rem maximum for year, or, under special circumstances, volunteers could receive up to but not exceed 25 rem. This is voluntary.
Recovery of Hanford Criticality Radiation Dosimeters (see WHC-CM-4-1, Section 9.3.3, WHC Emergency Plan, for guidelines)	3 rem

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5.0 EMERGENCY RESOURCES

5.1 BUILDING EMERGENCY RESPONSE ORGANIZATION

Personnel listed in Attachment A of this facility emergency plan are the minimum recommended staff for the PUREX Facility Emergency Response Organization, which is established to handle different emergencies at PUREX. In any emergency which requires implementation of the provisions of this plan, the Building Emergency Director has the authority to commit the resources required to respond, including, money, manpower, and/or equipment.

All members in the PUREX Facility Emergency Response Organization are required to attend at least one of the PUREX Emergency Response Organization Training courses annually (training course number 020096). This training discusses roles and responsibilities of the different response team members in the event of an emergency.

Members of the PUREX Facility Emergency Response Organization are as follows:

(1) Building Emergency Director
(2) Staging Area Manager(s)
(3) Personnel Accountability Aides
(4) Bomb Search Team
(5) Hazardous Material/Waste Coordinators Team, and
(6) Evacuation Bus Drivers Team

Attachment A of this document contains a list of the PUREX Facility Emergency Response Organization. WHC-IP-0684-202A, PUREX Facility Emergency Response Organization Members Phone Listing, is a monthly/quarterly publication internal to PUREX. This listing documents current names, phone numbers, office location, etc. of the PUREX Emergency Response Organization members.

5.1.1 BUILDING EMERGENCY DIRECTOR

The PUREX Building Emergency Director is the individual who coordinates and directs all the activities during a facility emergency. PUREX Primary Building Emergency Director is the PUREX Facility Manager. PUREX Alternate Building Emergency Directors are Operations shift surveillance managers. The Operations shift surveillance manager is the PUREX Building Emergency Director during off-shift hours and during the absence of the Facility Manager.

The Building Emergency Director is required to undergo Building Emergency Director Training annually. Responsibilities of the Building Emergency Director can be obtained from WHC-CM-4-1, WHC Emergency Plan, Section 5.0 Organizational Control, 1.5.1, Building Emergency Director. A current listing of Primary Building Emergency Director and alternates can be obtained from the Operations Shift Office or from WHC-IP-0684-202A, PUREX Facility Emergency Response Organization Phone Listing.

5.1.2 STAGING AREA MANAGERS

The PUREX Staging Area Managers are responsible for accounting for personnel within their area of responsibility. Staging Area Managers are also responsible for proper communication between Incident Command Posts. Due to the facility's extended layout PUREX has two staging areas and Staging Area Managers, one located inside the double security fence and the other located outside the double security fence:

Inside Area Staging Area Manager (East of the Main Vehicle Gate)	All personnel in buildings enclosed within the double security fence
Outside Area Staging Area Manager (West of MO-405 trailer)	All personnel in trailers associated with the PUREX located outside the double security fence.

NOTE: Depending on the nature of the emergency, wind direction, wind speed, etc., at the primary staging area, the Staging Area Manager, under the direction of the Building Emergency Director, has the authority to change the location of the primary staging area to an alternate area.

Staging area equipment, bull horn, hard hat, vests, etc., is located outside of the Operations Shift Office. Upon activation of an emergency evacuation signal, the Staging Area Managers are required to have this bag in their possession at the staging area.

Responsibilities of the Staging Area Manager can be obtained from WHC-CM-4-1, WHC Emergency Plan, Section 5.0 Organizational Control, 1.5.3 Staging Area Manager. A current listing of Staging Area Managers and their alternates can be obtained from the Operations Shift Office or from WHC-IP-0684-202A, PUREX Facility Emergency Response Organization Phone Listing.

5.1.3 PERSONNEL ACCOUNTABILITY AIDES

Personnel Accountability Aides are responsible for notifying their area occupants of evacuation or take cover by identifying with the appropriate emergency signal. Personnel Accountability Aides sweep their area following the announcement of an evacuation or take cover to ensure all personnel are accounted for. They are also responsible for providing names of unaccounted or missing personnel to the Staging Area Manager. Personnel Accountability Aides should know the shortest, quickest and the most effective emergency evacuation route to the Staging Area. A current listing of Personnel Accountability Aides and their alternates can be obtained from the Operations Shift Office or from WHC-IP-0684-202A, PUREX Facility Emergency Response Organization Phone Listing.

5.1.4 BOMB SEARCH TEAM

The PUREX Bomb Search Team is a volunteer team comprising of facility personnel from all shifts. The Building Emergency Director activates the Bomb Search Team in the event of a bomb threat in the facility. Members of the

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Bomb Search Team are required to complete a one-time Bomb Search Training to be a part of this team. A current listing of Bomb Search members can be obtained from the Operations Shift Office or from WHC-IP-0684-202A, PUREX Facility Emergency Response Organization Phone Listing.

5.1.5 HAZARDOUS MATERIAL/WASTE COORDINATORS TEAM

The PUREX Hazardous Material/Waste Coordinators Team is a team comprised of facility personnel on different shifts who have volunteered their expertise in different areas. The Building Emergency Director activates the Hazardous Material/Waste Coordinators Team in the event of a spill, release, explosion, or fire of hazardous materials/wastes in the facility. A current listing of Hazardous Material/Waste Coordinators team members can be obtained from the Operations Shift Office or from WHC-IP-0684-202A, PUREX Facility Emergency Response Organization Phone Listing.

5.1.6 EVACUATION BUS DRIVERS TEAM

The PUREX Facility Evacuation Bus Drivers Team is a volunteer team of facility personnel from all shifts. The Building Emergency Director activates the Evacuation Bus Drivers Team in the event of an area evacuation. PUREX facility has three emergency evacuation buses. If an evacuation is ordered or the evacuation siren sounds in the PUREX facility, employees should proceed to their appropriate primary staging area. A current listing of the Emergency Evacuation Bus Drivers team members can be obtained from the Operations Shift Office or from WHC-IP-0684-202A, PUREX Facility Emergency Response Organization Phone Listing.

For information on PUREX Evacuation Bus Routes, please refer to Section 6.1.2.

Refer to WHC-IP-0684-202A, a current publication listing phone numbers, office location, etc. of the PUREX Facility Emergency Response Organization members.

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5.2 EMERGENCY NOTIFICATIONS

5.2.1 EMERGENCY NOTIFICATIONS WITHIN THE FACILITY

Each employee is responsible for promptly notifying the Building Emergency Director or their manager of events and conditions which could have adverse safety, health, quality assurance, security, operational, or environmental implications.

Notification of an emergency to facility personnel will be given immediately by the Building Emergency Director or the Operations shift surveillance manager upon discovering, or being notified, of any emergencies.

An employee discovering such an incident should leave the immediate area if there is any danger of harm. If the incident is a fire, the nearest fire alarm should be activated. After activating the fire alarm, and for any other emergency incident, go to the nearest phone in a safe area, contact the Operations Shift Office at 3-2833, PAX 247, or dispatcher via emergency number PAX 811 and give the following information slowly and clearly:

- Your name
- Nature of the emergency
- Location of the emergency, and then have the person answering the call repeat the information back to you.

The Operations shift surveillance manager responds to an emergency to stabilize the emergency first and then notifies the Building Emergency Director. The Building Emergency Director will then notify upper management to assess the emergency situation and ensuring that no other necessary alarms are activated.

The PUREX Operations shift surveillance manager will notify the facility, area, or site personnel of emergency incidents, depending on the severity of the incident, via one or more of the following emergency warning systems:

- **PUREX PAX Public Address System** - for localized incidents which affect only a limited area in immediate proximity to the incident (can be used within the PUREX facility only).

- **Hanford site standard emergency signals** - Depending on the nature of the emergency, the appropriate emergency signal will be sounded. (See Section 5.6.1 and 5.6.2)

- **Crash Phone Alarm phones** - These phones are identified with a white label on the handle. When the crash alarm phone rings, the ring is steady (uninterrupted) and will continue to ring until answered. Answer promptly. Listen, DO NOT speak, and DO NOT hang up until told to do so. The crash alarm phones in the 200 Area can be used to request activation of the 200 Area Emergency Control Center or to relay safety or emergency messages to all 200 Area personnel.

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- **PUREX Internal PAX Crash Alarm Phones** - The PUREX Internal PAX crash alarm phones consists of telephones located in the Dispatcher's office, the Operations Shift Office, and the PUREX Laboratory. To notify other areas in PUREX, GTE phone lines should be used. The PAX crash alarm phones, internal to PUREX, are used to relay information/instructions from dispatcher to certain PUREX areas during an emergency.

- **The DOE-RL radio system** which links Management, Patrol, Fire, Safety, and Engineering representatives through a network of base stations and mobile and portable radio units.

5.2.2 EMERGENCY NOTIFICATIONS OUTSIDE THE FACILITY

DOE requires that all facilities keep DOE and WHC management fully and currently informed on occurrences which could:

- affect the health and safety of the public;
- seriously impact the intended purpose of DOE facilities;
- have a noticeable adverse effect on the environment; or
- endanger the health and safety of workers.

Implementation of PUREX facility specific criteria and requirements for the identification, categorization, notification, and reporting of occurrences in accordance with WHC-CM-1-3, MRP 5.14, "Occurrence Reporting and Processing of Optional Information" have been established in WHC-CM-5-9, PUREX/UO3 Plant Administration, Section 2.3, PUREX/UO3 Plant Occurrence Categorization, Notification and Reporting. These requirements apply to all PUREX facility employees and to all occurrences or potential occurrences at the PUREX facility.

Following any occurrence, initial notifications are required to be made. The PUREX Operations shift surveillance manager or PUREX Building Emergency Director is required to:

- notify the ONC (Occurrence Notification Center) Duty Officer at 6-2900.
- make an oral notification to the affected oversight group.
- determine whether the occurrence is reportable or not after discussions with the affected oversight group.

Occurrences shall be categorized as soon as practical according to the following general criteria:

EMERGENCIES: Examples of "emergencies" are the actual or potential release of hazardous or radioactive material to the environment, any natural or man-made event posing an actual or potential threat to the integrity of the facility, any safeguards or security threat to DOE Operations, PUREX facility personnel, etc.

UNUSUAL OCCURRENCES: Examples of "unusual occurrences" are the release of radioactive or hazardous materials above limits defined in permits or regulations, significant threats to safety, environment, or health

protection or the ability of the PUREX facility to operate, significant degradation of safety systems or environmental, safety, or health conditions, fatalities, exposures to hazardous or radioactive materials, any triggering of emergency systems or engineered safety features except under approved testing, etc.

OFF-NORMAL OCCURRENCES: Examples of "off-normal occurrences" are internal or external threats to safety, environmental, or health protection or the ability of the PUREX facility to operate, serious PUREX facility personnel injury or significant lost workday cases; PUREX facility personnel contamination, assimilation, exposure or significant on-site or off-site contamination of hazardous or radioactive materials in excess of administrative limits but within regulatory limits, etc.

If the occurrence is determined as reportable, emergency, unusual occurrence or off-normal occurrence, the PUREX Operations shift surveillance manager or the PUREX Building Emergency Director shall make oral and written of reportable occurrences as follows:

Emergencies: Oral notification to DOE through the ONC (Occurrence Notification Center) at 6-2900, shall be made within 15 minutes or less of categorization. Written notification shall be made as soon as practical, but in any event, within 24 hours of categorization, using the Notification Report.

Unusual Occurrences: Oral notification to DOE through the ONC (Occurrence Notification Center) at 6-2900, shall be made as soon as sufficient information is obtained to indicate the general nature and extent of the occurrence, but in any event within 2 hours of categorization. Written notification shall be made within 24 hours of categorization using the Notification Report.

Off-Normal Occurrences: Oral notification to DOE is not mandatory for an off-normal occurrence, but written notification shall be made within 24 hours of categorization using the Notification Report.

NOTE: If an event of lesser scope may generate media attention, notification within 24 hours to the Communications Department is required. Public sensitivity to the event and potential consequences must be considered, and it may be necessary to involve the Communications Department earlier than 24 hours of the occurrence categorization.

The Building Emergency Director should make oral notification of occurrences categorized as emergencies and unusual occurrences to the:

- Manager, Defense Operations Division and of the notifications to and discussions with the oversight organizations and DOE. This notification shall be made as soon as practical but in any case within 1 hour of occurrence categorization.

- Affected oversight organizations. The affected oversight organization will notify their DOE-RL counterparts of the event after receiving notifications from, and discussing the event with facility management).

In addition to the initial notifications, the PUREX Operations shift surveillance manager shall make follow-up notifications to DOE:

- for any further degradation in the level of safety of PUREX facility or other worsening conditions, including those that require the declaration of any emergency action levels if such a declaration has not been previously made;

- for any change from one emergency action level to another, and (3) for the termination of an emergency.

5.3 IDENTIFICATION AND DESCRIPTION OF EMERGENCY EQUIPMENT

The PUREX facility has a variety of fixed and portable emergency equipment that is regularly inspected and maintained for use in responding to emergencies such as fire, explosion, natural disasters, radiological incidents, terrorist incidents, releases and/or spills of hazardous materials and other emergencies. The type of emergency equipment and its capabilities are summarized below.

5.3.1 FIXED EMERGENCY EQUIPMENT

Type	No.	Capabilities
Fire Control Systems Sprinkler System	4	Assist in the control of a fire in the building
Dry Sprinkler System	1	Assist in the control of a fire in the building
Foam-water system	1	Extinguish a fire in the canyon or the White Room
Backup foam system	1	Extinguish a fire in the canyon
Fire fog system	1	Extinguish a fire in the canyon
Deluge sprinkler	1	Extinguish a fire in the Air Tunnel
CO_2 System	1	Fire control in the online monitoring room
Halon system	3	Assist in control of fire with lesser impact to employees and equipment & maintain criticality control
Fire hydrants sanitary raw water	7 3	Water supply for fire engines
Fire Department Connection Risers		Provides fire engine water sources
Safety Showers	68	Assist in flushing unwanted chemical material from employees clothing & body
Eye washes	12	Assist in flushing unwanted chemical materials from employees face & eyes
Alarm systems	See Section 5.6.1 and 5.6.2	

5.3.1 Fixed Emergency Equipment, Contd.

Type	No.	Capabilities
Other		
Chemical Sewer Diverter		Automatically diverts CSL stream to the 216-A-42 basin when radiation is detected. Manually diverts during pH excursion.
Steam Condensate Diverter		Automatically diverts SCD stream to the 216-A-42 basin when radiation is detected
Cooling Water Diverter		Automatically diverts CWL steam to the 216 A-42 basin when radiation is detected.

* See drawings on Emergency Equipment Locations, Section 5.4.

5.3.2 **PORTABLE EMERGENCY EQUIPMENT**

Type	No.	Capabilities
Fire Extinguisher		
5# ABC	6	Fire control, ABC fires
10# ABC		120 ABC fires
20# ABC	3	ABC fires
PWC (17# ABC)	3	ABC fires
10# BC	2	BC fires
20# BC	1	BC fires
Water (2 1/2 gal)	1	A fires
Halon	13	Fluorocarbon and Electrical fires
Portable Eye Washes	6	Assist in flushing unwanted chemicals/ material from employee's eyes
Protective Equipment		
SWP clothing		Assist in providing protection to employees against skin contamination from radioactive particles

5.3.2 Portable Emergency Equipment, Cont'd.

Type	No.	Capabilities
Respirators		Assist in providing protection to employees against skin contamination from radioactive particles
Escape Pak	10	5 minutes emergency escape units only
SCBA (Self-contained breathing apparatus) 30 minutes)	20	30 minute supply; assist in providing protection to employees against radioactive particulate and fume hazards in emergency use, escape, and rescue
* Portable lockers with Acid suits	51 (total)	46 suits that protect skin and clothing against hazardous materials and 5 air supplied acid hood suits to assist in providing employee protection against hazardous fumes as well as protect skin and clothing.
Emergency Equipment Cabinets	3	Provide equipment which may be needed during an emergency. Includes SWP clothing, filtered masks, plastic, rope, flashlight & knife
Spill Control		See Section 5.3.4
First Aid Supplies		Available at 200 East Medical Aid Station, Building 2719EA

* See Section 5.4 on Emergency Equipment Locations, and Appendix 3, Regulated Hazardous Waste Locations. Items in acid suit lockers are: Complete acid suit with attachable hood, Acid type goggles, Full face shield, Gauntlet type rubber gloves, and British legging rubber boots.

5.3.3 PROTECTIVE EQUIPMENT

Personnel protective equipment; SWP (Special Work Permit) related equipment: respirators, gloves, shoe covers, rubber boots, etc. Other equipment and materials are located in the PUREX SWP Lobby, and in the AMU area. Backup supplies are stored in the CONNEX storage units west of the 2714-A.

Refer to the specific Material Safety Data Sheets for information concerning what type of respiratory and personnel protective equipment should be used to isolate the spill area and/or stop the leak.

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5.3.4 SPILL CONTROL EQUIPMENT

Equipment identified in Sections 5.3.1, 5.3.2, 5.3.3, etc. will also be used for nonradioactive hazardous materials during the emergency and/or recovery phase.

Drums are stored at the Laboratory Dock and at the west end of building 202-A near the PR Dock. Drum handling equipment is stored by the CONNEX storage units west of the 2714-E warehouse. Spill control items:

- Personnel protective equipment; SWP's, respirators, gloves, shoe covers, rubber boots, etc.
- Absorbent material to absorb and contain spills.
- Pogo pump (barrel pump)
- Mops
- Brooms and dust pans
- Disposable plastic bags
- Trash container
- Barricade rope
- Soda ash (for acid neutralization)
- Special drums: overpack drums, open top drums with ring closures, closed top drums with bung closures, polyethylene drums, and rigid polyethylene drum liners.

Much of the above equipment and materials may be used in the control, containment, and cleanup of mixed waste spills or releases as directed by the Building Emergency Director. The amount of equipment and material taken into a radiation zone for handling mixed waste spills should be minimized as all materials that contact mixed wastes become either mixed waste or low level waste.

5.3.5 EMERGENCY MONITORING KIT AND BOMB SEARCH KIT

The sealed Emergency Monitoring Kit is a radiological safety kit and is located in the Material Control Trailer, MO-035. The key to the Material Control Trailer is available in the Shift Office at all times. The supplies in the emergency monitoring kit are as follows: Guider Muellers, Probes, a Snoopy, portable alpha instruments, masking tape, release stickers, emergency self-reading high range dosimeter pencils (0-10R), SWP clothing, MSA masks, extension cords, criticality chamber locations, flash lights (with batteries), remote air sampler, envelopes and air sample paper, nuclear excursion questionnaires, plastic bags, etc. Keys to the lock are by the monitoring kit in the trailer. The back up key is located by the Supervisor's mailbox in the Health and Safety office.

A Bomb Search Kit is located in MO-035, Material Control Trailer and is kept unlocked at all times. Contents include rope, tape, flashlights, etc., and copy of this emergency plan.

5.3.6 COMPREHENSIVE LIST OF EMERGENCY EQUIPMENT

FIRE EXTINGUISHERS: Operations Inspection Frequency: Monthly

Station Number	Location	Type
1	PUREX Main Lobby by Door 60	Halon
2	Dispatcher's Office	Halon
3	Central Hallway by Room 11	10# ABC
4	Central Control Room	Halon
5	Behind Central Control Room (door)	Halon
5A	Behind Central Control Room (backwall)	Halon
6	Women's Change Room	10# ABC
7	SWP Lobby by RPT Office	20# ABC
8	Men's Locker Room	10# ABC
9	West Switch Gear Room	Halon
10	Maintenance Lunch Room	Halon
11	Maintenance Shop Hallway	20# ABC
12	Maintenance Shop	5# ABC
13	Welding Crib	5# ABC
14	Tool Crib Room 100	20# ABC
15	Dock Gas Welding Cart	10# ABC
16	Electricians Maintenance Shop	10# ABC
17	Maintenance Building Upstairs	10# ABC
18	2714-A Building	10# ABC
19	Paint Shack	20# ABC
20	Service Blower Room	10# ABC
21	Power Control Process Blower Room	10# ABC
22	Power Control Room	Halon
22A	Process Blower Room Dock (BBQ)	5# ABC
23	Compressor Room Entry	10# ABC
23A	Compressor Room Door North	10# ABC
24	Compressor Portable (outside)	10# BC
25	Badgehouse Upper East Wall	Halon
25A	Badgehouse Upper AMS	10# ABC
25B	Badgehouse Lower AMS	10# ABC
26	AMU Basement	10# ABC
27	AMU 1ST Floor	10# ABC
28	AMU 2ND Floor	10# ABC
29	AMU 3RD Floor	10# ABC
30	AMU Penthouse	20# ABC
31	Upstairs Room 102B (hallway)	10# ABC
32	Upstairs Room 105 (hallway)	10# ABC
33	Computer Room 113	10# ABC
33A	Computer Room 113A	Halon
34	Lunch Room	10# ABC
35	P & O Gallery Rack 62	10# ABC
36	P & O Gallery Rack 50	20# ABC
37	P & O Gallery Rack 44	10# ABC
38	P & O Gallery Portable Welder	10# ABC
39	P & O Gallery Portable Gas Cart	10# ABC

FIRE EXTINGUISHERS: contd.

Station Number	Location	Type
40	Exit Compressor Room (Col 26)	10# ABC
41	P & O Gallery Rack 25	10# ABC
42	P & O Gallery Head End Door	10# ABC
43	P & O Gallery Drown Tank C-3A	10# ABC
44	Lab Dock	10# ABC
45	Lab Lunchroom Hallway	20# ABC
46	Lab Women's Locker Room	10# ABC
47	Lab Men's SWP Change Room	10# ABC
48	Lab Hallway Room 60	10# ABC
49	Lab Counting Room 55	Halon
50	Sample Receiving #2	10# ABC
51	Lab Hallway Room 53	10# ABC
52	Lab Hallway Room 51	10# ABC
53	Lab Supply Room	10# ABC
54	Lab Vent Room East Entrance	10# ABC
55	Lab Vent Room West Entrance	5# ABC
56	Head End Battery Room Entrance	10# ABC
57	Head End Control Room	Halon
58	Behind Head End Panel	10# ABC
59	East Switch Gear Room	Halon
60	East Change Room	10# ABC
61	East SWP Change Room	10# ABC
62	East End A-Equipment Room	10# DC
63	White Room	10# ABC
64	Canyon Lobby	Halon
65	Sample Gallery Col. 2	10# ABC
66	Sample Gallery Col. 9	10# ABC
67	Sample Gallery Col. 18	10# ABC
68	Sample Gallery Col. 24	10# ABC
69	Sample Gallery Col. 29	10# ABC
70	Sample Gallery Col. 34	10# ABC
71	U-Cell Entrance	10# ABC
72	Sample Gallery Col. 39	10# ABC
73	Sample Gallery Manipulator Shop	10# ABC
74	PIV Room East End	Halon
75	PIV Room West End	Halon
76	Storage Gallery by Elevator	20# ABC
77	Storage Gallery Col. 24	10# ABC
78	Storage Gallery Col. 28 Upper Level	10# ABC
79	Storage Gallery Col. 29	10# ABC
80	Storage Gallery Col. 33 Upper Level	10# ABC
81	Storage Gallery Col. 34	10# ABC
82	Storage Gallery Col. 36 Upper Level	10# ABC
83	Storage Gallery Col. 39	10# ABC
84	Storage Gallery East End	10# ABC
85	Q-Cell Exit to Stairs	10# ABC
86	Q-Cell Corridor Airlock	10# ABC

FIRE EXTINGUISHERS: contd.

Station Number	Location	Type
87	Q-Cell Hood Maintenance Room	10# ABC
88	Q-Cell AMU	10# ABC
89	Hot Shop Lobby	10# ABC
90	Hot Shop	10# ABC
90A	Hot Shop	20# A
90B	Hot Shop	20# BC
91	N-Cell Loadout Room	10# ABC
92	N-Cell Lower Glovebox Room	10# ABC
93	N-Cell Top of Stairs	Halon
94	Upper Control Room	Halon
95	Upper Glovebox Room	20# ABC
96	PR Corridor	10# ABC
97	N-Cell Lower Control Room	Halon
98	PR Room	10# ABC
99	L-11	10# ABC
100	Mezzanine Between L11 and L10	Halon
101	N-Cell PR Elevator Penthouse	10# ABC
102	R-Cell	10# ABC
102A	R-Cell	10# ABC
103	ECMP	10# ABC
104	East Crane Cab Foyer	10# ABC
104A	East Crane Cab	10# BC
105	East Crane On Top	15# BC
106	Slave Crane	10# ABC
106A	Slave Crane On Top	10# ABC
107	WCMP	10# ABC
108	West Crane Cab	10# ABC
108A	West Crane Cab Foyer	10# ABC
108B	West Crane Relay (Back Room)	10# BC
109	West Crane On Top Of Bridge	10# ABC
110	West Elevator Motor Room	10# ABC
111	211-A Dock 8	10# ABC
112	211-A East Wall	10# ABC
113	203-A Pump House	10# ABC
114	203-A Control Room	10# ABC
115	206-A Door #1	10# ABC
116	RR Cut Storage Shed	10# ABC
117	RR Cut Inside Tunnel Door	10# ABC
118	RR Cut Inside Car Puller Motor Room	10# ABC
119	MO-666	20# ABC
119A	MO-666	10# ABC
120	HO-64-15323 (S&PM Trailer)	10# ABC
120A	HO-64-15323 (S&PM Trailer)	10# ABC
121	MO-707 Inside (Maint. Engineering Trlr)	10# ABC
121A	MO-707 Outside (Maint. Engineering Trlr)	10# ABC
122	MO-023 Kitchen (Misc Trailer)	10# ABC
122A	MO-023 Northwest Door (Misc Trailer)	10# ABC

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FIRE EXTINGUISHERS: contd.

Station Number	Location	Type
122B	MO-023 Southeast Door (Misc Trailer)	20# ABC
123	MO-035 (Material Control Trailer)	10# ABC
124	MO-409 Northeast (Lab Trailer)	10# ABC
124A	MO-409 Northwest (Lab Trailer)	10# ABC
125	2711-A	10# ABC
126	2712-A	10# ABC
127	213-A	10# BC
128	291-AD Outside	10# ABC
128A	291-AD Inside	10# ABC
129	212-A	20# BC
130	295-A ASD	10# ABC
131	294-A	10# BC
132	292-AB Bottle Rack At Stack Building	Halon
133	292-AB North Door Inside Stack Bldg.	10# ABC
133A	292-AB South Door Inside Stack Bldg.	Halon
134	293-A Airlock	10# ABC
135	293-A Upper Control Room	10# ABC
136	291-A Steam Turbine South Wall	10# BC
137	291-AE 4th Filter Bldg. Front Entry	10# ABC
137A	291-AE 4th Filter Building Back Exit	10# ABC
138	295-AB PDD	10# ABC
138A	295-AB PDD Change Shack	10# ABC
139	PR Dock	10# ABC
140	Emergency Generator Inside Fence	10# ABC
141	Emergency Generator Outside Fence	10# ABC
142	203-A Change Shack	10# ABC
143	206-A/RR Cut Change Shack	10# ABC
144	PUREX Backside Change Shack	10# ABC
145	RR/Cut Change Shack Outside Compound	10# ABC
146	MO-405 SE Door	10# ABC
147	MO-405 Kitchen	10# ABC
148	MO-405 NE Door	10# ABC
149	MO-405 NW Door	10# ABC
150	MO-405 SW Door	10# ABC
151	MO-405 Front Entry Airlock	10# ABC
152	MO-347 NE Door	10# ABC
153	MO-347 Kitchen	10# ABC
154	MO-347 NW Door	10# ABC
155	MO-355 NE Door	Halon
156	MO-355 Kitchen	10# ABC
157	MO-355 NW Door	10# ABC
158	Training Trailer	10# ABC
159	Training Trailer	10# ABC
160	MO-273 East Bay East Wall	10# ABC
161	MO-273 Front Door Entrance	10# ABC
162	MO-273 West Bay West Wall	10# ABC
163	MO-273 North Hallway	10# ABC
164	MO-273 Kitchen	10# ABC

FIRE HYDRANTS: Operations Inspection Frequency: Monthly

Hydrant Number	Location
1A	Across from 211-A (eastside)
2A	East of Lab Dock #7 and Lab Trailer
R3A	Southeast Corner Backside of PUREX by Door 275
4A	Eastend, Backside of PUREX
5A	Eastside of Building 213
No number	Westside of Building 213
R6A	Westend, Backside of PUREX
7A	Westend Backside of PUREX, across from 2712-A
8A	Northwest end of MO-023, by steamline
R9A	Westend Frontside of PUREX, next to water storage tank
10A	Front of 202-A, next to PUREX Badgehouse walkway

FIRE DEPARTMENT CONNECTORS: Operations Inspection Frequency: Monthly

Connector Number	Location
1	FDC at Badgehouse
2	FDC Riser 3 south of PR Dock
3	FDC Riser 1 next to SWP Dock
4	FDC Foam System next to Door 75
5	FDC next to Door 83
6	FDC Laboratory Sprinkler System next to Door 174

EVACUATION BUSES:

Operations Start/Run Frequency: Weekly
Operations Functional Test/Equipment Inspection Frequency: Monthly
200E Garage Class B Inspections: Yearly

Bus Number	Location
HO-1B-01810	PUREX Front Parking Lot (west side of MO-273)
HO-1B-01817	PUREX Front Parking Lot (west side of MO-273)
HO-1B-01827	PUREX Front Parking Lot (west side of MO-273)

2-WAY RADIOS: Operations Test Frequency: Monthly

Station Location	Type	Quantity
Head End Control Room	Desk	1
	Portable	1
Central Control Room	Desk	1
Dispatch Office	Desk	1
	Portable	9

SAFETY SHOWERS: Operations Inspection/Test Frequency: Monthly

Station Number	Location
1	AMU Basement (north)
2	AMU Basement (south)
3	AMU 1st Floor
4	AMU 2nd Floor
5	AMU 3rd Floor
6	AMU Dock (Bay B)
7	P&O Gallery Rack 62
8	P&O Gallery Rack 55
9	P&O Gallery Rack 48
10	P&O Gallery Rack 42
11	P&O Gallery Rack 35
12	P&O Gallery Rack 32
13	P&O Gallery Rack 26
14	P&O Gallery Rack 21
15	P&O Gallery Rack 15
16	P&O Gallery Rack 7
17	P&O Gallery Rack 3
18	Lab Hallway
19	Lab Hallway
20	Lab Supply Room
21	Lab Dock (outside door 102)
22	White Room Column 9
23	White Room Column 5
24	Sample Gallery Column 3
25	Sample Gallery Column 7
26	Sample Gallery Column 11
27	Sample Gallery Column 15
28	Sample Gallery Column 17
29	Sample Gallery Column 21
30	Sample Gallery Column 25
31	Sample Gallery Column 28
32	Sample Gallery Column 30
33	Sample Gallery Column 34
34	Sample Gallery Column 38
35	Sample Gallery Column 40
36	U-Cell
37	Q-Cell Hood Maintenance Room
38	Q-Cell AMU
39	Hot Shop
40	R-Cell
41	211-A Dock
42	211-A Sulfuric Tank
43	211-A Sulfuric Tank
44	211-A Dock 8
45	211-A Dock 8
46	211-A Dock 8
47	211-A Dock 8
48	211-A Tank 34 Neutralizer

SAFETY SHOWERS: contd.

Station Number	Location
49	211-A Tank 11
50	211-A Tank 12
51	211-A Tank 20
52	211-A Tank 21
53	211-A Tank 40
54	211-A Tank 41
55	211-A Tank 42
56	211-A Inside (northwest)
57	211-A Inside (southeast)
58	211-A Nitric Unload Station
59	215-A NAOH Station (truck pad area)
60	215-A NAOH Station (trench area)
61	203-A Outside East Wall
62	203-A Pump House
63	203-A Control Room
64	203-A Dock 10 (east)
65	203-A Dock 10 (west)
66	203-A by Tank P-4
67	206-A (inside Fractionator Bldg)
68	293-A Outside (west wall)
69	293-A Lower Control Room
70	293-AA (H2O2 Area)
71	New PDD (not in service yet)
72	295-AC CSL

SELF-CONTAINED BREATHING APPARATUS:
Operations Bottle Pressure/Equipment Inspection Frequency: Weekly
Operations Functional Test/Equipment Inspection Frequency: Monthly

Station Number	Location
1	Main Hallway
2	Main Hallway
3	Main Hallway
4	Main Hallway
5	Main Hallway
6	Main Hallway
7	Main Hallway
8	Main Hallway
9	East Switchgear Room
10	East Switchgear Room
11	Lab Lunchroom Hallway
12	Lab Lunchroom Hallway
13	N-Cell Upstairs Hallway
14	N-Cell Upstairs Hallway
15	Front Dock 3 emergency monitoring kit

EYE WASH STATIONS (PERMANENT): Operations Inspection/Test Frequency: Monthly

Station Number	Location
1	AMU Basement (north)
2	AMU Basement (south)
3	AMU 1st Floor
4	AMU 2nd Floor
5	AMU 3rd Floor
6	AMU Dock (Bay B)
7	Lab Hallway
8	Lab Hallway
9	Lab Hallway
10	Lab Supply Room
11	Battery Charging and Storage Room
12	Sample Gallery Column 3
13	Sample Gallery Column 30
14	Q-Cell AMU
15	211-A Inside (southeast)
16	215-A NAOH Station (truck pad area)
17	215-A NAOH Station (trench area)
18	293-AA (H202 area)
19	New PDD (not in service yet)

EYE WASH STATIONS (PORTABLE-GREEN UNITS):
Operations Inspection Frequency: Monthly
Pipefitters PM (2A24026) Frequency - empty and refill: Bi-Annual (twice yearly)

Station Number	Location
1	Paint Shop
2	Lab Vent Room (southwest end)
3	PIV Room (cage)

EYE WASH STATIONS (PORTABLE-SILVER UNITS):
Operations Inspection Frequency: Weekly
Pipefitters PM (2A24025) Frequency - empty and refill: Monthly

Station Number	Location
1	Central Control Instrument Room
2	Head End Instrument Room
3	N-Cell
4	N-Cell
5	PR Room

AMU/211-A SPILL CONTROL STATIONS:
Operations Inspection Frequency (plant operating): Weekly
Operations Inspection Frequency (plant down): Monthly

Station Location	Spill Control Station Contents
AMU Basement	▪ Tyvek Acid Suit
AMU 1st Floor	▪ Acid Type Goggles
AMU 2nd Floor	▪ Acid Type Gloves
AMU 3rd Floor	▪ Hazorb Pads
211-A	▪ Polyzorb Pads
	▪ Disposable Bags

AMU/211-A SPILL CONTROL CENTERS:
Operations Inspection Frequency (plant operating): Weekly
Operations Inspection Frequency (plant down): Monthly

Station Location	Spill Control Station Contents
AMU Basement	▪ Acid Spill Kit
AMU 1st Floor	▪ Caustic Spill Kit
AMU 2nd Floor	▪ Solvent Spill Kit
AMU 3rd Floor	
211-A	

TEST EVACUATION/TAKE COVER SIRENS: Operations Test Frequency: Monthly

Type of Siren

Evacuation (steady)
Take Cover (wavering)

PAX CRASH ALARM PHONES: Operations Test Frequency: Weekly

Type of Alarm

Pax Crash Alarm Phone (steady phone ring)

EMERGENCY LANTERNS: Covered on the following Electrical PM's:

2A22001	Monthly
2A22058	Annual
2A22074	Annual

SELF-ILLUMINATED "EXIT" LIGHTS: **Operations Inspection Frequency: Monthly**

Door Number	Location of Light
16	Compressor Room Door to P&O Gallery - Column 26
19	P&O Gallery to Lab - Column 35
*167	Lab Mens SWP Room to Change Room
240	Lab Vent Room Eastend Door
238	Lab Vent Room Westend Door
27	Lab Vent Room from Crane Gallery
*166	Lab Corridor East Airlock
102	Lab Airlock Door to Dock 6
173	Lab Door to Dock 5 Eastside - Outside Door
174	Lab Storage Room to Dock 5 - Outside Door
*168	Lab Women SWP to Change Room
125	Lab Airlock to Dock 7 - Outside Door
131	East Switchgear to Dock 7
20	East Switchgear to P&O Column 35
24	P&O Gallery to East Stairwell
B-115	Storage Gallery Eastend
*25	Mezzanine to East PRV
*271	East Change Room to South Stairs
263	SWP Lobby to ECMP Stairs
331	ECMP Door - Canyon Side
B-175	Bottom of ECMP Stairwell - Outside Door
B-4	Sample Gallery to SWP Lobby Stairwell Column 10
*B-5	Sample Gallery to AMU Airlock Column 18
B-8	Sample Gallery to Lab Stairs Column 31
*B-47	Sample Gallery to East Stairwell
B-49	Sample Gallery to West Stairwell
12	P&O Gallery Column 10
39	Maintenance Lunchroom Hallway
501	Westend Maintenance Shop - Outside Door
29	Tool Crib - Outside Door
505	271-AB East Entrance - Outside Door
525	271-AB Upstairs East Hallway Door - Outside Door
509	271-AB Upstairs North Door - Outside Door
43	West Switchgear Room Door - Outside Door
no #	Hallway to Door 44
44	SWP Lobby - Outside Door
*143	Supply Room Hallway Door
142	Women SWP Room to Supply Room
no #	Women Change Room East Wall
148	Main Lobby Door to Door B-60
207	2nd Floor by Conference Room - Outside Door
no #	2nd Floor Hall to Door B-207
69	AMU First Level - Outside Door
B-14	Basement AMU to Stairwell
B-113	Storage Gallery by Elevator
236	2nd Level AMU by Elevator
no #	3rd Level AMU by Stairs
14	P&O Gallery Column 19

9 1 1 2 4 1 1 3 1 7

SELF-ILLUMINATED "EXIT" LIGHTS: contd.

Door Number	Location of Light
15	P&O Gallery Column 22
75	Service Blower - Outside Door
76	PROCESS BLOWER WEST DOOR - Outside Door
83	PROCESS BLOWER EAST DOOR - Outside Door
84	COMPRESSOR ROOM OUTSIDE DOOR - Outside Door
B-49	Sample Gallery to West Stairwell
B-101	Hot Shop Lobby to West Stairwell
B-135	N-Cell Airlock--South Doors
*B-149	N-Cell Entrance--Inside
*B-146	N-Cell Entrance--Inside
*B-104	PR Corridor West Door
B-120	By West R-Cell Door West Wall
B-119	Eastside between N-Q-Cell Glovebox
B-138	N-Cell Lower Control Room
B-133	N-Cell Mezzanine
201	WCMP to West Stairwell
*161	Canyon Lobby Inside

LEGEND:

*(xxx): door may not be numbered
B-(xxx): door is below main floor level
no #: no door # on door or floor plan

EMERGENCY ACID SUIT LOCKERS:
Operations Seal Inspection Frequency: Monthly
Operations Replenish/Reseal Frequency: Quarterly

Locker Location	Number of Lockers
AMU Basement	1 emergency
AMU 1ST Floor	1 emergency
AMU 2ND Floor	2 emergency
AMU 3RD Floor	1 emergency
P&O - Column 24	2 emergency
P&O - Column 40	1 emergency
211-A	1 emergency
203-A	1 emergency
206-A	1 emergency
293-A	1 emergency
Q-Cell	1 emergency
Sample Gallery Column 4	1 emergency
Sample Gallery Column 15	1 emergency
Sample Gallery Column 33	1 emergency

Emergency Acid Suit Locker Contents:
- Complete Acid Suit with Hood
- Full Face Shield
- British Leggins/Rubber Boots
- Acid Type Goggles
- Acid Type Gauntlet Gloves

BOMB SEARCH KIT: **Administrative Inspection/Replenish Frequency: Quarterly**

Kit Location

MO-035 Material Control Trailer

Kit Contents	Quantity
Flashlights (with batteries)	6
Bump hats	6
Gloves	6 pairs
Maps	6 sets
Marking pens	6
Mirrors (and extension handles)	6
Crescent wrenches (for mirror adjustments)	2
Spools of string	6
Green tape	6 rolls
Masking tape	6 rolls

EMERGENCY EQUIPMENT CABINETS: Operations Inspection/Replenish Frequency: Quarterly

Cabinet Locations

1. Lab Trailer MO-409 (outside/southside)
2. 2714-A Chemical Warehouse (outside on dock)
3. Across from the PR Dock (by steamline)

Cabinet Contents	Quantity
Battery operated light	1 each
Cyalume lightsticks, white (2 yr shelf life)	1 package
Fire blanket in tote pack	1 each
Radiation rope	1 roll
Yellow rope	1 roll
Acid suit	2 each
Face shield	2 each
Goggles (acid type)	3 pair
Acid resistant rubber boots	2 pair
Acid resistant rubber gloves	2 pair
Leather gloves	4 pair
Hazorb spill control pillows	6 each
Polyzorb spill control pillows	6 each
Sorbent material (kitty litter)	1 gallon
Plastic disposable bags	1 bundle
PCB gloves	2 pair
Masking tape	1 roll
Green tape	1 roll
Retractable knives	2 each
Blank "Caution" sign	2 each
Blank "Danger" sign	2 each
Grease type pencil	1 each
First aid kit (mostly bandages/check seal)	1 each
List of phone numbers of persons to contact	1 list

Information List:

A. Radiological Safety Kit has SWP and respirators located in MO-035.

B. Bomb Search Kit has rope, tape, flashlights and copy of emergency plan, located in MO-035.

C. Emergency SCBA's
- Lab Hallway
- East Switchgear Room
- Main Lobby Area (mens change room hallway)
- 211-A Building
- 2711-A Building
- Front Dock 3 emergency monitoring kit

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5.4 FACILITY EMERGENCY EQUIPMENT LOCATIONS

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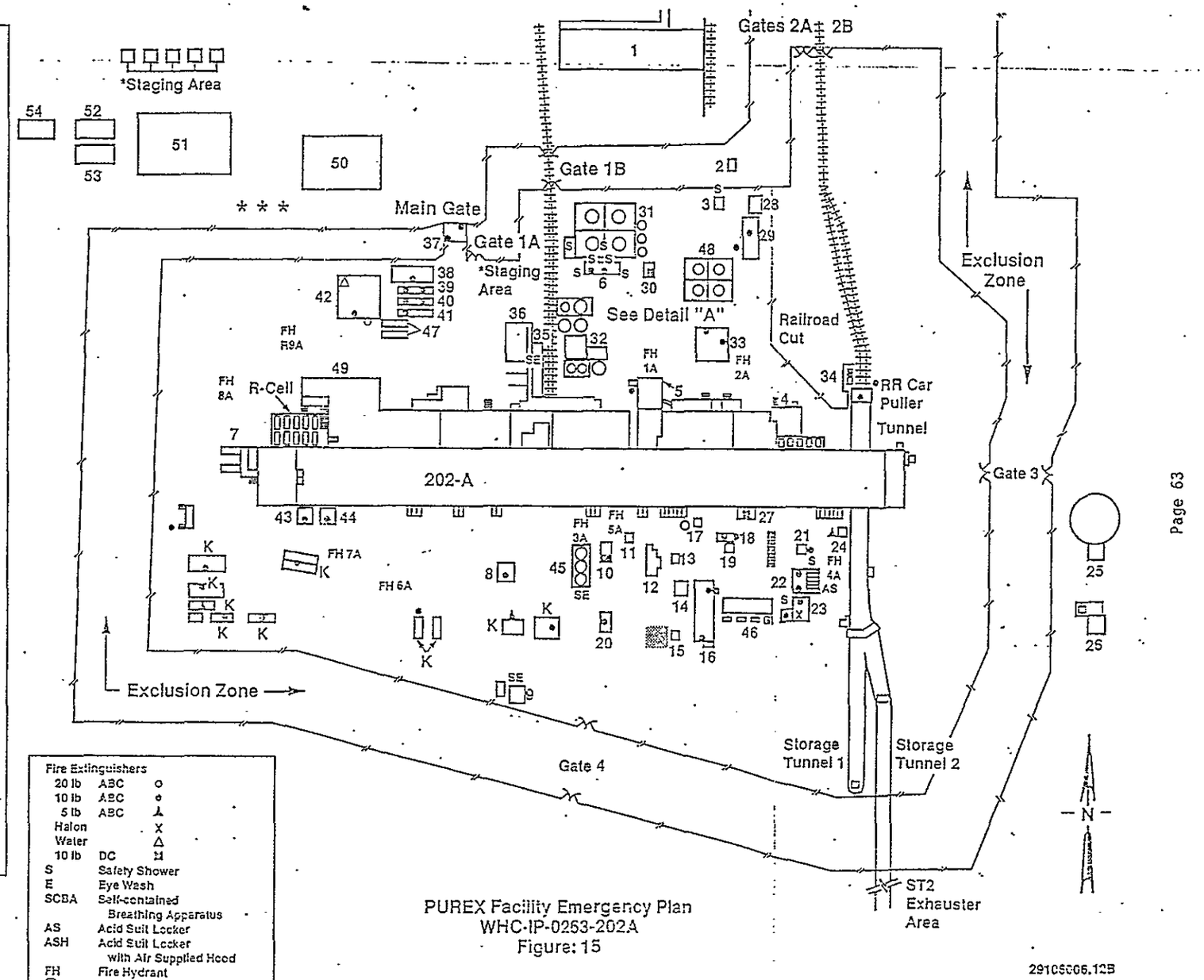
PUREX Facility Emergency Equipment Locations

Legend

1. 275-EA Warehouse
2. CSL PIT
3. 295-AC CSL (Chem. Sewer)
4. 205-A Fractionator
5. Laboratory Sample Receiving Dock
6. 203-A UNH Pump House Control Room
7. PR-Dock
8. 295-AB PDD (Process Distillate Discharge)
9. A-4 PTrPDD PIT
10. 213-A Reg. Maint. Workshop
11. 291-AB Sample Shack
12. Shielded Valve Pit
13. 291-AC Instrument Shack
14. 291-AG Instrument Shack
15. 291-AJ Instrument Shack
16. 291-AE #4 Filter Bldg.
17. 295-AA SCD (Steam Condensate Discharge)
18. 291-AH Ammonia Off Gas Filter Bldg.
19. 291-AH Ammonia Off Gas Sampler Bldg.
20. South End Change Shack
21. 294-A Instr. Shack
22. 293-A Dissolver Off Gas Bldg.
23. 292-AB Main Stack Bldg.
24. 295-A ASD (Ammonia Scrubber Discharge)
25. 201-A Pump PIT
26. 295-AD CWL (Cooling Water Line)
27. 212-A Load Out
28. 252-A
29. 251-A Emergency Generators
30. MO-332
31. 203-A Storage Area
32. 211-A Demineralizer Bldg.
33. MO-409 Laboratory Trailer
34. Railroad Storage Shed
35. 214 A, B, C, D
36. 2714-A
37. 2701-A Badge House
38. MO-035 Material Control Trailer
39. MO-707 Maintenance Engineering Trailer
40. MO-323 Internal Surveillance Trailer
41. MO-666 All Crafts Trailer
42. MO-023 Unoccupied
43. 2711-A-1
44. 2712-A
45. Empty Tanks
46. 251-A Exhaust Fans
47. 202-A-1 Storage Unit
48. Sodium Hydroxide Tanks (Empty)
49. 271-AB
50. MO-273 PUREX/UO3 Administration/Engrs. Trailer
51. MO-405 PUREX/UO3 Programs Trailer
52. MO-2[illegible] Quality Assurance Trailer
53. MO-347 Training Trailer
54. MO-945 Technical Training Trailer



Fire Extinguishers

20 lb	ABC	o
10 lb	ABC	●
5 lb	ABC	⅄
Halon		X
Water		△
10 lb	DC	H
S	Safety Shower	
E	Eye Wash	
SCBA	Self-contained Breathing Apparatus	
AS	Acid Suit Locker	
ASH	Acid Suit Locker with Air Supplied Hood	
FH	Fire Hydrant	
Ⓟ	PAX Phone	
✱	Emergency Evacuation Buses	

PUREX Facility Emergency Plan
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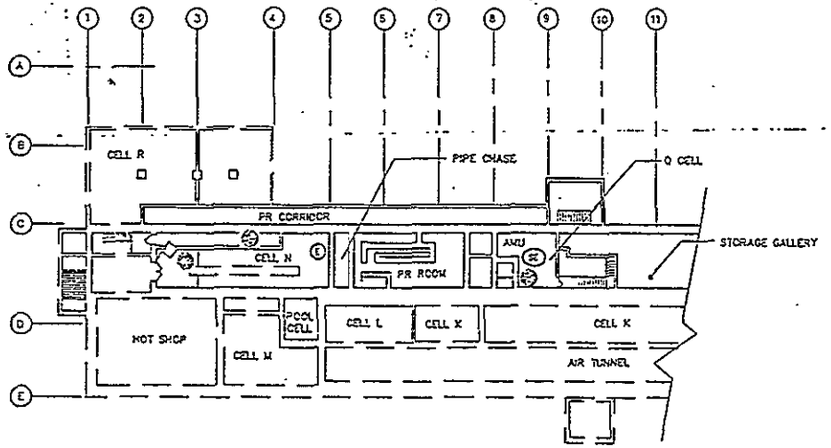
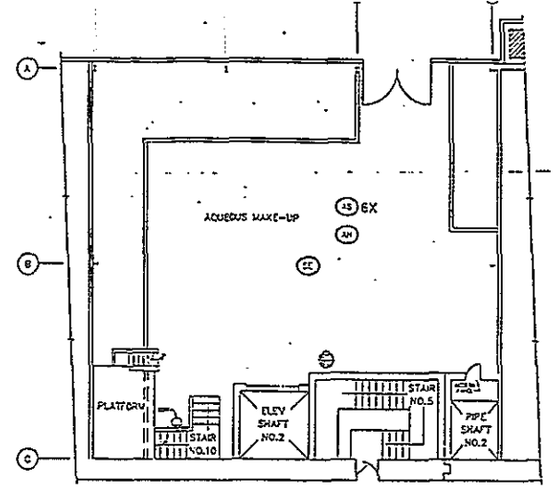
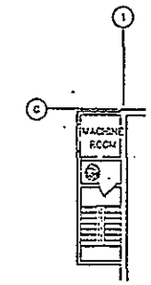


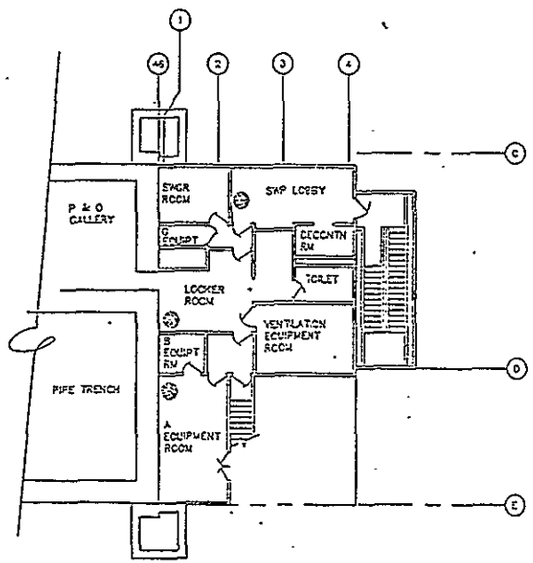
N – CELL MEZZANINE – ELEVATION 685' – 10"



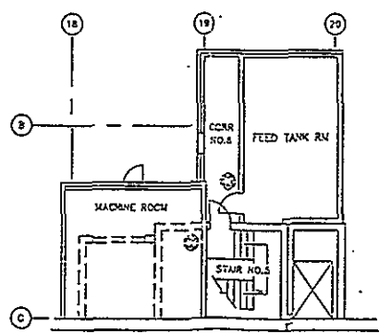
AMU 3rd FLOOR–ELEVATION 738'–3"



MACHINE ROOM–ELEVATION 747'–4"



CRANE MAINTENANCE FLOOR PLAN – ELEVATION 720' – 6"



AMU 4rd FLOOR–ELEVATION 752'–9"

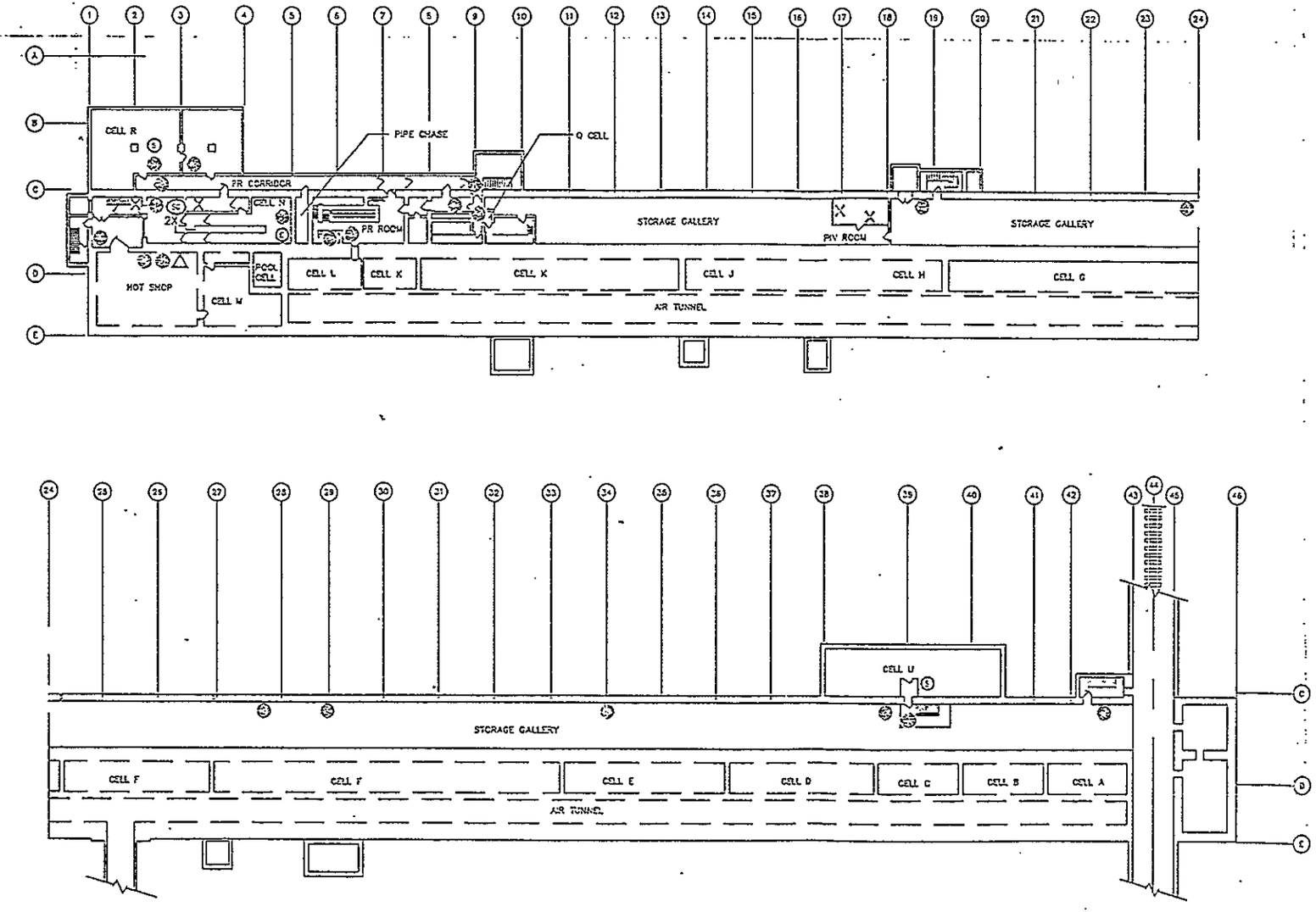
NORTH

LEGEND

- EYE WASH
- SAFETY SHOWER & EYE WASH
- ACID SUIT LOCKER
- ACID SUIT WITH AIR SUPPLIED HOOD
- FIRE EXTINGUISHERS:

EMERGENCY EQUIPMENT LOCATIONS – PUREX BUILDING

CADFILE: EMEQ-PUR.DWG



NORTH

LEGEND

- (S) SAFETY SHOWER
- (E) EYE WASH
- (SC) SELF-CONTAINED BREATHING APPARATUS (30 MINUTES)
- FIRE EXTINGUISHERS:

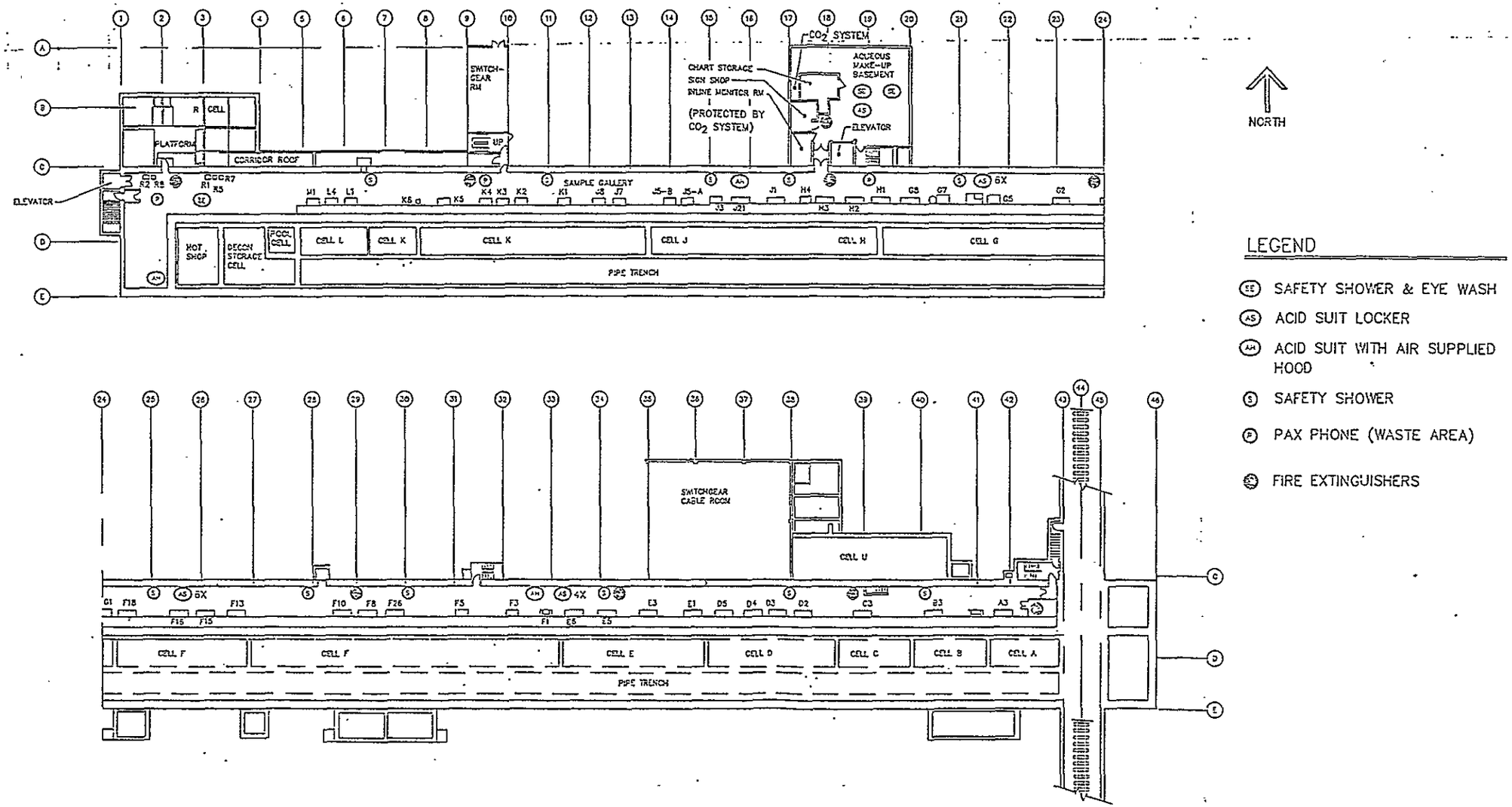
FIRE EXTINGUISHERS:

- X HALON
- △ WATER

STORAGE GALLERY EMERGENCY EQUIPMENT LOCATIONS

ELEVATION – 673'-4"

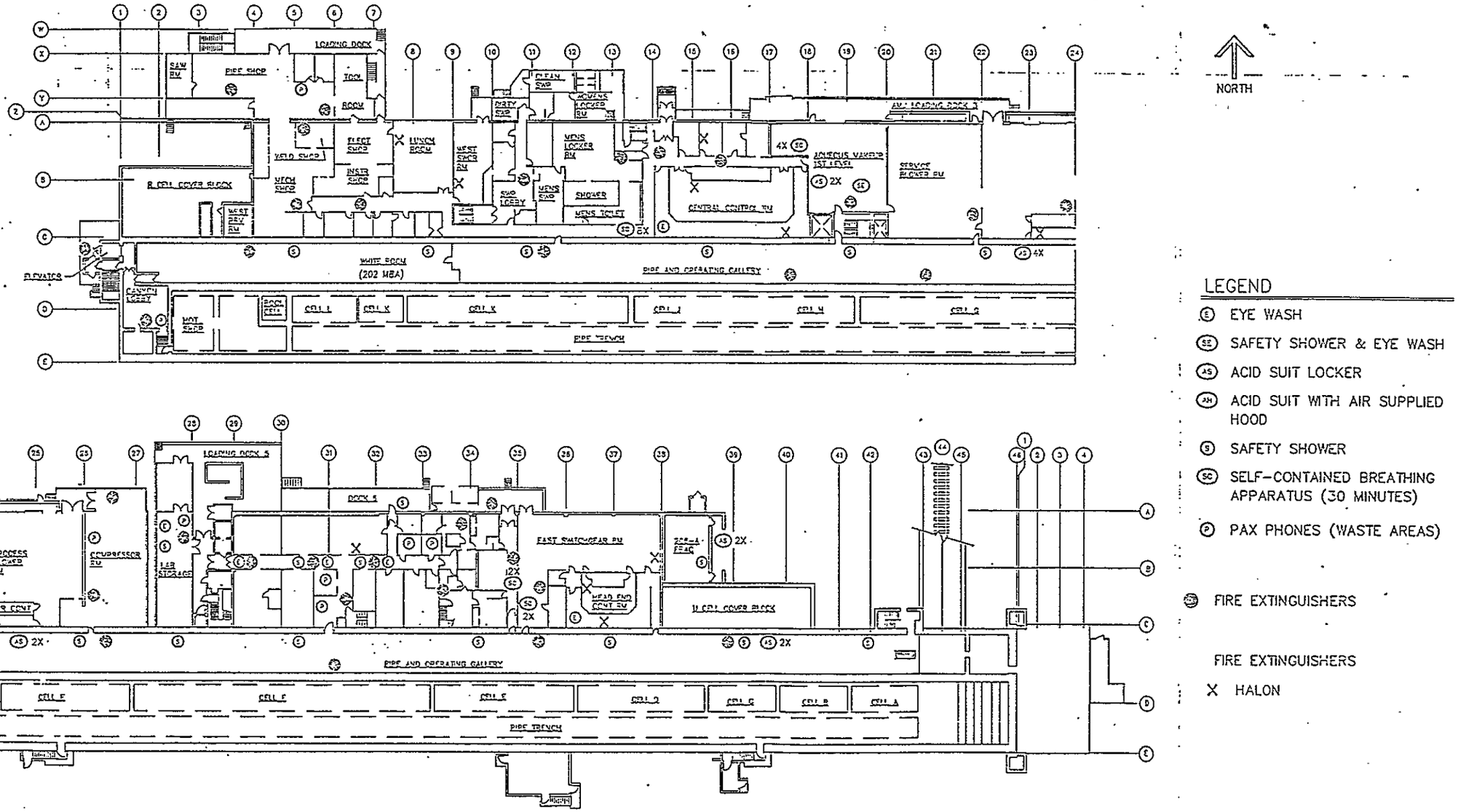
CADFILE: EMEQ-SG.DWG



SAMPLE GALLERY EMERGENCY EQUIPMENT LOCATIONS

ELEVATION – 700'-3"

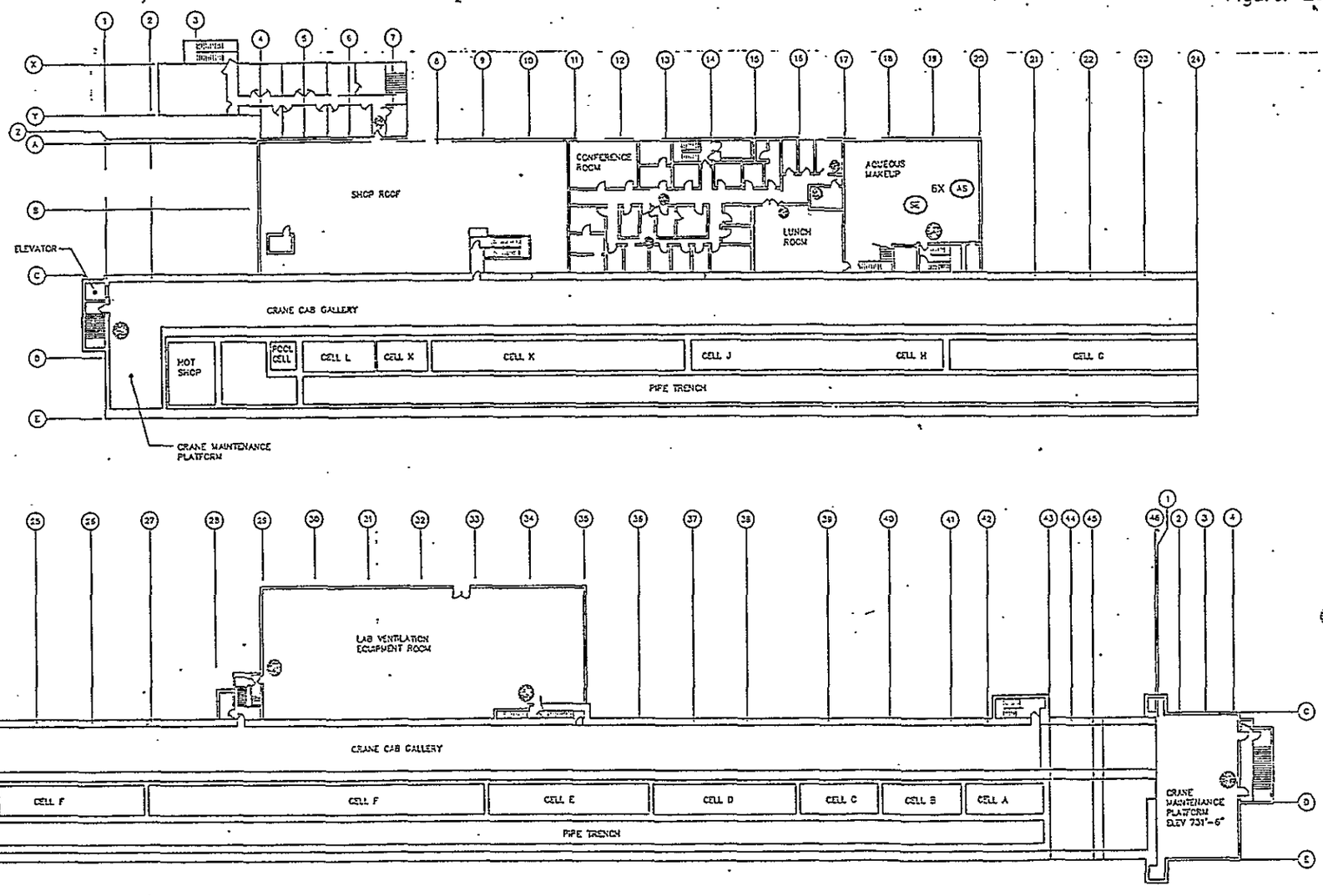
CADFILE: EMEQ-SAM.DWG



P & O GALLERY EMERGENCY EQUIPMENT LOCATIONS

ELEVATION – 712'-0"

CADFILE: EMEQ-PO.DWG



FIRE EXTINGUISHERS SPECIFIC LOCATION NOT NOTED:

- EAST CRANE CAB FOYER
- EAST CRANE CAB
- EAST CRANE ON TOP
- SLAVE CRANE
- SLAVE CRANE ON TOP
- WEST CRANE CAB
- WEST CRANE CAB FOYER
- WEST CRANE RELAY ROOM
- WEST CRANE ON TOP

NORTH

LEGEND

- SE SAFETY SHOWER & EYE WASH
- AS ACID SUIT LOCKER
- FIRE EXTINGUISHERS:

CRANE CAB GALLERY EMERGENCY EQUIPMENT LOCATIONS

ELEVATION - 732'6"

CADFILE: EMEQ-CC.DWG

5.5 TRAILER EMERGENCY EQUIPMENT LOCATIONS

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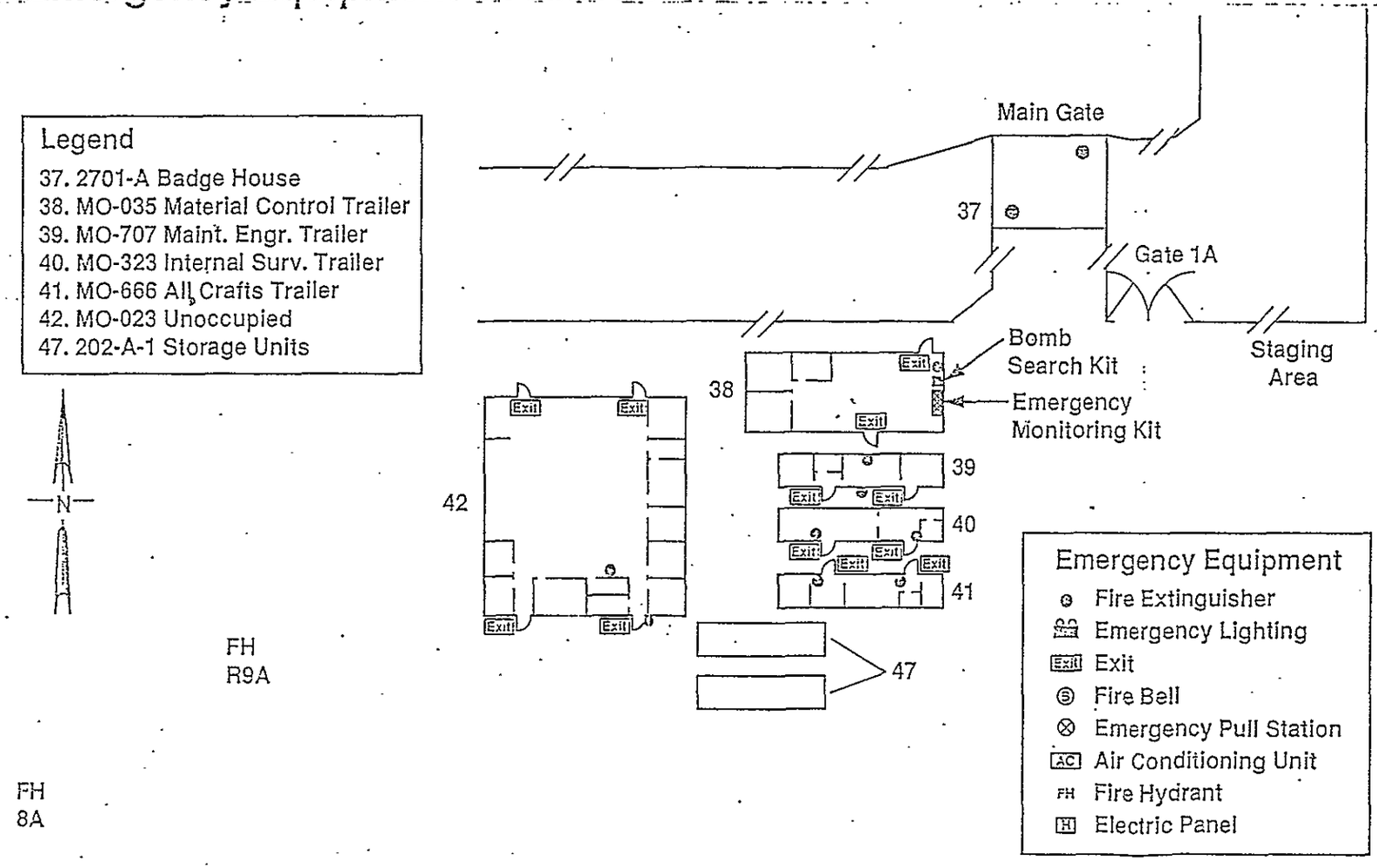
MO-023, MO-035, MO-323, MO-666 and MO-707 Emergency Equipment Locations



PUREX Facility Emergency Plan
WHC-IP-0263-202A
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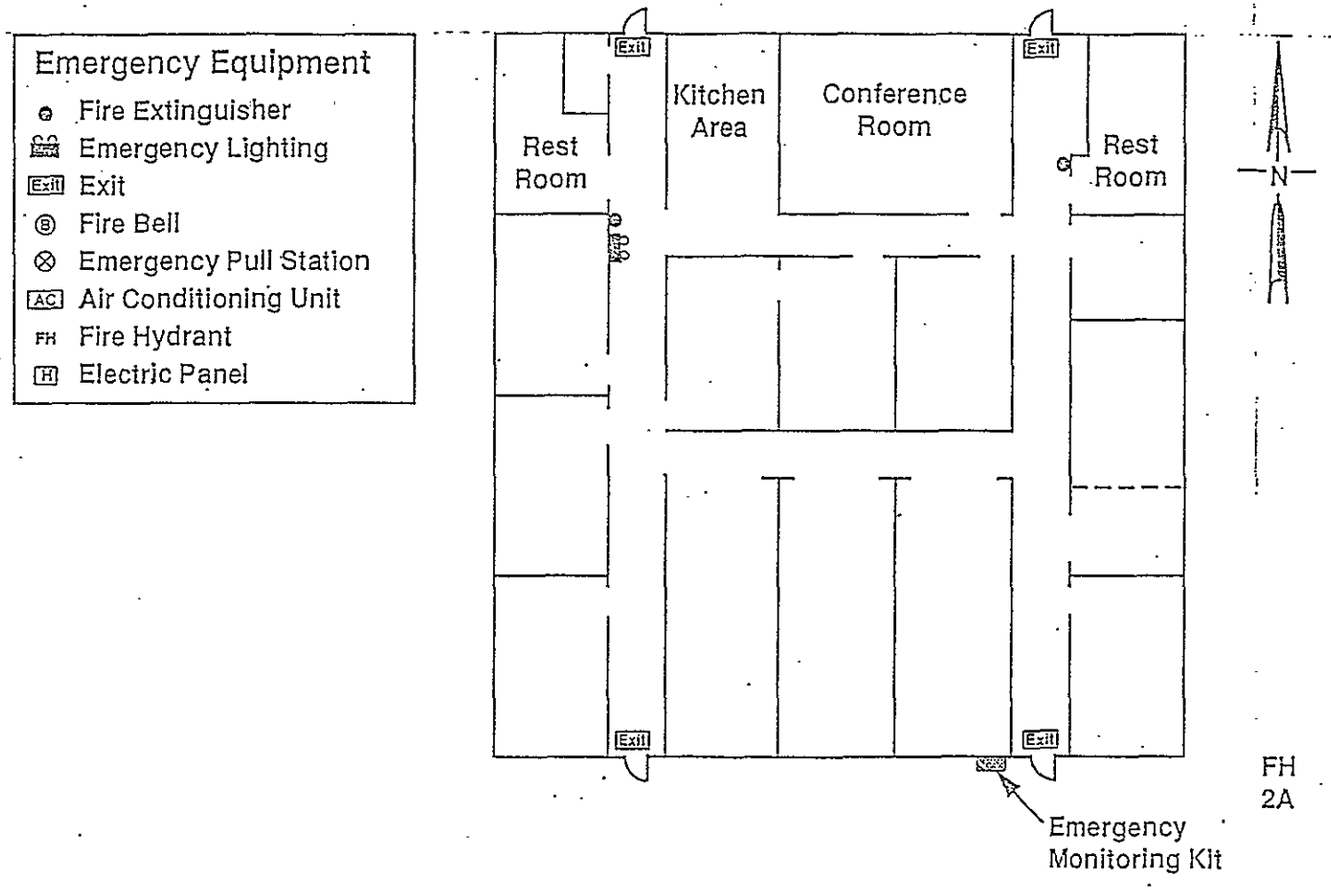
MO-409 Emergency Equipment Locations



PUREX Facility Emergency Plan
WHC-IP-0263-202A
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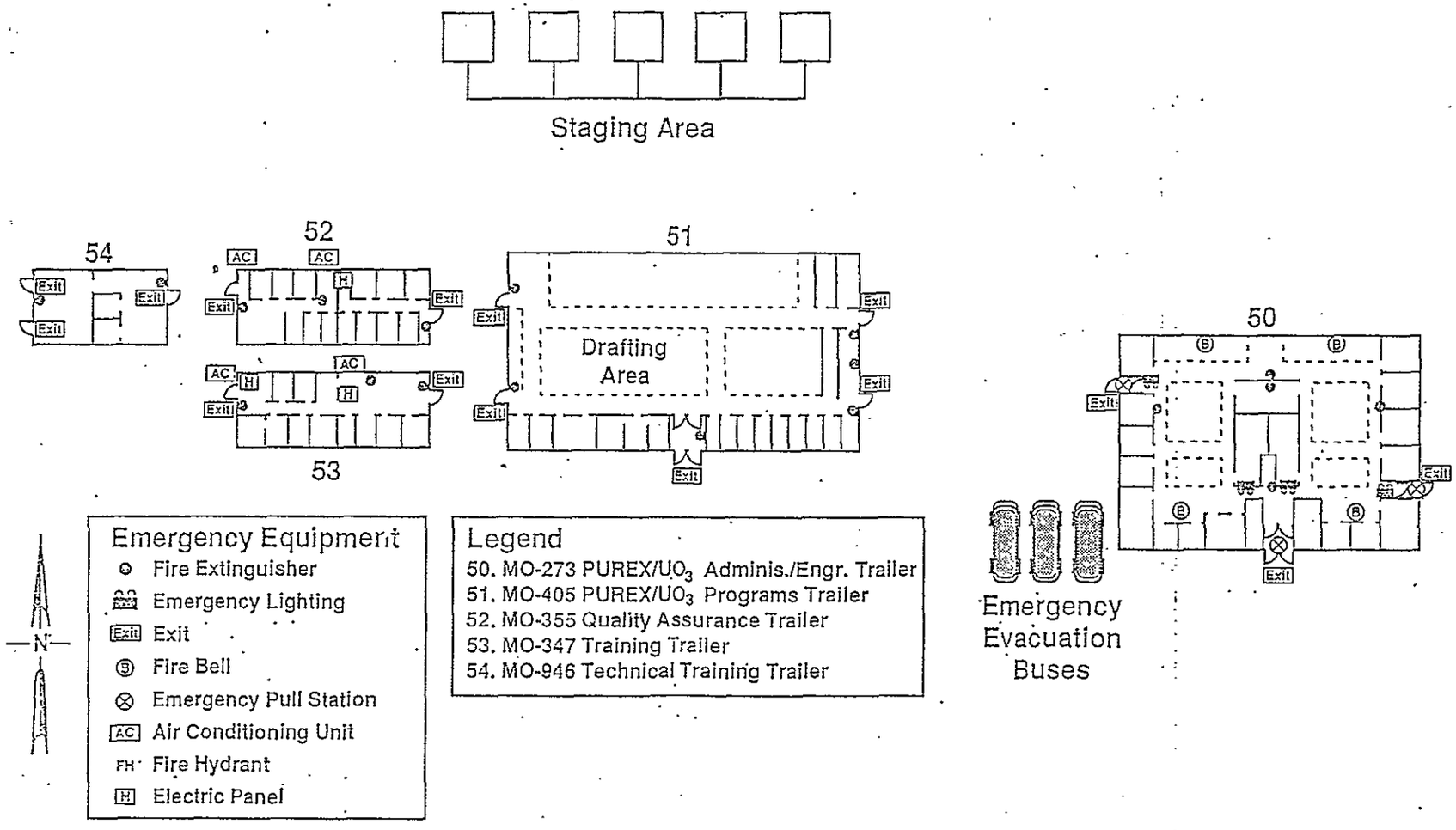
MO-273, MO-347, MO-355, MO-405 and MO-946 Emergency Equipment Locations



PUREX Facility Emergency Plan
WHC-IP-0263-202A
Figure: 23

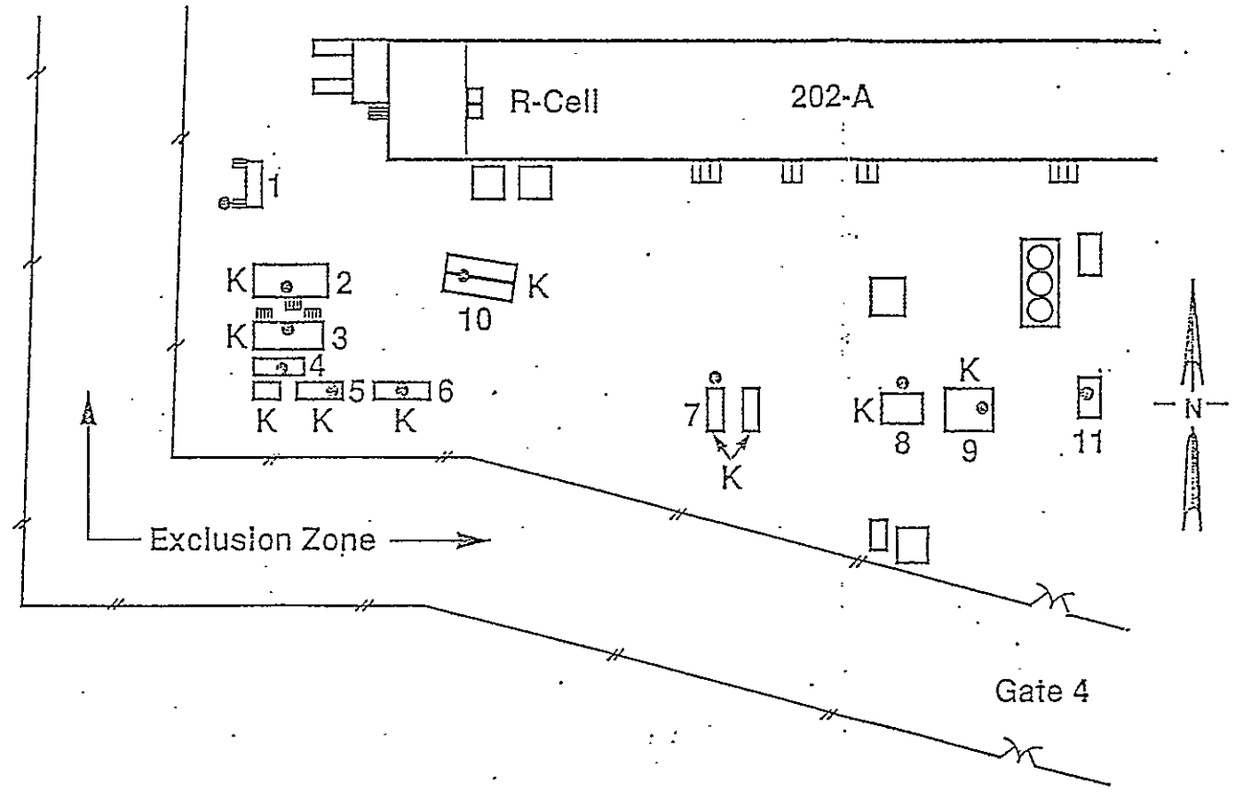
29106005.15

Kaiser Engineers Trailers Emergency Equipment Locations

Legend

1. 4-150 Toilet Trailer
2. 64-15011 All-Craft Trailer
3. MO-112 Superintendent's Trailer
4. 64-12658 Electrical Trailer
5. Electrical Shop
6. 64-15342 Fitters Office
7. 64-15016 Sheetmetal Shop
8. E-6 Fitters Storage Shack
9. Pipefitters Shop
10. 64-15341 Electrical Stores Trailer
11. E-9 Change House

⊙ Fire Extinguisher



PUREX Facility Emergency Plan
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5.6 EMERGENCY ALARMS AND WHEN/HOW THEY WILL BE ACTIVATED

5.6.1 STANDARD EMERGENCY ALARMS

SIGNAL	MEANING	ACTIONS
STEADY TONE ON SIREN	AREA EVACUATION	GO TO EVACUATION AREA AND WAIT FOR INSTRUCTIONS.
WAVERING TONE ON SIREN	TAKE COVER	TAKE COVER IN NEAREST BUILDING, SHUT DOORS & WINDOWS & SHUT OFF VENTILATION (EXCEPT 202-A, SEE SECTION 6.1.3).
HOWLER (AH-OO-GAH)	CRITICALITY	RUN AWAY FROM ALARM SOUND, GET 100 FEET AWAY FROM THE FACILITY AND GO DIRECTLY TO A DESIGNATED STAGING AREA AS IDENTIFIED IN THE FACILITY EMERGENCY PLAN.
GONG	FIRE	DO NOT EVACUATE UNLESS DIRECTED TO DO SO BY THE BUILDING EMERGENCY DIRECTOR
CONTINUOUS RINGING BELL & FLASHING RED LIGHT	POTENTIAL AIRBORNE RADIOLOGICAL CONTAMINATION	HOLD YOUR BREATH, LEAVE IMMEDIATE AREA, ESTABLISH AT LEAST ONE PHYSICAL BARRIER BETWEEN YOU AND THE AFFECTED AREA AND CONTACT THE RPT MANAGER OR THE OPERATIONS SHIFT SURVEILLANCE MANAGER.
200, 300 AND 400 AREAS CRASH PHONE ALARM RINGING TELEPHONE	EMERGENCY COMMUNICATIONS	PICK UP PHONE AND LISTEN. RELAY MESSAGE STEADILY TO BUILDING EMERGENCY DIRECTOR
ALL CLEAR SIGNAL	THE ALL CLEAR SIGNAL FOR ANY OF THESE ALARMS OR SIGNALS WILL BE PASSED BY VOICE. THE FACILITY PUBLIC ADDRESS SYSTEM OR CRASH ALARM PHONES MAY BE USED FOR THIS PURPOSE.	

9 2 1 2 4 3 3

5.6.2 FACILITY SPECIFIC EMERGENCY ALARMS

Depending upon the severity of the emergency incident, in addition to the standard emergency signals discussed in Section 5.6.1, PUREX notifies personnel via one or more of the following emergency warning systems:

- PUREX PAX (Public Address) System - for localized incidents which affect only a limited area in immediate proximity to the incident.

- PUREX PAX Crash Alarm Phones - identified with a white label on the handle. When the crash phone rings, the ring is steady (uninterrupted) and will continue to ring until answered. Certain areas of the facility are connected through the PUREX Dispatcher. The dispatcher can reach personnel in areas inside of the building if and when no other communication means are available.

NOTE: The PUREX PAX crash alarm phones should NOT be confused with a separate crash alarm phones system which is used throughout the 200 Area. This system can be used by the 200 Area Emergency Control Center to request activation of the PUREX Facility Emergency Response Organization or to relay safety or emergency messages to PUREX personnel. The PUREX PAX crash alarm phones system, internal to PUREX, is used to relay information/instructions from the PUREX Dispatcher to facility personnel during an emergency.

6.0 EMERGENCY RESPONSE PLANS

This section contains emergency response actions and procedures that pertain to the PUREX Facility. Emergency response in the following situations are discussed below:

- Evacuation Signal
- Take Cover Signal
- Attack by hostile factions
- Bomb Threat to the facility
- Utility disconnect: Loss of electricity, water, ventilation, steam, air, etc.
- Fire
- Major process disruption
- Natural hazards
- Hazardous materials, Hazardous waste/mixed waste spills, explosions, releases, etc.
- Radioactive materials, effluent discharges, spreads, etc.
- Criticality

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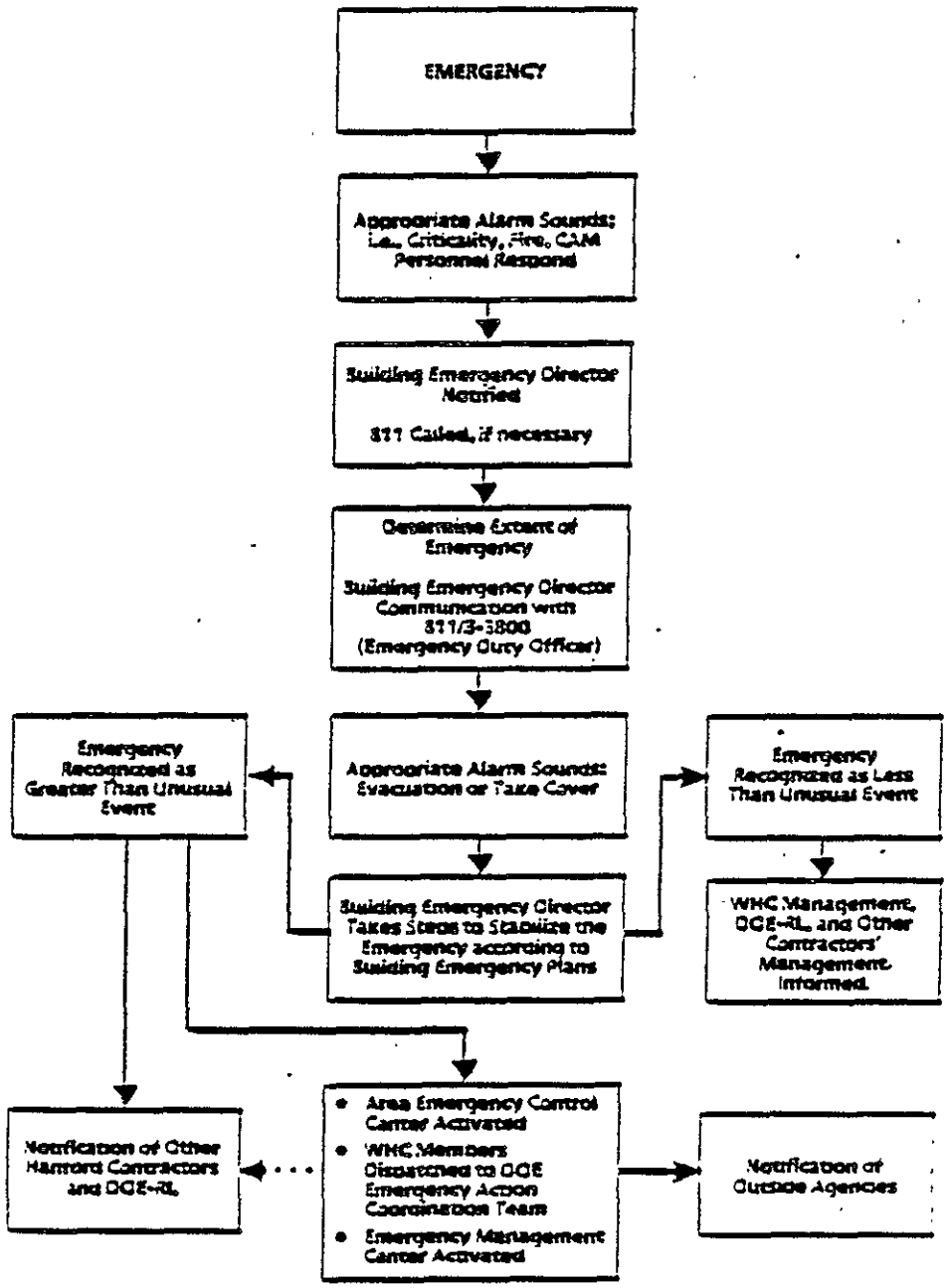
FIGURE 25 - EMERGENCY ACTION FLOW CHART



6.1 EVACUATION AND TAKE COVER ALARM RESPONSE

6.1.1 EVACUATION - STEADY SIREN RESPONSE

The following actions should be taken in the event an evacuation of the PUREX facility becomes necessary:

- The Building Emergency Director will make the decision to evacuate the facility.

- Upon decision to evacuate the facility and/or exclusion area, secure all classified materials and have dispatcher perform the following actions:

- activate the steady siren: Utilize the indoor and outdoor sirens as required. Leave sirens on for at least 3 minutes for the outdoor siren and 1 minute for the indoor siren.

- make PAX announcement for all personnel inside of the double security fence to evacuate to the Staging Area, along with any other information and instructions related to the emergency.

- make oral notifications to all trailers associated with the facility.

- Call 811 or 3-3800 to notify the Westinghouse Emergency Duty Officer. Relay pertinent information and request assistance as required.

- As time allows, maintain appropriate communication with the Westinghouse Emergency Preparedness Organization at 6-6694 and the 200 Area Emergency Control Center at 3-3876, 3-1786, or 9-948-0833.

- Advise building personnel over the PAX system to proceed to the appropriate staging area. Selection of the staging area may be dependant upon the incident and/or weather conditions. Further instructions will be provided at the Staging Area by the Building Emergency Director or his delegate.

AREA	STAGING AREA LOCATION
INSIDE AREA STAGING AREA	North of 202-A, east of main vehicle gate
OUTSIDE AREA STAGING AREA	West of MO-405 trailer

- Staging Area Manager will ensure that a radio (tuned to frequency F1) is available at the Staging Area to communicate with the Building Emergency Director. Account for personnel. (Include any personnel outside the 2701-AB badgehouse). Report unaccounted/missing personnel to the Building Emergency Director.

- Staging Area Manager will verify that the staging area is a safe location (radiation, smoke, debris, toxic fumes, etc.). Management will assess conditions and assign duties to either correct the problem or evacuate personnel from the staging and relocate if necessary.

- Keep personnel in SWP clothing and street clothes separated.
- Assemble evacuation bus drivers and provide information about the destination and route, if applicable.
- Notify personnel, using emergency numbers, in buildings listed below (as applicable) and relay any pertinent information by PAX crash alarm phones, GTE phones, etc.
- Reentry to the building will be authorized by the Building Emergency Director.

EMERGENCY NUMBERS

	2701-AB	PUREX BADGEHOUSE	3-4266 or 3-4265	PAX 283
	293-A		PAX 332	
	MO-023	-NA- unoccupied		
	MO-035	MATERIALS CONTROL TRAILER	3-1504 or 3-5266	
*	MO-273	PUREX/UO3 ADMINIS./ENGRS. TRAILER	3-1792 or 3-1273	
	MO-323	INTERNAL SURVEILLANCE TRAILER	3-1607 or 3-2020	
*	MO-347	TRAINING TRAILER	3-1240 or 3-1046	
*	MO-355	QUALITY ASSURANCE TRAILER	3-3789 or 3-2115	
*	MO-405	PUREX/UO3 PROGRAMS TRAILER	3-3785 or 3-4025	
	MO-409	LABORATORY TRAILER	3-3120 or 3-1147	
	MO-666	ALL CRAFTS TRAILER	3-5230 or 3-1431	
	MO-707	MAINTENANCE ENGINEERING TRAILER	3-1265 or 3-3014	
*	MO-946	TRAINING CLASSROOM TRAILER	3-3655 or 3-2659	
	KAISER ENGINEERS HANFORD TRAILERS		3-1288 or 3-1281	PAX 274

* Trailers located outside the double security fence

PUREX OPERATIONS SHIFT OFFICE	3-4055 OR 3-2833	PAX 247
PUREX DISPATCHER	3-2199	PAX 245

PUREX RADIO BASE STATIONS AND PORTABLE RADIO (P) NUMBERS:

OUTSIDE AREA STAGING AREA MANAGER	P-9
INSIDE AREA STAGING AREA MANAGER	P-10
PUREX DISPATCHER	STATION 17
PUREX SHIFT OFFICE	P-24

6.1.2 AREA EVACUATION

If a 200 East area evacuation is ordered, employees should proceed to their appropriate staging area and wait for further instructions.

The Building Emergency Director will direct all actions for PUREX facility. The order to evacuate will normally be passed via the 200 Area crash alarm phone system. However, there are not enough phones to cover all 200 East area occupied facilities. Since the PUREX facility is on the crash alarm phone system, the PUREX Building Emergency Director will assist in informing occupied facilities to evacuate.

There are two types of 200 area evacuations: RAPID or CONTROLLED. Differences between Rapid and Controlled evacuations are emphasized as they occur in the following steps. When possible, the following steps should be conducted concurrently:

- Halt any operations or work (perform emergency shutdown procedures, if applicable, for Rapid evacuation) and place the facility in a safe condition.

- Sound the evacuation siren. (The 200 Area Powerhouses, 284-E and 284-W, will also sound the steam whistles). Use any available means (PAX system, GTE phones, radios, bullhorns, runners etc.) to pass the evacuation information.

- Evacuate personnel to the appropriate staging area. At the staging area:

- Segregate personnel into five groups; SWP clad personnel, personnel with keys to private vehicles available immediately, personnel with keys to government vehicles, evacuation bus drivers, and all others.

- Conduct personnel accountability (not necessary for Rapid evacuation).

- Direct evacuation bus driver(s) to warm up the bus(es).

- Relay pertinent evacuation information (routes, destination etc.) to personnel with vehicle keys and evacuation bus drivers. (The PUREX facility evacuation bus(es) shall follow the assigned routes unless directed otherwise).

Bus #1 Proceed Northeast on 4th to Buffalo; North on Buffalo to 7th; West on 7th to Baltimore; North on Baltimore to Atlanta; South on Atlanta to 4th; East on 4th to Baltimore; South on Baltimore to the main gate.

Bus #2 Proceed Northeast on 4th to Canton; North on Canton to 8th; West on 8th to 7th; West on 7th to Baltimore; South on Baltimore to the main gate.

Bus #3 Proceed West on 4th to Baltimore; South on Baltimore to the maingate. (Refer to bus routes in section 6.1.2)

- Load personnel in civilian clothes into private and government vehicles, load SWP clad people into bus(es), try to provide reserve transportation for people with late shutdown duties.

- Dispatch private and government vehicles as soon as they are loaded.

- Load remaining people into evacuation bus(es) maintaining segregation if possible.

- Dispatch buses after assigning bus drivers their route. Advise drivers to pick up pedestrians along their route. If possible, provide bus drivers with portable radios so that they can communicate with the Emergency Control Center on Radio Safety Net KOB.743 freq. 165.410 or Ops. & Maint. Net KGB.513 freq. 167.975.

- Report status to the Emergency Control Center (3-3876, 3-1786, 9-948-0833, Radio Safety Net KOB.743 freq. 165.410 or Ops. & Maint. Net KGB.513 freq. 167.975). Request additional transportation if required and report names of personnel who remained to perform late shutdown duties.

- Direct any remaining people to the pick-up point at bus turnaround at PUREX badge house.

EMERGENCY NUMBERS

	2701-AB	PUREX BADGEHOUSE	3-4266 or 3-4265	PAX 283
	293-A		PAX 332	
	MO-023	-NA- unoccupied		
	MO-035	MATERIALS CONTROL TRAILER	3-1504 or 3-5266	
*	MO-273	PUREX/UO3 ADMINIS./ENGRS. TRAILER	3-1792 or 3-1273	
	MO-323	INTERNAL SURVEILLANCE TRAILER	3-1607 or 3-2020	
*	MO-347	TRAINING TRAILER	3-1240 or 3-1046	
*	MO-355	QUALITY ASSURANCE TRAILER	3-3789 or 3-2115	
*	MO-405	PUREX/UO3 PROGRAMS TRAILER	3-3785 or 3-4025	
	MO-409	LABORATORY TRAILER	3-3120 or 3-1147	
	MO-666	ALL CRAFTS TRAILER	3-5230 or 3-1431	
	MO-707	MAINTENANCE ENGINEERING TRAILER	3-1265 or 3-3014	
*	MO-946	TRAINING CLASSROOM TRAILER	3-3655 or 3-2659	
*	KAISER ENGINEERS HANFORD TRAILERS		3-1288 or 3-1281	PAX 274

* Trailers located outside the double security fence

PUREX OPERATIONS SHIFT OFFICE	3-4055 OR 3-2833	PAX 247
PUREX DISPATCHER	3-2199	PAX 245

PUREX RADIO BASE STATIONS AND PORTABLE RADIO (P) NUMBERS:

OUTSIDE AREA STAGING AREA MANAGER	P-9
INSIDE AREA STAGING AREA MANAGER	P-10
PUREX DISPATCHER	STATION 17
PUREX SHIFT OFFICE	P-24

FIGURE 26 - ROUTE FOR EVACUATION BUS # 1

Proceed Northeast on 4th to Buffalo; North on Buffalo to 7th; West on 7th to Baltimore; North on Baltimore to Atlanta; South on Atlanta to 4th; East on 4th to Baltimore: South on Baltimore to the main gate.

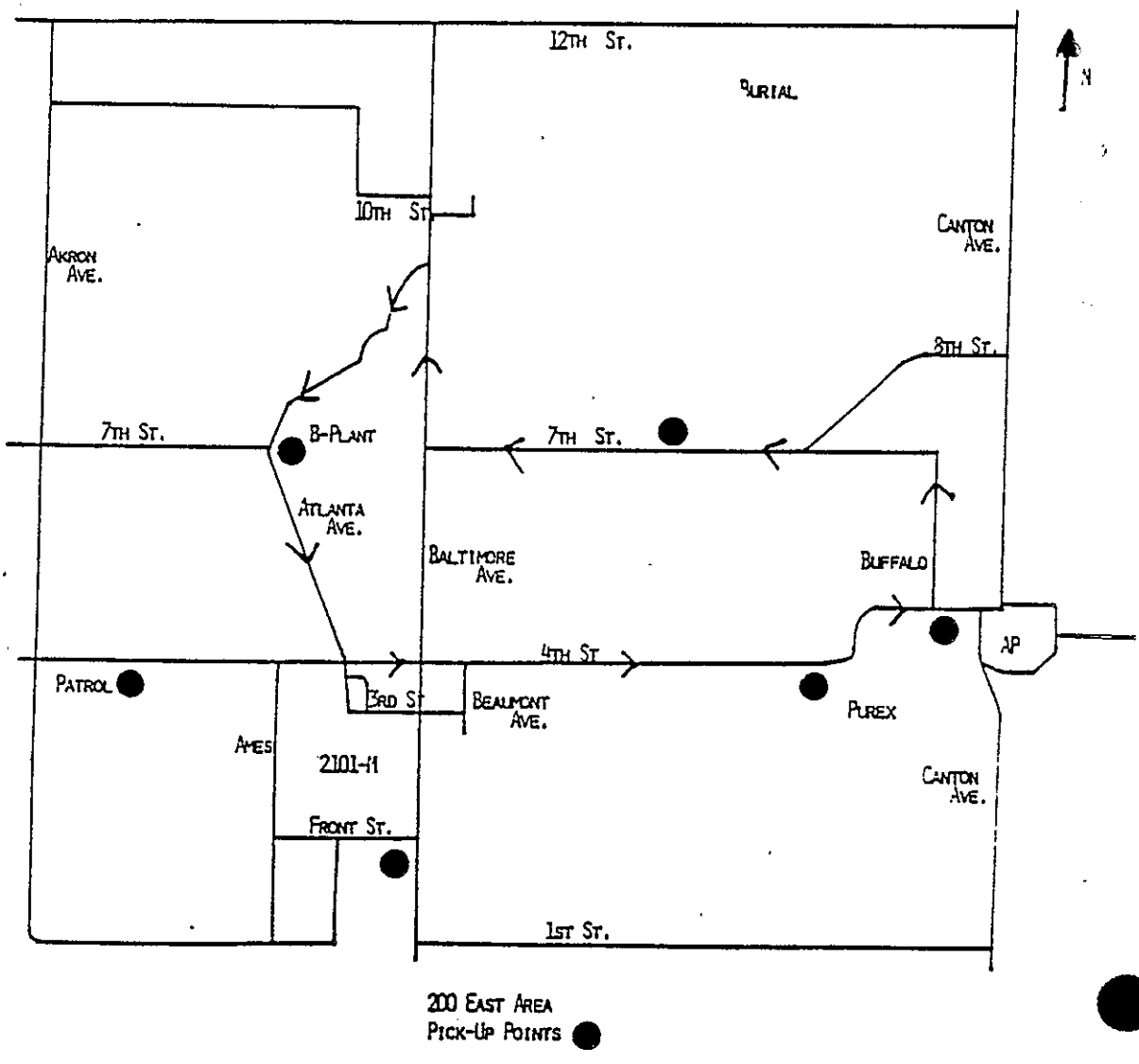


FIGURE 27 - ROUTE FOR EVACUATION BUS # 2

Proceed Northeast on 4th to Canton; North on Canton to 8th; West on 8th to 7th; West on 7th to Baltimore; South on Baltimore to the main gate.

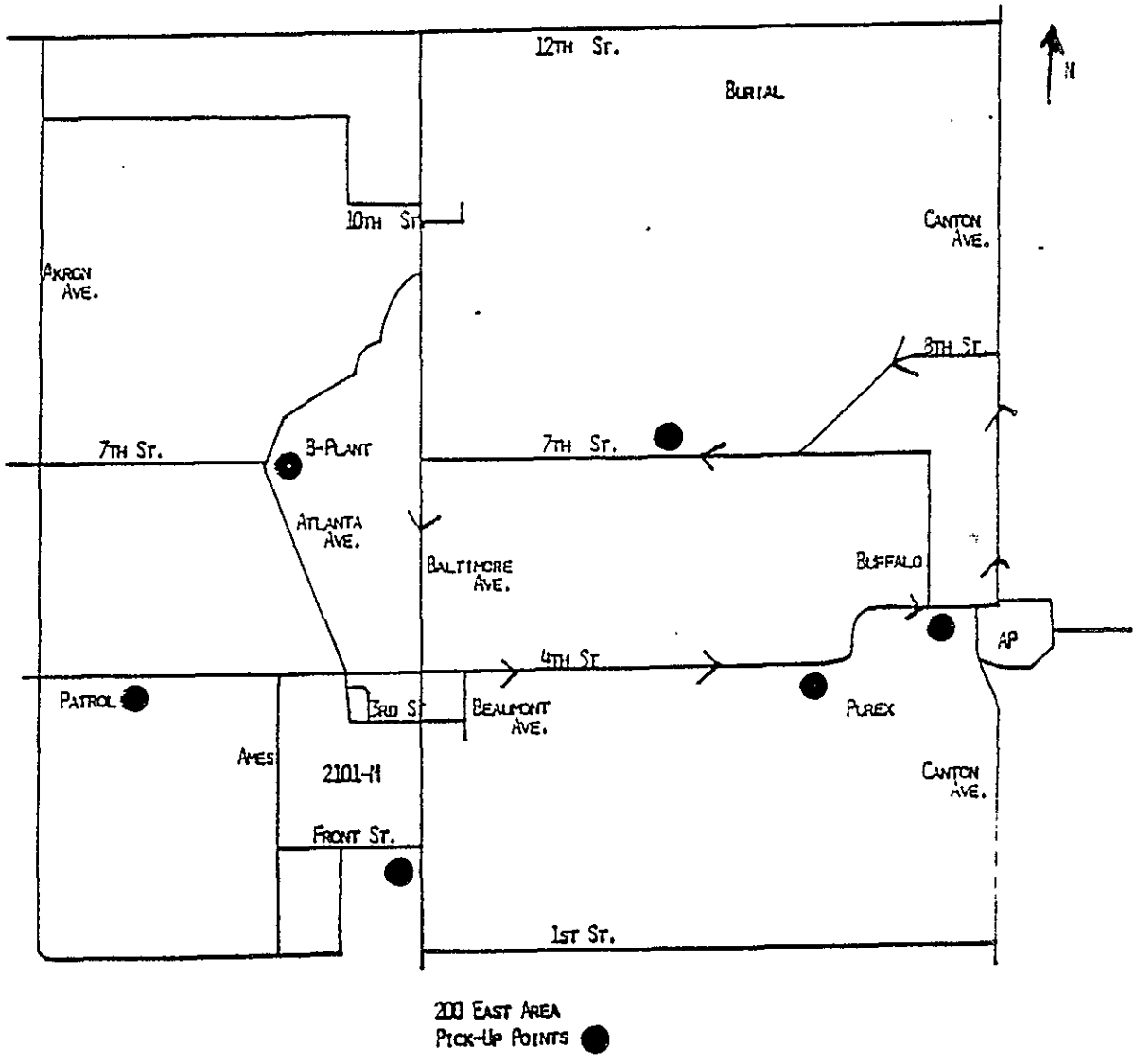


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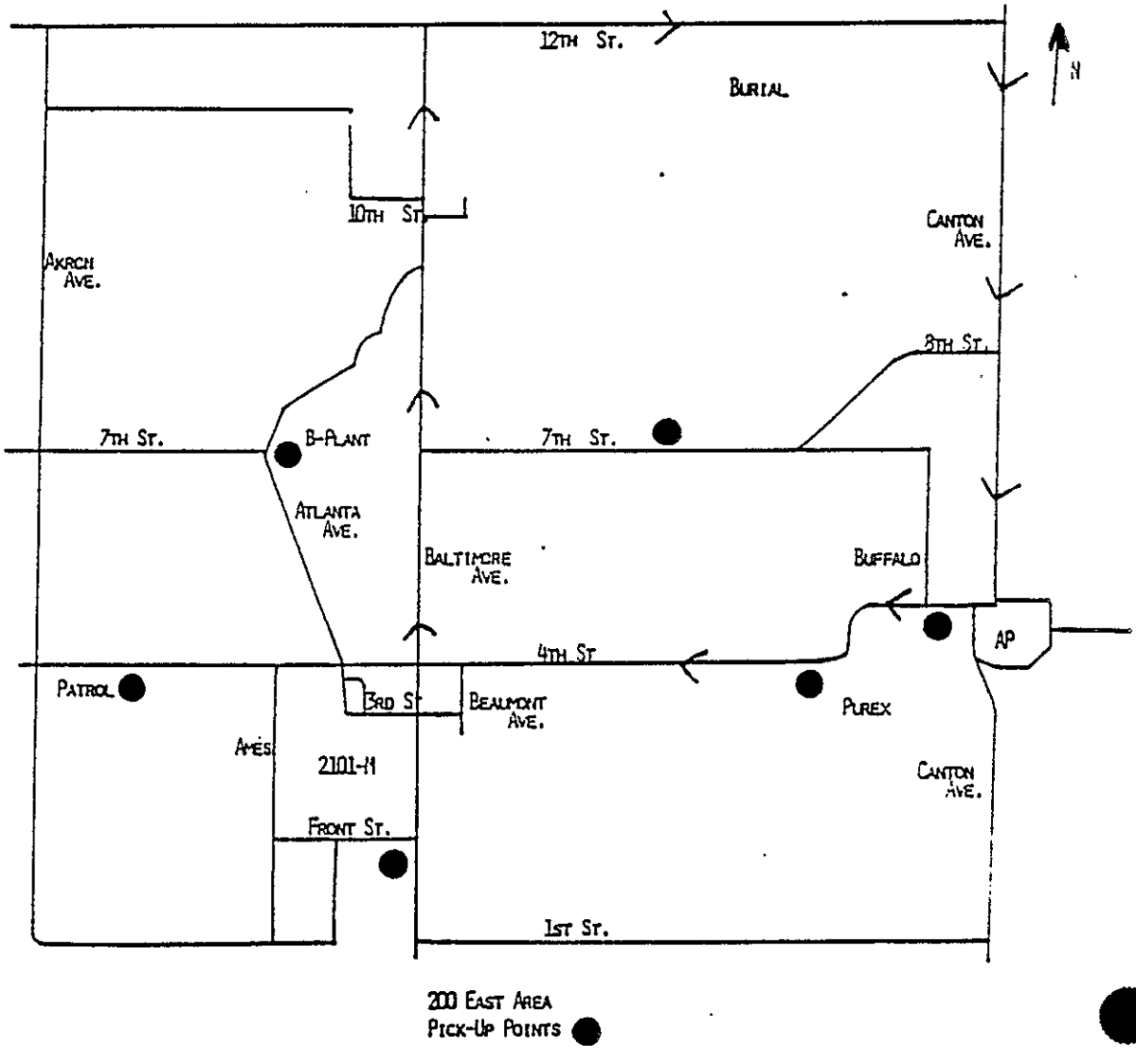
FIGURE 28 - ROUTE FOR EVACUATION BUS # 3

Proceed West on 4th to Baltimore; South on Baltimore to the main gate.



6.1.3 TAKE COVER - WAILING SIREN RESPONSE

Personnel should take cover in the nearest building or trailer when they hear the take cover alarm. Shut all doors and windows.

In the event of a take cover situation, the following actions should be considered by the Building Emergency Director:

- Have the Dispatcher activate the Take Cover Alarm siren.
- Curtail ventilation if conditions warrant.
- Notify personnel, using emergency numbers listed on the next page, in buildings and relay pertinent information as per shift surveillance manager using any means of available communication.
- Notify personnel that a survey is required if entering the facility from outdoors. Announce where survey is being conducted.
- If the "Take Cover" was initiated by adverse radiological conditions, the Building Emergency Director shall request Health and Safety to survey personnel as they enter the facility from outdoors.
- As time allows, maintain appropriate communication with the Westinghouse Emergency Preparedness Organization at 6-6694.
- Accumulate respiratory protection equipment in the SWP Lobby for controlled disbursement.
- Conduct personnel accountability. Report unaccounted/missing, and injured personnel to the 200 Area Emergency Control Center at 3-3876, 3-1786, 9-948-0833, Radio Safety Net KOB.743 freq. 165.410 or Ops. & Maint. Net KGB.513 freq. 167.975.
- The PUREX facility will maintain a secured mode until the "ALL CLEAR" signal is initiated.

EMERGENCY NUMBERS

	2701-AB	PUREX BADGEHOUSE	3-4266 or 3-4265	PAX 283
	293-A		**PAX 332**	
	MO-023	-NA- unoccupied		
	MO-035	MATERIALS CONTROL TRAILER	3-1504 or 3-5266	
*	**MO-273**	PUREX/UO3 ADMINIS./ENGRS. TRAILER	3-1792 or 3-1273	
	MO-323	INTERNAL SURVEILLANCE TRAILER	3-1607 or 3-2020	
*	**MO-347**	TRAINING TRAILER	3-1240 or 3-1046	
*	**MO-355**	QUALITY ASSURANCE TRAILER	3-3789 or 3-2115	
*	**MO-405**	PUREX/UO3 PROGRAMS TRAILER	3-3785 or 3-4025	
	MO-409	LABORATORY TRAILER	3-3120 or 3-1147	
	MO-666	ALL CRAFTS TRAILER	3-5230 or 3-1431	
	MO-707	MAINTENANCE ENGINEERING TRAILER	3-1265 or 3-3014	
*	**MO-946**	TRAINING CLASSROOM TRAILER	3-3655 or 3-2659	
	KAISER ENGINEERS HANFORD TRAILERS		3-1288 or 3-1281	PAX 274

* Trailers located outside the double security fence

PUREX OPERATIONS SHIFT OFFICE	3-4055 OR 3-2833	PAX 247
PUREX DISPATCHER	3-2199	PAX 245

PUREX RADIO BASE STATIONS AND PORTABLE RADIO (P) NUMBERS:

OUTSIDE AREA STAGING AREA MANAGER	P-9
INSIDE AREA STAGING AREA MANAGER	P-10
PUREX DISPATCHER	STATION 17
PUREX SHIFT OFFICE	P-24

6.1.4 ATTACK BY HOSTILE FACTIONS

Normally, the PUREX facility will be alerted of an impending attack via the 200 Area crash alarm phone system.

The following actions should be considered in the event of a hostile attack on the PUREX facility:

- Have dispatcher activate the "TAKE COVER" siren.
- Secure all classified material and special nuclear material.
- Establish communication with the Patrol Operations Center at 3-3800 or 811. The Building Emergency Director will establish a field office, if necessary.
- Notify personnel, using emergency numbers listed on the next page, in buildings (as applicable) and relay any pertinent information by any means of available communication.
- As time allows, take cover procedures should be invoked with the concurrence of the Westinghouse Emergency Preparedness Organization.
- Follow instructions given by the Building Emergency Director.
- Inform and direct personnel of required actions via the PAX system.
- Conduct personnel accountability. Report unaccounted/missing personnel to the 200 Area Emergency Control Center at 3-3876, 3-1786, 9-948-0833, Radio Safety Net KOB.743 freq. 165.410 or Ops. & Maint. Net KGB.513 freq. 167.975.
- The PUREX facility will maintain a secured mode until the "ALL CLEAR" signal is initiated via the 200 Area crash alarm telephone system.

EMERGENCY NUMBERS

	2701-AB	PUREX BADGEHOUSE	3-4266 or 3-4265	PAX 283
	293-A		PAX 332	
	MO-023	-NA- unoccupied		
	MO-035	MATERIALS CONTROL TRAILER	3-1504 or 3-5266	
*	MO-273	PUREX/UO3 ADMINIS./ENGRS. TRAILER	3-1792 or 3-1273	
	MO-323	INTERNAL SURVEILLANCE TRAILER	3-1607 or 3-2020	
*	MO-347	TRAINING TRAILER	3-1240 or 3-1046	
*	MO-355	QUALITY ASSURANCE TRAILER	3-3789 or 3-2115	
*	MO-405	PUREX/UO3 PROGRAMS TRAILER	3-3785 or 3-4025	
	MO-409	LABORATORY TRAILER	3-3120 or 3-1147	
	MO-666	ALL CRAFTS TRAILER	3-5230 or 3-1431	
	MO-707	MAINTENANCE ENGINEERING TRAILER	3-1265 or 3-3014	
*	MO-946	TRAINING CLASSROOM TRAILER	3-3655 or 3-2659	
	KAISER ENGINEERS HANFORD TRAILERS		3-1288 or 3-1281	PAX 274

* Trailers located outside the double security fence

PUREX OPERATIONS SHIFT OFFICE	3-4055 OR 3-2833	PAX 247
PUREX DISPATCHER	3-2199	PAX 245

PUREX RADIO BASE STATIONS AND PORTABLE RADIO (P) NUMBERS:

OUTSIDE AREA STAGING AREA MANAGER	P-9
INSIDE AREA STAGING AREA MANAGER	P-10
PUREX DISPATCHER	STATION 17
PUREX SHIFT OFFICE	P-24

6.2 BOMB THREAT RESPONSE GUIDES

6.2.1 BUILDING EMERGENCY DIRECTOR RESPONSE

The Building Emergency Director is responsible to:

- Request personnel that ALL radio transmissions be curtailed immediately.
- Activate the PUREX Facility Volunteer Bomb Search Team. The Bomb Search teams must report to the Operations Shift Office. (Refer to Attachment A of this document, PUREX Facility Emergency Response Organization, or WHC-IP-0684-202A, for a current listing of Volunteer Bomb Search Team Members).
- Call 811 and confer with the Westinghouse Emergency Duty Officer to determine evacuation/search needs.
- Notify PUREX Patrol Operations Center at 3-3800 or 811 and relay all information.
- Obtain bomb search equipment from MO-035, Material Control trailer.
- The Building Emergency Director shall assign team members areas to be searched and time frame for reporting progress back to the command center. Each team shall begin searching assigned area.
- Notify personnel, using emergency numbers, in buildings (as applicable) and relay any pertinent information by PAX crash alarm phones, GTE phones, etc.
- When bomb is located, evacuate area near its location.
- If time allows, take cover procedures should be invoked (with the concurrence of the Westinghouse Emergency Preparedness Organization).

6.2.2 BOMB SEARCH TEAM RESPONSE

The Bomb Search Team should:

- Upon entering a room, make an audible check (i.e., listen for any unusual sounds).
- Divide the room into four parts: floor area, wall area halfway up, rest of wall to ceiling, and ceiling above.
- Mark rooms with tape when search is complete.
- <u>DO NOT TOUCH, MOVE or DISTURB</u> any suspected item.
- Use tape or string to mark direction to suspicious item for bomb squad to locate.

- Continue search unless directed otherwise by the Building Emergency Director.

- Return to the command center upon completion of the search, or at the designated time. If a bomb has not been found, the Building Emergency Director will make a decision on whether to evacuate the facility.

6.2.3 BUILDING EMPLOYEE RESPONSE

Upon receipt of a bomb threat phone call, an employee should respond as follows:

- Obtain a copy of the bomb threat form if readily available and complete as much as possible of the form while the caller is still on the phone. At the conclusion of the call, complete the remainder of the form as quickly as possible.

- Try to get the caller to reveal details of the threat, location of bomb, detonation time, or some clue to his identity.

- Note vocal characteristics of the caller.

- Listen for background noise.

- Immediately notify your immediate manager and the Building Emergency Director.

- Tell no one else.

6.2.4 RECEIVERS OF WRITTEN THREATS

- Handle the letter as little as possible to preserve fingerprints and avoid smudging.

- Immediately notify the Building Emergency Director. (The Building Emergency Director will notify the Patrol Operations Center at 811 or 3-3800)

- Record all details of the receipt; i.e., where found, how delivered, when found, etc.

- Tell no one else.

- The Building Emergency Director will release the letter only to WHC Security personnel or to a person authorized by WHC Security.

6.2.5 DISCOVERER OF A BOMB OR SUSPICIOUS OBJECT

- Clear the immediate area of personnel. Do not transmit on a radio near the suspected object.

- Immediately notify the Building Emergency Director at 3-4055 or PAX 247.
- Stand guard in a sheltered location and at maximum possible distance to assure that no one enters the area.

EMERGENCY NUMBERS

	2701-AB	PUREX BADGEHOUSE	3-4266 or 3-4265	PAX 283
	293-A		PAX 332	
	MO-023	-NA- unoccupied		
	MO-035	MATERIALS CONTROL TRAILER	3-1504 or 3-5266	
*	MO-273	PUREX/UO3 ADMINIS./ENGRS. TRAILER	3-1792 or 3-1273	
	MO-323	INTERNAL SURVEILLANCE TRAILER	3-1607 or 3-2020	
*	MO-347	TRAINING TRAILER	3-1240 or 3-1046	
*	MO-355	QUALITY ASSURANCE TRAILER	3-3789 or 3-2115	
*	MO-405	PUREX/UO3 PROGRAMS TRAILER	3-3785 or 3-4025	
	MO-409	LABORATORY TRAILER	3-3120 or 3-1147	
	MO-666	ALL CRAFTS TRAILER	3-5230 or 3-1431	
	MO-707	MAINTENANCE ENGINEERING TRAILER	3-1265 or 3-3014	
*	MO-946	TRAINING CLASSROOM TRAILER	3-3655 or 3-2659	
	KAISER ENGINEERS HANFORD TRAILERS		3-1288 or 3-1281	PAX 274

* Trailers located outside the double security fence

PUREX OPERATIONS SHIFT OFFICE	3-4055 OR 3-2833	PAX 247
PUREX DISPATCHER	3-2199	PAX 245

PUREX RADIO BASE STATIONS AND PORTABLE RADIO (P) NUMBERS:

OUTSIDE AREA STAGING AREA MANAGER	P-9
INSIDE AREA STAGING AREA MANAGER	P-10
PUREX DISPATCHER	STATION 17
PUREX SHIFT OFFICE	P-24

6.3 OPERATIONAL EMERGENCIES RESPONSE PLAN

The following sources of information should be utilized to aid in evaluating and determining any operational emergency and its appropriate response:

I) CONTROLLED PRINT FILE DRAWINGS - The controlled set of essential drawings selected by the facility that reflects the real time configuration necessary for the operation of the facility. The set of controlled print file drawings consist of:

(i) CAD (Cell Arrangement Drawings): are drawings that depict the relationship of installed equipment in the cells of the facility.

(ii) Essential Drawings: are drawings identified by the facility staff as being necessary to directly support the safe operation of the facility.

(iii) General Piping Layouts: Special class of layouts of the facility depicting piping, equipment, and Heating, Ventilation, and Air Conditioning.

(iv) IEFDs (Instrument Engineering Flow Diagrams): are drawings delineating major process equipment, control valves, and process piping - including composite flow diagrams, and engineering flow diagrams and process engineering flow schematics.

II) PLANT OPERATING PROCEDURES: are procedures that provide preplanned methods for safely and efficiently conducting operations with minimum reliance on memory. These procedures also provide clear and ready reference for correctly responding to off-normal situations.

III) PUREX PROCESS CONTROL MANUAL - provides an audit link between the Operations Safety Requirements and process control documents.

IV) PUREX PROCESS TECHNICAL MANUAL - is a reference handbook documenting the technical bases of current PUREX process. It also provides a physical description of the Plant and equipment.

V) ELECTRICAL LOAD LIST DATABASE - consists of a breakdown of loads as they are electrically supplied from the 13.8 kV incoming supply down to each individual breaker, compartment, or load.

VI) CRITICALITY PREVENTION MANUAL - provides requirements and guidance for nuclear criticality safety and prevention.

VII) MATERIAL SAFETY DATA SHEETS (MSDSs) - are response sheets that provide concise information to support decisions that need to be made by the discoverer or responder and the Building Emergency Director in the event of a spill, leak or release of hazardous material. DO NOT use Material Safety Data Sheets for stabilization and cleanup activities. A separate recovery

plan should be implemented for the purpose. Satellite stations are areas that store Material Safety Data Sheets. There are four satellite stations located throughout the PUREX facility. They are: (1) Operations Shift Office, 202-A building, Room 9, (2) MO-273, Administration/Process Engineers Trailer, (3) 202-A building, Room 67, Laboratory area and (4) the Maintenance Instrument Shop. MSDS Central Files location is Room 202-A building, Room 113.

VIII) SECTIONS OF THIS DOCUMENT, EMERGENCY PLAN FOR PUREX FACILITY - Sections of this emergency plan contains emergency response actions to the following situations: Evacuation signal, take cover signal, attack by hostile factions, bomb threat to the facility, utility disconnect (loss of electricity, water, ventilation, steam, air, etc.), fire, major process disruption, natural hazards, hazardous materials/mixed wastes spills, explosions, releases, etc., radioactive materials, effluent discharges, spreads, criticality, etc.

6.3.1 UTILITY INTERRUPTION PLAN FOR PUREX BUILDING

The purpose of this response is to provide the steps necessary to place the facility in a safe and secure condition when a utility interruption emergency has been declared. The severity of this emergency depends upon the type of utility lost (i.e. water, steam, air, electricity) and the specific locations involved. Each emergency must be individually evaluated pertaining to the type of utility, its location, etc. to initiate the appropriate response. An interruption of utilities in the 202-A building does not pose emergency situations in the miscellaneous support buildings and trailers.

Upon discovering any interruption in utilities (air, electrical, ventilation, steam), call the Operations shift surveillance manager at PAX 247. The Building Emergency Director will decide whether to declare an emergency after the following has been done:

- Determine extent of loss.
- Contact the 200 East Powerhouse at 3-2350 or 3-2355 and give information of the utility outage. Determine the source of the failure and the estimated time to restore the utility.
- Evaluate backup emergency capabilities.
- Determine immediate needs and potential impacts.

6.3.1.1 LOSS OF ELECTRICITY

Upon loss of electricity, emergency lighting will activate. Normal ventilation will shut down and the steam driven exhaust turbine will activate. The standby diesel generators located in 281-A will automatically come on after a 15-20 second delay and will supply power until normal electrical service is returned.

In the event of a loss of electric power, the Building Emergency Director will decide whether to declare an emergency after the following has been done:

- Determine extent of loss.
- Contact the 200 East Powerhouse at 3-2350 or 3-2355 and give information of the power outage. Determine the source of the failure and the estimated time to restore the utility.
- Evaluate backup emergency capabilities.
- Determine immediate needs and potential impacts.
- Verify operating condition of the ventilation system.

If this loss results in the Building Emergency Director declaring a facility emergency, the response actions should be as follows:

- Contact the manager of the 200 East Powerhouse at 3-2350 or 3-2355 to report action being taken and to determine any other course of action that might be necessary.
- Verify the operating condition of the ventilation system (section 6.3.2).
- Call 3-3800 and relay the pertinent information.
- IF emergency power is available, ONLY restart equipment that are essential to maintain the Plant in safe and secure standby condition. Remember to turn OFF all unnecessary equipment that would restart automatically.
- IF extended outage is expected, request electricians to energize additional Motor Control Centers (MCCs) as needed from the emergency bus.
- Perform personnel accountability.
- Once normal power is restored, restart equipment that does not have automatic restart features.

EMERGENCY NUMBERS

	2701-AB	PUREX BADGEHOUSE	3-4266 or 3-4265	PAX 283
	293-A		PAX 332	
	MO-023	-NA- unoccupied		
	MO-035	MATERIALS CONTROL TRAILER	3-1504 or 3-5266	
*	MO-273	PUREX/UO3 ADMINIS./ENGRS. TRAILER	3-1792 or 3-1273	
	MO-323	INTERNAL SURVEILLANCE TRAILER	3-1607 or 3-2020	
*	MO-347	TRAINING TRAILER	3-1240 or 3-1046	
*	MO-355	QUALITY ASSURANCE TRAILER	3-3789 or 3-2115	
*	MO-405	PUREX/UO3 PROGRAMS TRAILER	3-3785 or 3-4025	
	MO-409	LABORATORY TRAILER	3-3120 or 3-1147	
	MO-666	ALL CRAFTS TRAILER	3-5230 or 3-1431	
	MO-707	MAINTENANCE ENGINEERING TRAILER	3-1265 or 3-3014	
*	MO-946	TRAINING CLASSROOM TRAILER	3-3655 or 3-2659	
	KAISER ENGINEERS HANFORD TRAILERS		3-1288 or 3-1281	PAX 274

* Trailers located outside the double security fence

PUREX OPERATIONS SHIFT OFFICE	3-4055 OR 3-2833	PAX 247
PUREX DISPATCHER	3-2199	PAX 245

PUREX RADIO BASE STATIONS AND PORTABLE RADIO (P) NUMBERS:

OUTSIDE AREA STAGING AREA MANAGER	P-9
INSIDE AREA STAGING AREA MANAGER	P-10
PUREX DISPATCHER	STATION 17
PUREX SHIFT OFFICE	P-24

6.3.1.2 LOSS OF STEAM

The importance of steam has greatly diminished since the PUREX facility was placed in a standby condition. During the standby condition, steam is mostly used for heating building ventilation air and for most process solution transfers. The most critical use of steam is to operate the steam turbine which exhausts air from the canyon during an electrical outage.

In the event of a loss of steam, the Building Emergency Director will decide whether to declare an emergency after the following has been done:

- Determine extent of loss.
- Contact the 200 East Powerhouse at 3-2350 or 3-2355 and give information of the steam outage. Determine the source of the failure and the estimated time to restore the utility.
- Evaluate backup emergency capabilities.
- Determine immediate needs and potential impacts.
- Verify operating condition of the ventilation system.

If the loss results in the Building Emergency Director declaring a facility emergency, the response actions should be as follows:

- Contact the manager of the 200 East Powerhouse at 3-2350 or 3-2355 to report action being taken and to determine any other course of action that might be necessary.

- If the cause of the failure is determined to be within the Plant, contact the Plant Shift Maintenance Manager at 3-2633 and obtain assistance.

- Notify the Patrol Operations Center at 811 or 3-3800 of the emergency and request for additional assistance if needed.

- Perform personnel accountability. Report any missing personnel to the 200 Area Emergency Control Center at 3-3876, 3-1786, 9-948-0833, Radio Safety Net KOB.743 freq. 165.410 or Ops. & Maint. Net KGB.513 freq. 167.975.

If the outage is for an extended period of time and temperatures are close to or below freezing, building personnel should be instructed to take the following actions:

- Open the bypass around the condensate traps on all ventilation preheat and reheat coils.

- Open the blowdown valves at the following locations:

- West End Feeder Loop
- East Loop at RR Tunnel
- East PRV Station
- West PRV Station
- Heating PRV Loop
- All traps in turbine house

- Reduce the building ventilation to the following:

- #1 system - one supply and two exhaust fans
- #2 system - one supply and both Sample Gallery hood exhausts, West Sample Gallery room exhaust, and the PR Room exhaust fans.
- #3 system - one supply fan
- #4 system - one supply and one exhaust fan

- Drain the distilled water tanks in the service blower room and in the laboratory room.

- Ensure that adequate flows are maintained on the raw, sanitary, and demineralized water systems to prevent the line from freezing.

Upon notifcation from the 200 East Powerhouse that the steam supply will be restored to normal, perform the following actions:

- Verify that the following blowdown valves are closed:

- all traps in turbine house
- East loop at RR Tunnel
- West End Feeder Loop

- When steam pressures are returned to normal, have the power operator perform the following actions:

- Close the blowdown valves at the East and West PRV Stations and the PRV station for the heating and ventilation system.

- Commence closing the bypasses around the preheat and reheat condensate traps.

- Return the four ventilation systems to normal.

After the Plant is maintained in a safe and secure standby condition, and once steam is restored,

- Instruct personnel to check and blow down appropriate condensate lines in the outlying buildings such as 211-A, 212-A, 203-A, and 291-A.

For more information on Loss of Steam, refer to WHC-CM-5-24, Sections 12.5.17 and 14.6.19.

EMERGENCY NUMBERS

	2701-AB	PUREX BADGEHOUSE	3-4266 or 3-4265	PAX 283
	293-A		PAX 332	
	MO-023	-NA- unoccupied		
	MO-035	MATERIALS CONTROL TRAILER	3-1504 or 3-5266	
*	MO-273	PUREX/UO3 ADMINIS./ENGRS. TRAILER	3-1792 or 3-1273	
	MO-323	INTERNAL SURVEILLANCE TRAILER	3-1607 or 3-2020	
*	MO-347	TRAINING TRAILER	3-1240 or 3-1046	
*	MO-355	QUALITY ASSURANCE TRAILER	3-3789 or 3-2115	
*	MO-405	PUREX/UO3 PROGRAMS TRAILER	3-3785 or 3-4025	
	MO-409	LABORATORY TRAILER	3-3120 or 3-1147	
	MO-666	ALL CRAFTS TRAILER	3-5230 or 3-1431	
	MO-707	MAINTENANCE ENGINEERING TRAILER	3-1265 or 3-3014	
*	MO-946	TRAINING CLASSROOM TRAILER	3-3655 or 3-2659	
	KAISER ENGINEERS HANFORD TRAILERS		3-1288 or 3-1281	PAX 274

* Trailers located outside the double security fence

PUREX OPERATIONS SHIFT OFFICE	3-4055 OR 3-2833	PAX 247
PUREX DISPATCHER	3-2199	PAX 245

PUREX RADIO BASE STATIONS AND PORTABLE RADIO (P) NUMBERS:

OUTSIDE AREA STAGING AREA MANAGER	P-9
INSIDE AREA STAGING AREA MANAGER	P-10
PUREX DISPATCHER	STATION 17
PUREX SHIFT OFFICE	P-24

6.3.1.3 LOSS OF AIR

Air is provided to the building by a set of four electric compressors and one portable diesel compressor. The portable compressor is used for emergency purposes only. In the event of a loss of air, the Building Emergency Director will decide whether to declare an emergency after the following has been done:

- Determine extent of loss.
- Evaluate backup emergency capabilities, if necessary. Instruct a power operator to place portable emergency diesel air compressor in service.
- Evaluate facility impacts.

If the loss results in the Building Emergency Director declaring a facility emergency, the response actions should be as follows:

- Evacuate all radiation areas using the PAX system. Perform personnel accountability, and report any missing personnel to the 200 Area Emergency Control Center at 3-3876, 3-1786, 9-948-0833, Radio Safety Net KOB.743 freq. 165.410 or Ops. & Maint. Net KGB.513 freq. 167.975.

- Immediately do whatever is necessary to control contamination from entering into the clean areas due to a ventilation reversal. If required, shut off both canyon supply and electric exhaust fans and run the steam driven exhaust turbine.

- Contact the power operator to see that safe differential pressures are being maintained. Ventilation dampers to be checked are:

- Supply dampers SF1, 1A and 4A
- Exhaust dampers EF-1, 1-2, 1-3, 1-4, 4-1, and 4-2.

- Notify Patrol Operations Center at 811 or 3-3800, relay pertinent information.

- Contact the Health and Safety group and request that special air sampling and contamination surveys be performed to ensure that an air reversal has not occurred.

- If jet transfers are in progress, the jet air blow will not work. If possible, complete transfers to minimize the possibility of solution suck back. Check at the P & O Gallery jet gang valve site with a Cutie Pie when finished to assure that no suck back occurred.

- If the outage is for an extended period of time, check for possible installation of another portable air compressor.

- When air supply is restored, instruct the power operator to restart any secured fans and establish the proper ventilation flows.

For more information on Loss of Air, refer to WHC-CM-5-24, Section 14.5.13.

EMERGENCY NUMBERS

	2701-AB	PUREX BADGEHOUSE	3-4266 or 3-4265	PAX 283
	293-A		**PAX 332**	
	MO-023	-NA- unoccupied		
	MO-035	MATERIALS CONTROL TRAILER	3-1504 or 3-5266	
*	**MO-273**	PUREX/UO3 ADMINIS./ENGRS. TRAILER	3-1792 or 3-1273	
	MO-323	INTERNAL SURVEILLANCE TRAILER	3-1607 or 3-2020	
*	**MO-347**	TRAINING TRAILER	3-1240 or 3-1046	
*	**MO-355**	QUALITY ASSURANCE TRAILER	3-3789 or 3-2115	
*	**MO-405**	PUREX/UO3 PROGRAMS TRAILER	3-3785 or 3-4025	
	MO-409	LABORATORY TRAILER	3-3120 or 3-1147	
	MO-666	ALL CRAFTS TRAILER	3-5230 or 3-1431	
	MO-707	MAINTENANCE ENGINEERING TRAILER	3-1265 or 3-3014	
*	**MO-946**	TRAINING CLASSROOM TRAILER	3-3655 or 3-2659	
	KAISER ENGINEERS HANFORD TRAILERS		3-1288 or 3-1281	PAX 274

* Trailers located outside the double security fence

PUREX OPERATIONS SHIFT OFFICE	3-4055 OR 3-2833	PAX 247
PUREX DISPATCHER	3-2199	PAX 245

PUREX RADIO BASE STATIONS AND PORTABLE RADIO (P) NUMBERS:

OUTSIDE AREA STAGING AREA MANAGER	P-9
INSIDE AREA STAGING AREA MANAGER	P-10
PUREX DISPATCHER	STATION 17
PUREX SHIFT OFFICE	P-24

6.3.1.4 LOSS OF WATER

In the event of a loss of water, the Building Emergency Director will decide whether to declare an emergency after the following has been done:

- Determine extent of loss.
- Contact the 200 East Powerhouse at 3-2350 or 3-2355 and give information of the water outage. Determine the source of the failure and the estimated time to restore the utility.
- Evaluate backup emergency capabilities.

NOTE: For additional information on Loss of Sanitary Water, refer to WHC-CM-5-24, Section 14.6.21

For additional information on Loss of Raw Water, refer to WHC-CM-5-24, Section 14.6.22.

If the loss results in the Building Emergency Director declaring a facility emergency, the response actions should be as follows:

- Contact the 200 East Powerhouse operator at 3-2350 to determine the duration of the outage.
- Instruct via the PAX system to STOP all hazardous material handling.
- The high-storage tank should be checked for level.
- Notify the Patrol Operations Center at 811 or 3-3800 and relay pertinent information. Request additional assistance if needed.
- Notify personnel to conserve water. Post signs in all locker rooms to limit water usage.
- Check water level in elevated 50,000 gallon tank, 2901-A, to assess sanitary water reserves.
- Instruct power operators to notify the Building Emergency Director when normal water service is restored.

When normal water service is restored:

- Instruct all personnel to return to work.
- Contact Patrol Operations Center at 3-3800 or 811 to relay building status.

6.3.1.5 LOSS IN TELEPHONE SERVICE

In the event of a loss in telephone service, responses by the Building Emergency Director should be as follows:

- establish communications using another available source, such as:

- PUREX PAX system
- Patrol radio frequencies
- Portable radios with two frequencies
- Runners

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6.3.2 LOSS OF VENTILATION

In the event of a loss of ventilation, the Building Emergency Director will decide whether to declare an emergency after the following has been done:

- Determine extent of loss.
- Contact the Power Control Room at 3-3851 or PAX 278 and determine the extent of the emergency.
- Verify that the following equipment is operational:

- Steam Turbine EF-V11-4/EF-1-4 - automatically starts in the event of a failure of the electrical exhaust fans. The power operator should continuously monitor the canyon differential pressure

- Exhaust Fan EF-V21-1/EF-2-5 or EF-V21-1A/EF-2-5A - automatically energized by the emergency power circuit and exhausts air from the PR and N-Cell areas. The power operator should contact the process operator in this area to ensure that adequate hood differential pressure is being maintained.

- Exhausts EF-V41-1/EF-4-1 or EF-V41-1A/EF-4-2 - exhaust the PUREX Laboratory hoods and are energized by the emergency power circuit. The power operator should contact the laboratory supervisor to ensure adequate hood differential pressures are being maintained.

- Canyon Supply Dampers - the power operator should ensure that the canyon supply dampers are fully open.

- Evaluate backup emergency capabilities.

- Evaluate ventilation/contamination control concerns.

If the loss results in the Building Emergency Director declaring a facility emergency, the response actions should be as follows:

- IF ventilation is not adequate for contamination control, evacuate all the radiation areas in the building or the entire building if necessary.

- Request the Health and Safety group to monitor air samples in the service areas to protect against the contaminated air entering this area and to define respiratory protection as required.

- Contact 811 or 3-3800 and relay pertinent information and request additional assistance as required.

- When normal ventilation is returned to service, call the power control room and request status of the building ventilation systems.

- Contact Health and Safety and request all radiation areas in the building be surveyed for contamination.

IF personnel were evacuated from the building:

- Perform personnel accountability. Notify 200 Area ECC of any missing personnel at 3-3876, 3-1786, 9-948-0833, Radio Safety Net KOB.743 freq. 165.410 or Ops. & Maint. Net KGB.513 freq. 167.975.

- After normal ventilation is established and contamination surveys are complete, announce on the PAX system that personnel return to work.

EMERGENCY NUMBERS

	2701-AB	PUREX BADGEHOUSE	3-4266 or 3-4265	PAX 283
	293-A		**PAX 332**	
	MO-023	-NA- unoccupied		
	MO-035	MATERIALS CONTROL TRAILER	3-1504 or 3-5266	
*	**MO-273**	PUREX/UO3 ADMINIS./ENGRS. TRAILER	3-1792 or 3-1273	
	MO-323	INTERNAL SURVEILLANCE TRAILER	3-1607 or 3-2020	
*	**MO-347**	TRAINING TRAILER	3-1240 or 3-1046	
*	**MO-355**	QUALITY ASSURANCE TRAILER	3-3789 or 3-2115	
*	**MO-405**	PUREX/UO3 PROGRAMS TRAILER	3-3785 or 3-4025	
	MO-409	LABORATORY TRAILER	3-3120 or 3-1147	
	MO-666	ALL CRAFTS TRAILER	3-5230 or 3-1431	
	MO-707	MAINTENANCE ENGINEERING TRAILER	3-1265 or 3-3014	
*	**MO-946**	TRAINING CLASSROOM TRAILER	3-3655 or 3-2659	
	KAISER ENGINEERS HANFORD TRAILERS		3-1288 or 3-1281	PAX 274

* Trailers located outside the double security fence

PUREX OPERATIONS SHIFT OFFICE	3-4055 OR 3-2833	PAX 247
PUREX DISPATCHER	3-2199	PAX 245

PUREX RADIO BASE STATIONS AND PORTABLE RADIO (P) NUMBERS:

OUTSIDE AREA STAGING AREA MANAGER	P-9
INSIDE AREA STAGING AREA MANAGER	P-10
PUREX DISPATCHER	STATION 17
PUREX SHIFT OFFICE	P-24

6.3.3 FIRE RESPONSE PLAN

6.3.3.1 BUILDING EMPLOYEE RESPONSE

Any person discovering a fire shall take the following actions immediately:

- Avoid inhaling smoke, fumes, or vapors even if no hazardous waste is involved.
- Pull the nearest alarm box and notify the Operations Shift Office, the dispatcher, or call 811. Provide as much information as possible without personal risk.
- Personnel, if trained, may be assigned bythe Operations shift surveillance manager to use fire fighting equipment available in the area. This may be done only if it poses NO risk of injury to the employees, and only until they are relieved by the Fire Department personnel.
- Keep people away from the fire area.

6.3.3.2 BUILDING EMERGENCY DIRECTOR RESPONSE

The Building Emergency Director will be responsible for directing the following activities:

- Identify the exact location and extent of fire and assign a person to meet the Fire Department at door 60. Relay pertinent information and be ready to assist in any way. Direct the Fire Department to the location of the alarm or fire.
- Contact the Patrol Operations Center at 811 or 3-3800 and provide as much information as possible. Request additional assistance as needed.
- Identify the character, exact source, amount and extent of any released materials, (request Process Engineering support for this effort).
- The Building Emergency Director may confer with Health and Safety and Nuclear Facility Safety for contamination controls and area postings.
- If the emergency involves a hazardous waste storage area, contact the Hazardous Waste Coordinator to identify the materials involved. Contact Industrial Safety and Fire Protection at 3-1255.
- Ensure that the Fire Department Hazardous Material Response Team (HMRT) has been notified (refer to Hazardous Material Plan, Section 6.0, of the Westinghouse Emergency Preparedness Plan, WHC-CM-4-1).
- Set up a forward command post in conjunction with Fire, Patrol, etc.

Material Safety Data Sheets provide immediate information to support decisions in the event of release of hazardous material. It should be used

for immediate response to a spill or release to isolate the area, and/or stop the leak. Stabilization and cleanup activities will be handled under a separate recovery plan. A canyon fire shall be extinguished remotely using the systems provided. Follow procedure PO-001-050 for operating the fire fog/fire foam system.

If building personnel were evacuated,

- Perform personnel accountability. Notify 200 Area ECC of any missing personnel at 3-3876, 3-1786, 9-948-0833, Radio Safety Net KOB.743 freq. 165.410 or Ops. & Maint. Net KGB.513 freq. 167.975.

- Re-entry into the building shall be authorized only by the Building Emergency Director.

EMERGENCY NUMBERS

	2701-AB	PUREX BADGEHOUSE	3-4266 or 3-4265	PAX 283
	293-A		PAX 332	
	MO-023	-NA- unoccupied		
	MO-035	MATERIALS CONTROL TRAILER	3-1504 or 3-5266	
*	MO-273	PUREX/UO3 ADMINIS./ENGRS. TRAILER	3-1792 or 3-1273	
	MO-323	INTERNAL SURVEILLANCE TRAILER	3-1607 or 3-2020	
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*	MO-405	PUREX/UO3 PROGRAMS TRAILER	3-3785 or 3-4025	
	MO-409	LABORATORY TRAILER	3-3120 or 3-1147	
	MO-666	ALL CRAFTS TRAILER	3-5230 or 3-1431	
	MO-707	MAINTENANCE ENGINEERING TRAILER	3-1265 or 3-3014	
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	KAISER ENGINEERS HANFORD TRAILERS		3-1288 or 3-1281	PAX 274

* Trailers located outside the double security fence

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PUREX RADIO BASE STATIONS AND PORTABLE RADIO (P) NUMBERS:

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PUREX DISPATCHER	STATION 17
PUREX SHIFT OFFICE	P-24

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6.3.4 MAJOR PROCESS DISRUPTION

Since the PUREX facility is in transition to standby mode, no major process disruptions are possible. However, special process operations are taking place during this transition to standby mode. The following actions should be considered by the Building Emergency Director in the event of a process operation disruption:

- Notify the following personnel; Process Control representative, Nuclear Facility Safety representative, Health and Safety manager.
- Notify the Patrol Operations Center on 3-3800 or 811 and relay pertinent information and request additional assistance as needed.
- Notify the Analytical Laboratory at 3-3109 to prepare for quick turnaround on appropriate samples.
- Evaluate the need to evacuate or take cover.
- Refer to PUREX Final Safety Analysis Report (SD-HS-SAR-001), Chapter 9, for applicable accident scenario.

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6.3.5 PRESSURE HAZARDS

Since the PUREX facility is in transition to standby mode and the process is currently shutdown, no catastrophic pressure hazards exist at the facility.

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6.4 NATURAL HAZARDS RESPONSE

The following sections outline the responsibilities of the Building Emergency Director, the Emergency Duty Officer, the Patrol Operations Center, and Security Operations Center in the event of any natural hazard emergency.

Each Building Emergency Organization must be ready to respond, at the direction of the WHC Area Emergency Director, in the following areas:

- Search for injured or trapped employees
- Render first aid (normal medical response may be overtaxed)
- Search for fires and other hazards
- Fight fires
- Turn off water, gas, and electricity
- Perform facility inspection
- Form a recovery plan
- Perform cleanup

6.4.1 VOLCANIC ERUPTION/EARTHQUAKE/ASH FALL/HIGH WINDS/TORNADO/ FLOOD/RANGE FIRE

The following actions should be taken upon notification that an ash plume, high winds, an earthquake, a tornado, a Columbia river flood, or a range fire, is headed for the Hanford Reservation or toward the facility:

6.4.1.1 BUILDING EMERGENCY DIRECTOR RESPONSE

The Building Emergency Director should:

- Contact the Pacific Northwest Laboratory (PNL) Meteorology Weather Station on 3-2716 to determine estimated time of arrival for the ash plume.
- Make the decision to initiate take cover emergency response and follow the "Take Cover" response plan in Section 6.1.3.
- Protect supply air inlets and reduce ventilation flows as appropriate. Turn on or increase water to the air scrubbers where possible.
- Maintain communication with the Westinghouse Emergency Duty Officer to discuss facility condition and changing fallout conditions.

The Building Emergency Director is responsible for his facility and occupants. Normally the Building Emergency Director would rely on emergency teams (Emergency Control Center staff, Fire, Environmental Radiation Protection Technologists, etc.) to warn and assist facilities which may be affected by radioactive or hazardous material releases. A seismic event could cause damage to a facility to the extent that the Primary Building Emergency Director is incapacitated or unable to respond. For this reason, it is imperative that at least one alternate Building Emergency Director be identified for all periods of building/facility occupancy.

Due to the anticipated consequences of a seismic event, all Building Emergency Directors and emergency response organizations should consider the following during and immediately after an earthquake to reduce the potential of real impact on adjacent facilities and personnel and on offsite populations.

6.4.1.2 BUILDING EMPLOYEE RESPONSE

During the earthquake, facility personnel should perform the following actions:

- Remain calm. Think through the consequences of any action you take.
- If indoors, stay away from windows, steam lines, and gloveboxes. Watch for falling plaster, light fixtures, ductwork, and other objects. Pay particular attention to bookcases and file cabinets. Stay away from containers of harmful materials. Exit Analytical Laboratory rooms.

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- Respond to all emergency signals. Exercise judgement to evaluate risks prior to action.

- Seek shelter under a table, desk, in a corner away from windows, in a strong doorway, or in a concrete stairway. If you must go outside, exit the main building and move upwind and away from the facility.

- If outside, avoid buildings, power poles, stacks, the water tower, and other objects which could fall. Avoid chemical tanks, and the 211-A and 203-A areas. If possible, move to an open area away from all hazards. If in an automobile, stop in the safest place available, preferably an open area.

After the earthquake:

- Follow instructions that may be given over the PAX or an emergency PA system. If you are told to evacuate the facility, go to your designated staging area unless directed otherwise.

- Check fellow workers for injuries. Do not attempt to move seriously injured persons unless they are in immediate danger of further injury. For serious or life threatening emergencies, call 811 for emergency assistance and notify facility management.

- Do not use matches or lighters. Do not operate electrical switches or appliances which could create sparks and ignite gas from broken lines.

- Do not touch downed power lines or objects in contact with downed wires. When in doubt, don't touch.

- Do not use the telephone or PAX unless you are requesting emergency assistance or are instructed by management or the Building Emergency Director.

- Establish damage assessment teams for the local area and areas beyond the facility background.

- Assess damage to local facility using the post-event checklist in Section 9.3.

- Determine if release of inventories of hazardous material (both radioactive and nonradioactive) is occurring or likely to occur.

- Determine current local meteorology.

- Warn adjacent facilities of event using: crash alarm, radios, telephone, runners, and/or Hanford Patrol rover vehicles.

- Use the Patrol Operations Center to notify local U.S. Department of Energy, Richland Field Office contacts for notification of offsite populations if

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release has occurred or is suspected of occurring which could affect offsite populations.

- Determine the need to have Patrol Operations Center at 811 or 3-3800 initiate road closures (Highway 240, and/or onsite roadways) to reduce potential exposures.

- If your facility is unaffected, provide resources and personnel assistance to other affected personnel and facilities.

- If and when the Emergency Duty Officer responds use him as a communicator to summon additional assistance.

6.4.2 SEISMIC EVENT RESPONSE

6.4.2.1 BUILDING EMERGENCY DIRECTOR RESPONSE

The Building Emergency Director needs to promptly assess post-earthquake emergency needs and:

- Take necessary actions to protect facility personnel and onsite and offsite personnel.

- Report needs to the Emergency Control Center for prioritization and resolution. It is important to remember that the effects of an earthquake or resultant tremors may cause disruptions in the normal communications system as well as transportation systems such as damage to roadways and rail lines. These disruptions may lead to delays in assistance to affected facility and personnel.

Initial Building Emergency Director response may vary, depending on the magnitude and extent of the event, but generally will include the following:

- Order the evacuation of nonessential personnel to the staging area.

- Notify the Patrol Operations Center at 3-3800 or 811 of local conditions, state emergency.

NOTE: If telephone systems are inoperable, try radio transmission, send messenger, or wait for emergency response personnel to arrive.

- Conduct personnel accountability. Report missing or unaccounted persons to the Building Emergency Director.

- Check personnel for injuries. Do not attempt to move seriously injured persons unless they are in immediate danger of further injury. For serious or life threatening emergencies, call 811 for emergency assistance and notify facility management.

- Instruct personnel that telephones and other communications resources should remain free for emergency response and assistance requests only.

- Provide information to Area Emergency Director and Emergency Duty officer.

- Consider shutdown of operating systems. Keep in mind that systems using pressurized gases, hazardous materials, thermal energy, etc., may pose a personnel hazard due to system failure or breach.

- Utilize local personnel resources (radiation protection technologists, chemists, maintenance personnel, engineers, operators, etc.) to evaluate hazards from failed systems, i.e., ruptured steam lines, downed electrical lines, spilled chemicals, etc.

- Utilize local personnel (radiation protection technologists, chemists, maintenance personnel, engineers, operators, etc.) to rescue people stranded in elevators, cranes, etc. If the fire department is able to respond, they may be better qualified in the rescue efforts.

- The Building Emergency Director should check their facilities using the checklist in Section 9.0 to assess the damage and report any emergencies to the Patrol Operations Center at 811 or 3-3800.

- Arrange for engineering evaluations as necessary to evaluate whether buildings are stable. Until buildings are evaluated, re-entry should only be allowed as needed for personnel rescue and chemical and/or radiation safety.

6.4.2.2 BUILDING PERSONNEL RESPONSE

During the seismic event, facility personnel must perform the following actions:

- Remain calm. Think through the consequences of any action you take.

- If indoors, stay away from windows, steam lines, and gloveboxes. Watch for falling plaster, light fixtures, ductwork, and other objects. Pay particular attention to bookcases and file cabinets. Stay away from containers of harmful materials. Exit Analytical Laboratory rooms.

- Seek shelter. If you must go outside, exit the main building and move upwind and away from the facility.

- Respond to all emergency signals. Exercise judgement to evaluate risks prior to action.

- If outside, avoid buildings, power poles, stacks, the water tower, and other objects which could fall. Avoid chemical tanks, and the 211-A and 203-A areas. If possible, move to an open area away from all hazards. If in an automobile, stop in the safest place available, preferably an open area.

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After the seismic event:

- Follow instructions that may be given over the PAX or an emergency PA system. If you are told to evacuate the facility, go to your designated staging area unless directed otherwise.
- Check fellow workers for injuries. Do not attempt to move seriously injured persons unless they are in immediate danger of further injury. For serious or life threatening emergencies, call 811 for emergency assistance and notify facility management.
- Do not use matches or lighters. Do not operate electrical switches or appliances which could create sparks and ignite gas from broken lines.
- Do not touch downed power lines or objects in contact with downed wires. When in doubt, don't touch.
- Do not use the telephone or PAX unless you are requesting emergency assistance or are instructed by management or the Building Emergency Director.

EMERGENCY NUMBERS

	2701-AB	PUREX BADGEHOUSE	3-4266 or 3-4265	PAX 283
	293-A		PAX 332	
	MO-023	-NA- unoccupied		
	MO-035	MATERIALS CONTROL TRAILER	3-1504 or 3-5266	
*	MO-273	PUREX/UO3 ADMINIS./ENGRS. TRAILER	3-1792 or 3-1273	
	MO-323	INTERNAL SURVEILLANCE TRAILER	3-1607 or 3-2020	
*	MO-347	TRAINING TRAILER	3-1240 or 3-1046	
*	MO-355	QUALITY ASSURANCE TRAILER	3-3789 or 3-2115	
*	MO-405	PUREX/UO3 PROGRAMS TRAILER	3-3785 or 3-4025	
	MO-409	LABORATORY TRAILER	3-3120 or 3-1147	
	MO-666	ALL CRAFTS TRAILER	3-5230 or 3-1431	
	MO-707	MAINTENANCE ENGINEERING TRAILER	3-1265 or 3-3014	
*	MO-946	TRAINING CLASSROOM TRAILER	3-3655 or 3-2659	
	KAISER ENGINEERS HANFORD TRAILERS		3-1288 or 3-1281	PAX 274

* Trailers located outside the double security fence

PUREX OPERATIONS SHIFT OFFICE	3-4055 OR 3-2833	PAX 247
PUREX DISPATCHER	3-2199	PAX 245

PUREX RADIO BASE STATIONS AND PORTABLE RADIO (P) NUMBERS:

OUTSIDE AREA STAGING AREA MANAGER	P-9
INSIDE AREA STAGING AREA MANAGER	P-10
PUREX DISPATCHER	STATION 17
PUREX SHIFT OFFICE	P-24

6.5 HAZARDOUS MATERIALS AND HAZARDOUS WASTE/MIXED WASTE

6.5.1 SPILL RESPONSE PLAN

6.5.1.1 BUILDING EMPLOYEE RESPONSE

The person discovering the spill shall take the following immediate action:

- Do not walk into or touch any spilled material or waste.
- Avoid inhaling fumes, smoke, or vapors even if no hazardous material/waste is involved.
- Do not assume that gases or vapors are harmless because of lack of smell.
- Contact the Building Emergency Director or Operations Shift office immediately at PAX 247. Provide as much information as possible without personal risk.
- Keep people away from the spill area.

6.5.1.2 BUILDING EMERGENCY DIRECTOR RESPONSE

Upon being notified of a spill, the Building Emergency Director must immediately take the following actions:

- Identify the character, exact source, amount, and extent of any released materials. (See Section 3.1, Assessments). Establish a control point as close to the spill area as possible.
- Refer to the specific Material Safety Data Sheet (MSDS) for information concerning what type of respiratory and personnel protective equipment should be used, and methods used to isolate the spill and/or stop the leak. Isolate the spill area and/or stop the leak. The MSDS lists additional hazards that must be considered and responded to, if needed.
- Contact the Facility Industrial Safety Representative at 3-1255 for any additional information.
- If the emergency involves a hazardous waste accumulation area, contact the PUREX Facility Hazardous Waste Coordinator to identify the materials involved.
- If it is determined that assistance is required, notify the Patrol Operations Center at 811 or 3-3800, and request that the Fire Department Hazardous Material Response Team (HMRT) be dispatched to PUREX. Provide as much information as possible. Assign a representative to meet and direct the HMRT Team to the area of the spill.

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- Assess possible hazards to human health and the environment (considering direct, indirect, immediate and long-term effects) that may result from the spill.

- Contact the Pacific Northwest Laboratory (PNL) Meteorology Weather Station on 3-2716 to determine the wind speed, direction and plume stability. Assess whether other facilities or locations may be affected by the spill. Notify the Patrol Operations Center at 3-3800 or 811 and request assistance as needed.

- Consider shutdown of the intake air supply system.

- Take all reasonable measures necessary to ensure that fires, explosions, and releases do not occur, recur, or spread to other dangerous waste at the facility.

- Evaluate the need to evacuate part or all of the facility. Take into account the location of spill and ensure the safety of the evacuation staging area.

- Contact PUREX Environmental Compliance Group, phone 3-3048 (alternate 3-4032) and request assistance in stabilization and cleanup of the spill.

- Contact WHC Environmental Protection immediately for off-site reporting requirements at 3-4306. (To allow for the reporting of all hazardous substances spill/releases to the appropriate agency within 2 hours from the time of spill/release).

NOTE: If the hazardous material spill occurs in a radiation zone resulting in mixed waste, the Building Emergency Director or line management should contact Health and Safety for assistance in determining the contamination controls and area postings, and in providing information for helping the Building Emergency Director assess possible hazards to human health and environment, the need for evacuation, and precautions to follow in isolating and cleaning up the spill.

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6.5.2 CONTAINER SPILLS AND LEAKAGE

6.5.2.1 BUILDING EMPLOYEE RESPONSE

The person discovering the spill/leak shall take the following immediate action:

- Do not walk into or touch any spilled material or waste.
- Avoid inhaling fumes, smoke, or vapors even if no hazardous material is involved.
- Do not assume that gases or vapors are harmless because of lack of smell.
- Contact the Building Emergency Director or Operations Shift office immediately at PAX 247. Provide as much information as possible without personal risk.
- Keep people away from the spill area.

Depending on the size of the spill, one of the following procedures may be carried out:

- Refer to the specific Material Safety Data Sheet (MSDS) for information concerning size of the spill or leakage, type of respiratory and personnel protective equipment to be used to isolate the spill area and/or stop the leak. The MSDS also lists additional hazards that must be considered and responded to, if needed.
- Prevent, if possible, leakage or flow into the sewer.

6.5.2.2 BUILDING EMERGENCY DIRECTOR RESPONSE

Upon being notified of a spill, the Building Emergency Director must immediately take the following actions:

- Identify the character, exact source, amount, and extent of any released materials. (See Section 3.1, Assessments). Establish a control point as close to the spill area as possible.
- Refer to the specific Material Safety Data Sheet (MSDS) for information concerning what type of respiratory and personnel protective equipment should be used, and methods used to isolate the spill and/or stop the leak. Isolate the spill area and/or stop the leak. The MSDS lists additional hazards that must be considered and responded to, if needed.
- Contact the Facility Industrial Safety Representative at 3-1255 for any additional information.

- If the emergency involves a hazardous waste accumulation area, contact the PUREX Facility Hazardous Waste Coordinator to identify the materials involved.

- If it is determined that assistance is required, notify the Patrol Operations Center at 811 or 3-3800, and request that the Fire Department Hazardous Material Response Team (HMRT) be dispatched to PUREX. Provide as much information as possible. Assign a representative to meet and direct the HMRT Team to the area of the spill.

- Assess possible hazards to human health and the environment (considering direct, indirect, immediate and long-term effects) that may result from the spill.

- Contact the Pacific Northwest Laboratory (PNL) Meteorology Weather Station on 3-2716 to determine the wind speed, direction and plume stability. Assess whether other facilities or locations may be affected by the spill. Notify the Patrol Operations Center at 3-3800 or 811 and request assistance as needed.

- Consider shutdown of the intake air supply system.

- Take all reasonable measures necessary to ensure that fires, explosions, and releases do not occur, recur, or spread to other dangerous waste at the facility.

- Evaluate the need to evacuate part or all of the facility. Take into account the location of spill and ensure the safety of the evacuation staging area.

- Contact PUREX Environmental Compliance Group, phone 3-3048 (alternate 3-4032) and request assistance in stabilization and cleanup of the spill.

- Contact WHC Environmental Protection for off-site reporting requirements.

NOTE: If the hazardous material spill occurs in a radiation zone resulting in mixed waste, the Building Emergency Director or line management should contact Health and Safety for assistance in determining the contamination controls and area postings, and in providing information for helping the Building Emergency Director assess possible hazards to human health and environment, the need for evacuation, and precautions to follow in isolating and cleaning up the spill.

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EMERGENCY NUMBERS

	2701-AB	PUREX BADGEHOUSE	3-4266 or 3-4265	PAX 283
	293-A		PAX 332	
	MO-023	-NA- unoccupied		
	MO-035	MATERIALS CONTROL TRAILER	3-1504 or 3-5266	
*	MO-273	PUREX/UO3 ADMINIS./ENGRS. TRAILER	3-1792 or 3-1273	
	MO-323	INTERNAL SURVEILLANCE TRAILER	3-1607 or 3-2020	
*	MO-347	TRAINING TRAILER	3-1240 or 3-1046	
*	MO-355	QUALITY ASSURANCE TRAILER	3-3789 or 3-2115	
*	MO-405	PUREX/UO3 PROGRAMS TRAILER	3-3785 or 3-4025	
	MO-409	LABORATORY TRAILER	3-3120 or 3-1147	
	MO-666	ALL CRAFTS TRAILER	3-5230 or 3-1431	
	MO-707	MAINTENANCE ENGINEERING TRAILER	3-1265 or 3-3014	
*	MO-946	TRAINING CLASSROOM TRAILER	3-3655 or 3-2659	
	KAISER ENGINEERS HANFORD TRAILERS		3-1288 or 3-1281	PAX 274

* Trailers located outside the double security fence

PUREX OPERATIONS SHIFT OFFICE	3-4055 OR 3-2833	PAX 247
PUREX DISPATCHER	3-2199	PAX 245

PUREX RADIO BASE STATIONS AND PORTABLE RADIO (P) NUMBERS:

OUTSIDE AREA STAGING AREA MANAGER	P-9
INSIDE AREA STAGING AREA MANAGER	P-10
PUREX DISPATCHER	STATION 17
PUREX SHIFT OFFICE	P-24

6.5.3 TANK SPILLS AND LEAKAGE

Should a hazardous material/mixed waste release occur, the material will be transferred to another compatible tank or to containers using either a portable or permanently installed pump.

6.5.3.1 BUILDING EMPLOYEE RESPONSE

The person discovering the spill shall take the following immediate action:

- Do not walk into or touch any spilled material or waste.
- Avoid inhaling fumes, smoke, or vapors even if no hazardous material is involved.
- Do not assume that gases or vapors are harmless because of lack of smell.
- Contact the Building Emergency Director or Operations Shift office immediately at PAX 247. Provide as much information as possible without personal risk.
- Keep people away from the spill area.

Depending on the size of the spill, one of the following procedures may be carried out:

- Refer to the specific Material Safety Data Sheet (MSDS) for information concerning size of the spill or leakage, type of respiratory and personnel protective equipment to be used to isolate the spill area and/or stop the leak. The MSDS also lists additional hazards that must be considered and responded to, if needed.
- Prevent, if possible, leakage or flow into the sewer.

6.5.3.2 BUILDING EMERGENCY DIRECTOR RESPONSE

Upon being notified of a spill, the Building Emergency Director must immediately take the following actions:

- Identify the character, exact source, amount, and extent of any released materials. (See Section 3.1, Assessments). Establish a control point as close to the spill area as possible.
- Refer to the specific Material Safety Data Sheet (MSDS) for information concerning what type of respiratory and personnel protective equipment should be used, and methods used to isolate the spill and/or stop the leak. Isolate the spill area and/or stop the leak. The MSDS lists additional hazards that must be considered and responded to, if needed.
- Contact the Facility Industrial Safety Representative at 3-1255 for any additional information.

- If the emergency involves a hazardous waste accumulation area, contact the PUREX Facility Hazardous Waste Coordinator to identify the materials involved.

- If it is determined that assistance is required, notify the Patrol Operations Center at 811 or 3-3800, and request that the Fire Department Hazardous Material Response Team (HMRT) be dispatched to PUREX. Provide as much information as possible. Assign a representative to meet and direct the HMRT Team to the area of the spill.

- Assess possible hazards to human health and the environment (considering direct, indirect, immediate and long-term effects) that may result from the spill.

- Contact the Pacific Northwest Laboratory (PNL) Meteorology Weather Station on 3-2716 to determine the wind speed, direction and plume stability. Assess whether other facilities or locations may be affected by the spill. Notify the Patrol Operations Center at 3-3800 or 811 and request assistance as needed.

- Consider shutdown of the intake air supply system.

- Take all reasonable measures necessary to ensure that fires, explosions, and releases do not occur, recur, or spread to other dangerous waste at the facility.

- Evaluate the need to evacuate part or all of the facility. Take into account the location of spill and ensure the safety of the evacuation staging area.

- Contact PUREX Environmental Compliance Group, phone 3-3048 (alternate 3-4032) and request assistance in stabilization and cleanup of the spill.

- Contact WHC Environmental Protection for off-site reporting requirements.

NOTE: If the hazardous material spill occurs in a radiation zone resulting in mixed waste, the Building Emergency Director or line management should contact Health and Safety for assistance in determining the contamination controls and area postings, and in providing information for helping the Building Emergency Director assess possible hazards to human health and environment, the need for evacuation, and precautions to follow in isolating and cleaning up the spill.

EMERGENCY NUMBERS

	2701-AB	PUREX BADGEHOUSE	3-4266 or 3-4265	PAX 283
	293-A		PAX 332	
	MO-023	-NA- unoccupied		
	MO-035	MATERIALS CONTROL TRAILER	3-1504 or 3-5266	
*	MO-273	PUREX/UO3 ADMINIS./ENGRS. TRAILER	3-1792 or 3-1273	
	MO-323	INTERNAL SURVEILLANCE TRAILER	3-1607 or 3-2020	
*	MO-347	TRAINING TRAILER	3-1240 or 3-1046	
*	MO-355	QUALITY ASSURANCE TRAILER	3-3789 or 3-2115	
*	MO-405	PUREX/UO3 PROGRAMS TRAILER	3-3785 or 3-4025	
	MO-409	LABORATORY TRAILER	3-3120 or 3-1147	
	MO-666	ALL CRAFTS TRAILER	3-5230 or 3-1431	
	MO-707	MAINTENANCE ENGINEERING TRAILER	3-1265 or 3-3014	
*	MO-946	TRAINING CLASSROOM TRAILER	3-3655 or 3-2659	
	KAISER ENGINEERS HANFORD TRAILERS		3-1288 or 3-1281	PAX 274

* Trailers located outside the double security fence

PUREX OPERATIONS SHIFT OFFICE	3-4055 OR 3-2833	PAX 247
PUREX DISPATCHER	3-2199	PAX 245

PUREX RADIO BASE STATIONS AND PORTABLE RADIO (P) NUMBERS:

OUTSIDE AREA STAGING AREA MANAGER	P-9
INSIDE AREA STAGING AREA MANAGER	P-10
PUREX DISPATCHER	STATION 17
PUREX SHIFT OFFICE	P-24

6.5.4 FIRE AND EXPLOSION ASSOCIATED WITH HAZARDOUS MATERIALS

6.5.4.1 BUILDING EMPLOYEE RESPONSE

Any person discovering a fire shall take the following actions immediately:

- Avoid inhaling smoke, fumes, or vapors even if no hazardous waste is involved.
- Pull the nearest alarm box and notify the Operations shift surveillance manager's office, dispatcher or call 811. Provide as much information as possible without personal risk. The Operations shift surveillance manager will notify the Building Emergency Director.
- Until relieved by Fire Department personnel or personnel assigned by the Operations shift surveillance manager, keep people away from the fire area and if safe to do so, make use of at-hand fire fighting equipment.
- Trained personnel may perform fire fighting techniques using methods outlined in the pre-fire plans for that area. Supplied air respirators (Scott air packs) should be worn during fire fighting for protection from smoke and potential airborne radioactive materials.

6.5.4.2 BUILDING EMERGENCY DIRECTOR RESPONSE

The Operations shift surveillance manager, until relieved by the Building Emergency Director will be responsible for directing the following activities:

- Identify the character, exact source, amount and extent of any released materials, (request support from Process Engineering for this effort), and maintain communications with the Building Emergency Director.
- If the emergency involves a hazardous waste accumulation area, contact the PUREX Facility Hazardous Waste Coordinator to identify the materials involved.
- Contact the Patrol Operations Center at 811 or 3-3800 and provide as much information as possible, request additional assistance as needed.
- Assign a person to meet the Fire Department at the Gamewell panel at door 60. Relay pertinent information and be ready to assist in any way. Direct the Fire Department to the location of the alarm or fire.
- Set up a forward command post.
- Confer with Health and Safety and Nuclear Facility Safety groups for criticality/contamination controls and area postings.
- Ensure that the Fire Department Hazardous Material Response Team (HMRT) has been notified (refer to Hazardous Material Plan, Section 6.0, of the Westinghouse Emergency Preparedness Plan, WHC-CM-4-1).

- Establish a command post, and if necessary, man the post with a Building Emergency Director representative and a Fire Department representative.

NOTE: MSDSs, Material Safety Data Sheets, provide immediate information to support decisions that need to be made by the Building Emergency DIrector in the event of release of hazardous material. It should be used for immediate response to a spill or release to isolate the area, and/or stop the leak. Stabilization and cleanup activities will be handled under a separate recovery plan.

- A canyon fire shall be extinguished remotely using the systems provided. Follow procedure PO-001-050 for operating the fire fog/fire foam system. The following items shall be considered to specifically verify a canyon fire:

- Observe the air tunnel temperature in the Power Control Room and the main stack temperature at 292-AB.

- Have electrician verify cell temperature indication.

- Observe tank temperatures in suspect cell(s).

- Observe cell differential pressure indicators.

- Observe cell cover blocks from canyon viewing windows.

- Remove cell cover blocks and visually inspect cell.

- Evaluate the need to shut down the affected exhaust ventilation system or supply system to prevent breaching of building containment.

- Activation of the fire alarm does not mean immediate evacuation is required. The Building Emergency Director shall determine the need for evacuating all or nonessential personnel and shall follow the evacuation emergency response procedure.

- After the emergency has been terminated, all personnel involved, equipment used, and clothing worn shall be surveyed by Health and Safety for contamination.

- The damaged area will be examined to determine the cause of the fire/explosion and the extent of the damage, the location and status of equipment affected will be recorded.

- Items considered to be evidence with regard to cause of the incident shall be preserved as well as practical.

<u>Re-entry into the facility shall be authorized only by the Building Emergency Director.</u>

EMERGENCY NUMBERS

	2701-AB	PUREX BADGEHOUSE	3-4266 or 3-4265	PAX 283
	293-A		PAX 332	
	MO-023	-NA- unoccupied		
	MO-035	MATERIALS CONTROL TRAILER	3-1504 or 3-5266	
*	MO-273	PUREX/UO3 ADMINIS./ENGRS. TRAILER	3-1792 or 3-1273	
	MO-323	INTERNAL SURVEILLANCE TRAILER	3-1607 or 3-2020	
*	MO-347	TRAINING TRAILER	3-1240 or 3-1046	
*	MO-355	QUALITY ASSURANCE TRAILER	3-3789 or 3-2115	
*	MO-405	PUREX/UO3 PROGRAMS TRAILER	3-3785 or 3-4025	
	MO-409	LABORATORY TRAILER	3-3120 or 3-1147	
	MO-666	ALL CRAFTS TRAILER	3-5230 or 3-1431	
	MO-707	MAINTENANCE ENGINEERING TRAILER	3-1265 or 3-3014	
*	MO-946	TRAINING CLASSROOM TRAILER	3-3655 or 3-2659	
	KAISER ENGINEERS HANFORD TRAILERS		3-1288 or 3-1281	PAX 274

* Trailers located outside the double security fence

PUREX OPERATIONS SHIFT OFFICE	3-4055 OR 3-2833	PAX 247
PUREX DISPATCHER	3-2199	PAX 245

PUREX RADIO BASE STATIONS AND PORTABLE RADIO (P) NUMBERS:

OUTSIDE AREA STAGING AREA MANAGER	P-9
INSIDE AREA STAGING AREA MANAGER	P-10
PUREX DISPATCHER	STATION 17
PUREX SHIFT OFFICE	P-24

6.5.5 TOXIC FUME RELEASE

The Operations shift surveillance manager, or Building Emergency Director must immediately take the following actions:

- Identify the character, exact source, amount, and extent of any released materials.
- Refer to the specific Material Safety Data Sheets (MSDSs) for information concerning what type of respiratory and personnel protective equipment should be used to isolate the spill area and/or stop the leak. The response sheets also list additional hazards that must be considered and responded to, if needed.
- If the emergency involves a hazardous waste accumulation area, contact the PUREX Facility Hazardous Waste Coordinator to identify the materials involved.
- If outside assistance is required, notify the Patrol Operations Center at 811 or 3-3800, and request that the Fire Department Hazardous Material Response Team be dispatched to PUREX. Provide as much information as possible. Assign a representative to meet and direct the HMRT Team to the area of the spill and set up a field office. Operations representative to coordinate activities with fire department, security, etc.
- Assess possible hazards to human health and the environment (considering direct and indirect immediate effects) that may result from the release.
- Contact the Pacific Northwest Laboratory (PNL) Meteorology Weather Station on 3-2716 to determine the wind speed, direction and plume stability. Assess whether other facilities or locations may be affected by the spill. Notify the Patrol Operations Center at 811 or 3-3800 and request assistance as needed.
- Take all reasonable measures necessary to ensure that fires, explosions, and releases do not occur, recur, or spread to other dangerous waste at the facility.
- Where applicable, stop processes and operations, collect and contain released wastes, and remove or isolate containers.
- Evaluate the need to evacuate part or all of the facility. Take into account the location of spill and ensure the safety of the evacuation staging area.
- Consider shutdown of the intake air supply system, and/or retain personnel inside the facility.
- Notify WHC Environmental Department of the incident and request assistance if necessary.

NOTE: If the toxic fume release occurs in a radiation zone, the Building Emergency Director or line management should contact Health and Safety for assistance in determining contamination controls and area postings, and in providing information for helping the Building Emergency Director assess possible hazards to human health and environment, the need for shutdowns and evacuation, and precautions to follow in isolating and eliminating the toxic fume release.

6.5.6 REACTIVE/CORROSIVE CHEMICAL HAZARD

The Operations shift surveillance manager, or Building Emergency Director must immediately take the following actions:

- Identify the character, exact source, amount, and extent of the material(s) involved.
- Refer to the specific Material Safety Data Sheets (MSDSs) for information concerning what type of respiratory and personnel protective equipment should be used to isolate the reactive/corrosive hazard. The response sheets also list additional hazards that must be considered and responded to, if needed.
- If the emergency involves a hazardous waste accumulation area, contact the PUREX Facility Hazardous Waste Coordinator to identify the materials involved.
- If it is determined that assistance is required, notify the Patrol Operations Center at 811 or 3-3800, and request that the Fire Department Hazardous Material Response Team be dispatched to PUREX. Provide as much information as possible. Assign a representative to meet and direct the HMRT Team to the area of the hazard and set up a field office. An Operations representative must coordinate activities with fire department, security, etc.
- Assess possible hazards to human health and the environment (considering direct and indirect immediate effects) that may result from the hazard.
- Contact the Pacific Northwest Laboratory (PNL) Meteorology Weather Station on 3-2716 to determine the wind speed, direction, if necessary. Assess whether other facilities or locations may be affected by the spill. Notify the Patrol Operations Center at 811 or 3-3800 and request assistance as needed.
- Take all reasonable measures necessary to ensure that fires, explosions, and releases do not occur, recur, or spread to other dangerous waste at the facility.
- Where applicable, stop processes and operations, collect and contain released wastes, and/or remove isolate containers.

- Evaluate the need to evacuate part or all of the facility. Take into account the location of hazard and ensure the safety of the evacuation staging area.

- Consider shutdown of the intake air supply system, and/or retain personnel inside the facility, if necessary.

- Notify WHC Environmental Department of the incident and request assistance if necessary.

NOTE: If the reactive/corrosive chemical hazard occurs in a radiation zone, the Building Emergency Director or line management should contact Health and Safety for assistance in determining contamination controls and area postings, and in providing information for helping the Building Emergency Director assess possible hazards to human health and environment, the need for shutdowns and evacuation, and precautions to follow in isolating and eliminating the toxic fume release.

6.5.7 THERMAL REACTION HAZARDS

The Operations shift surveillance manager, or Building Emergency Director must immediately take the following actions:

- Identify the character, exact source, amount, and extent of the material(s) involved.

- Refer to the specific Material Safety Data Sheets (MSDSs) for information concerning what type of respiratory and personnel protective equipment should be used to isolate the thermal reaction hazard. The response sheets also list additional hazards that must be considered and responded to, if needed.

- If the emergency involves a hazardous waste accumulation area, contact the PUREX Facility Hazardous Waste Coordinator to identify the materials involved.

- If it is determined that assistance is required, notify the Patrol Operations Center at 811 or 3-3800, and request that the Fire Department Hazardous Material Response Team be dispatched to PUREX. Provide as much information as possible. Assign a representative to meet and direct the HMRT Team to the area of the hazard and set up a field office. An Operations representative must coordinate activities with fire department, security, etc.

- Assess possible hazards to human health and the environment (considering direct and indirect immediate effects) that may result from the hazard.

- Contact the Pacific Northwest Laboratory (PNL) Meteorology Weather Station on 3-2716 to determine the wind speed, direction, if necessary. Assess whether other facilities or locations may be affected by the spill. Notify

the Patrol Operations Center at 811 or 3-3800 and request assistance as needed.

- Take all reasonable measures necessary to ensure that fires, explosions, and releases do not occur, recur, or spread to other dangerous waste at the facility.

- Where applicable, stop processes and operations, collect and contain released wastes, and/or remove isolate containers.

- Evaluate the need to evacuate part or all of the facility. Take into account the location of hazard and ensure the safety of the evacuation staging area.

- Consider shutdown of the intake air supply system, and/or retain personnel inside the facility, if necessary.

- Notify WHC Environmental Department of the incident and request assistance if necessary.

NOTE: If the reactive/corrosive chemical hazard occurs in a radiation zone, the Building Emergency Director or line management should contact Health and Safety for assistance in determining contamination controls and area postings, and in providing information for helping the Building Emergency Director assess possible hazards to human health and environment, the need for shutdowns and evacuation, and precautions to follow in isolating and eliminating the toxic fume release.

Material Safety Data Sheets (MSDSs), chemical response sheets, provides immediate information to support decisions that need to be made by the Building Emergency Director in the event of release of hazardous material. It should be used for immediate response to a spill or release to isolate the area, and/or stop the leak. Stabilization and cleanup activities will be handled under a separate recovery plan. These sheets also list additional hazards that must be considered and responded to, if needed.

6.5.8 FLAMMABLE LIQUIDS/MATERIALS HAZARDS

The Operations shift surveillance manager, or Building Emergency Director must immediately take the following actions:

- Identify the character, exact source, amount, and extent of the material(s) involved.

- Refer to the specific Material Safety Data Sheets (MSDSs) for information concerning what type of respiratory and personnel protective equipment should be used to isolate the flammable hazard. The response sheets also list additional hazards that must be considered and responded to, if needed.

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- If the emergency involves a hazardous waste accumulation area, contact the PUREX Facility Hazardous Waste Coordinator to identify the materials involved.

- If it is determined that assistance is required, notify the Patrol Operations Center at 811 or 3-3800, and request that the Fire Department Hazardous Material Response Team be dispatched to PUREX. Provide as much information as possible. Assign a representative to meet and direct the HMRT Team to the area of the hazard and set up a field office. An Operations representative must coordinate activities with fire department, security, etc.

- Assess possible hazards to human health and the environment (considering direct and indirect immediate effects) that may result from the hazard.

- Contact the Pacific Northwest Laboratory (PNL) Meteorology Weather Station on 3-2716 to determine the wind speed, direction, if necessary. Assess whether other facilities or locations may be affected by the spill. Notify the Patrol Operations Center at 811 or 3-3800 and request assistance as needed.

- Take all reasonable measures necessary to ensure that fires, explosions, and releases do not occur, recur, or spread to other dangerous waste at the facility.

- Where applicable, stop processes and operations, collect and contain released wastes, and/or remove isolate containers.

- Evaluate the need to evacuate part or all of the facility. Take into account the location of hazard and ensure the safety of the evacuation staging area.

- Consider shutdown of the intake air supply system, and/or retain personnel inside the facility, if necessary.

- Notify WHC Environmental Department of the incident and request assistance if necessary.

NOTE: If the flammable hazard occurs in a radiation zone, the Building Emergency Director or line management should contact Health and Safety for assistance in determining contamination controls and area postings, and in providing information for helping the Building Emergency Director assess possible hazards to human health and environment, the need for shutdowns and evacuation, and precautions to follow in isolating and eliminating the toxic fume release.

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EMERGENCY NUMBERS

	2701-AB	PUREX BADGEHOUSE	3-4266 or 3-4265	PAX 283
	293-A		PAX 332	
	MO-023	-NA- unoccupied		
	MO-035	MATERIALS CONTROL TRAILER	3-1504 or 3-5266	
*	MO-273	PUREX/UO3 ADMINIS./ENGRS. TRAILER	3-1792 or 3-1273	
	MO-323	INTERNAL SURVEILLANCE TRAILER	3-1607 or 3-2020	
*	MO-347	TRAINING TRAILER	3-1240 or 3-1046	
*	MO-355	QUALITY ASSURANCE TRAILER	3-3789 or 3-2115	
*	MO-405	PUREX/UO3 PROGRAMS TRAILER	3-3785 or 3-4025	
	MO-409	LABORATORY TRAILER	3-3120 or 3-1147	
	MO-666	ALL CRAFTS TRAILER	3-5230 or 3-1431	
	MO-707	MAINTENANCE ENGINEERING TRAILER	3-1265 or 3-3014	
*	MO-946	TRAINING CLASSROOM TRAILER	3-3655 or 3-2659	
	KAISER ENGINEERS HANFORD TRAILERS		3-1288 or 3-1281	PAX 274

* Trailers located outside the double security fence

PUREX OPERATIONS SHIFT OFFICE	3-4055 OR 3-2833	PAX 247
PUREX DISPATCHER	3-2199	PAX 245

PUREX RADIO BASE STATIONS AND PORTABLE RADIO (P) NUMBERS:

OUTSIDE AREA STAGING AREA MANAGER	P-9
INSIDE AREA STAGING AREA MANAGER	P-10
PUREX DISPATCHER	STATION 17
PUREX SHIFT OFFICE	P-24

6.5.9 ASBESTOS RELEASE

The PUREX Maintenance manager is responsible for the following actions:

- Immediately notify the Operations Shift Office. Provide all known information.
- Isolate the area and warn others.

The Operations Shift Office, or the immediate manager in the Maintenance Group, shall immediately take the following actions:

- Notify the Maintenance asbestos competent person on shift. If a Maintenance competent person is not on shift, notify the designated Maintenance asbestos competent person on call. Provide all known information.
- Ensure that all facility personnel are made aware of the potential hazard by PAX announcement or provide a barrier around release area and that the appropriate information is noted in both operations and maintenance shift log books.

The Maintenance asbestos competent person shall promptly take the following actions:

- Evaluate the extent of the potential hazard. This may include an analysis of the suspect material to confirm the presence of asbestos.
- Recommend the steps to be taken immediately to minimize possible asbestos release and to protect facility personnel. These steps include actions such as installation of barricades and signs to isolate the area, specifying if disposable protective clothing and respiratory protection are required while the area is being isolated, whether cleanup and/or repair must be started immediately or can be deferred until the work can be scheduled, and whether other organizations such as the Hazardous Waste Process Engineering Unit and Safety should be notified.

Cleanup and/or repair of damaged or exposed asbestos shall be done by trained personnel. Cleanup of emergency asbestos damage or releases should be completed within 72 hours of the onset of the emergency.

NOTE: For an asbestos release, as with all other emergencies, the Building Emergency Director shall have the authority to requisition: money, equipment, personnel, or resources as necessary to control and contain the event to ensure the safety of personnel, the facility, and the environment.

EMERGENCY NUMBERS

	2701-AB	PUREX BADGEHOUSE	3-4266 or 3-4265	PAX 283
	293-A		PAX 332	
	MO-023	-NA- unoccupied		
	MO-035	MATERIALS CONTROL TRAILER	3-1504 or 3-5266	
*	MO-273	PUREX/UO3 ADMINIS./ENGRS. TRAILER	3-1792 or 3-1273	
	MO-323	INTERNAL SURVEILLANCE TRAILER	3-1607 or 3-2020	
*	MO-347	TRAINING TRAILER	3-1240 or 3-1046	
*	MO-355	QUALITY ASSURANCE TRAILER	3-3789 or 3-2115	
*	MO-405	PUREX/UO3 PROGRAMS TRAILER	3-3785 or 3-4025	
	MO-409	LABORATORY TRAILER	3-3120 or 3-1147	
	MO-666	ALL CRAFTS TRAILER	3-5230 or 3-1431	
	MO-707	MAINTENANCE ENGINEERING TRAILER	3-1265 or 3-3014	
*	MO-946	TRAINING CLASSROOM TRAILER	3-3655 or 3-2659	
	KAISER ENGINEERS HANFORD TRAILERS		3-1288 or 3-1281	PAX 274

* Trailers located outside the double security fence

PUREX OPERATIONS SHIFT OFFICE	3-4055 OR 3-2833	PAX 247
PUREX DISPATCHER	3-2199	PAX 245

PUREX RADIO BASE STATIONS AND PORTABLE RADIO (P) NUMBERS:

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INSIDE AREA STAGING AREA MANAGER	P-10
PUREX DISPATCHER	STATION 17
PUREX SHIFT OFFICE	P-24

6.6 RADIOACTIVE MATERIALS RESPONSE PLAN

6.6.1 RADIOACTIVE GASEOUS DISCHARGE - STACK ALARM

The PUREX radioactive gaseous discharge points are listed below:

Stack Identification Numbers	Location	PUREX Code
291-A-1	Main Stack (Canyon and Dissolver Offgas)	EC
296-A-1	PR Room, Q-Cell, N-Cell	EP
296-A-2	West Sample Gallery Hoods	EHW
296-A-3	East Sample Gallery Hoods	EHE
296-A-5A	Laboratory Hoods (West)	ELW
296-A-5B	Laboratory Hoods (East)	ELE
*296-A-6	East Sample Gallery and U-Cell	EGE
*296-A-7	West Sample Gallery and R-Cell	EGW
*296-A-8	White Room	EW
*296-A-10	Storage Tunnel #2	ET
*296-A-14	293-A Backup facility	EB

* Record Sample Only - No CAM

The following actions should be taken in the event of a high radioactive gaseous discharge:

- Verify alarm set point for initial estimate of radioactivity released.
- For periodic samplers, request recount of the sample. Request Health and Safety to change the current sample and have it analyzed on a priority basis. Correct for radon (^{222}Rn) and thoron (^{220}Rn) daughters as appropriate.
- Determine the release classification from the tables at the end of this section (reference WHC-CM-7-5).
- Notify the following personnel:

- Health and Safety supervisor. Request that smears be taken from the stack plots, and portable air samplers be set up to obtain additional release information.
- Health Physics Technician. Relay pertinent information and request assistance for determining stack release concentrations and hazards.
- Shift Engineer, if available. Request help in determining possible cause.
- Emergency Director at the Patrol Operations Center at 811 or 3-3800. Relay pertinent information and request assistance as required.

- Contact Westinghouse Environmental Protection Organization and identify the problem.

- Contact the Pacific Northwest Laboratory (PNL) Meteorology Weather Station (3-2716) and obtain current wind speed, direction and plume stability. Based on this information, evaluate if locations outside the PUREX exclusion area are at risk. Call 811 and request assistance in the form of road blocks, 200 Area crash alarm phone notifications, to isolate areas that may be affected.

- If the P & O Gallery CAMs alarm, notify Power Operations to verify the shutdown of the P & O Gallery wall exhausters to divert all P & O Gallery exhaust to the White Room HEPA-filtered exhaust system and the ECMP exhaust to the canyon.

- Refer to Plant Operating Procedure PO-002-110, "Emergency Response to HVAC Systems" for specific responses and adjustments to individual ventilation systems.

- Evaluate whether to initiate a partial or complete emergency HVAC shutdown. Consult with PUREX Health and Safety representative, Health and Safety Supervisor and Emergency Director.

- Initiate the "Take Cover" alarm if it has been determined that it is necessary. (See Section 6.5.3)

For more information on Radioactive Gaseous Discharges, refer to the following manuals:

WHC-CM-4-10, Radiation Protection
WHC-CM-4-12, Operational Health Physics Practices Manual
WHC-CM-4-13, Operational Health Physics Procedures Manual

High radioactive gaseous discharges are classified into three classifications as indicated below (reference WHC-CM-7-5, Part B.)

6.6.1 Radioactive Gaseous Discharge - Stack Alarm, Cont'd.

Tables P-1 and P-2 are for all sources except the 291-A main stack. Table P-3 is for the 291-A main stack only.

TABLE P-1 OFF-NORMAL EVENT

Sample	Airborne Release Concentrations (168-hour average)
Gross Beta (^{90}Sr)	9×10^{-11} uCi/ml*
Gross Alpha (^{239}Pu)	2×10^{-13} uCi/ml*
Other Radionuclides	See WHC-CM-7-5, Parts B and D

* The weekly limits for the 296-A-1, 296-A-2, and 296-A-24 stacks are 10 times the limits of Table P-1.

TABLE P-2 IMMEDIATE RESPONSE

Sample	Airborne Release Concentrations (4-hour average)
Gross Beta (^{90}Sr)**	4.5×10^{-8} uCi/ml
Gross Alpha (^{239}Pu)**	1×10^{-10} uCi/ml
Other Radionuclides	See WHC-CM-7-5, Parts B and D

** Gross alpha and beta results should be corrected for short-lived radon and thoron daughters if possible. If process knowledge indicates that radon or thoron are present, emergency response may be delayed until laboratory results are available.

TABLE P-3 MAIN STACK ONLY

	Upset/Alarm Response <24-hour sample	Routine Controls ≥24-hour sample (record)
PCL (process control limit)	Gross Alpha (^{239}Pu)* = 2×10^{-12} uCi/ml	Long-lived Alpha = 2×10^{-12} uCi/ml
	or	or
	Gross Beta (^{90}Sr)* = 9×10^{-10} uCi/ml	Long-lived Beta = 9×10^{-10} uCi/ml
LCS (limiting control setting)	Gross Alpha (^{239}Pu)* = 1×10^{-10} uCi/ml	Long-lived Alpha = 1×10^{-10} uCi/ml
	or	or
	Gross Beta (^{90}Sr)* = 4.5×10^{-8} uCi/ml	Long-lived Beta = 4.5×10^{-8} uCi/ml

* The PUREX main stack is known to contain thoron (^{220}Rn) and its daughter products (^{212}Pb, ^{212}Bi, ^{212}Po, ^{208}Tl). Air samples can be expected to contain between 5×10^{-11} uCi/ml and 1×10^{-9} uCi/ml of total alpha activity due to thoron daughters alone. An emergency should therefore not be declared unless gross alpha results exceed the ^{212}Pb concentration by 1×10^{-10} uCi/ml, or unless laboratory Alpha Energy Analysis (AEA) or the Moving Radioactive Aerosol Monitor (MFRAM) indicate elevated ^{239}Pu levels. ^{212}Pb levels can be determined by the following methods (in order of preference):

1) Laboratory Gamma Energy Analysis (GEA)
2) Interpretation of MFRAM results
3) Reported annual average ^{212}Pb concentrations

6.6.2 RADIOACTIVE LIQUID DISCHARGE - PANEL ALARM

Listed below are the liquid effluent streams and diversion capability.

Stream Identification	Stream Description	Diversion to 216-A-42 Basin	Verification Sample
CWL	Cooling Water	Yes	Yes
CSL	Chemical Sewer	Yes	Yes
SCD	Steam Condensate	Yes	Yes

The following actions must be taken in the event of a high radioactive liquid discharge alarm:

- Verify that the stream has diverted to the 216-A-42 retention basin by checking the diversion indicators on Panel B-14 in the Central Control room.
- Immediately retrieve a verification sample and survey the sample with a GM P-11 probe at the side of the sample bottle.
- Send sample to the laboratory and request priority analysis.
- Contact and assemble representatives from the PUREX Process Systems group and PUREX Nuclear Safety. Attempt to determine the source of the radioactivity in the effluent stream.

For more information on Radioactive Liquid Discharges, refer to the following manuals:

WHC-CM-4-10, Radiation Protection
WHC-CM-4-12, Operational Health Physics Practices Manual
WHC-CM-4-13, Operational Health Physics Procedures Manual

IMMEDIATE RESPONSE

Sample	Liquid Release Concentration Limits (5000 X DCG)	
Total Beta (Cribs)	5×10^{-3} uCi/ml	(5.0 uCi/l)
Total Beta (Ponds)	5×10^{-3} uCi/ml	(5.0 uCi/l)
Alpha Total (^{239}Pu)	1.5×10^{-4} uCi/ml	(1.5×10^{-1} uCi/l)
Other Radionuclides	See WHC-GM-7-5, Parts B and F	

MONTHLY GUIDELINES

Sample	Liquid Release Concentration Limits uCi/l			
	PDD	SCD	CWL	CSL
Total Beta	4.0	4.0×10^{-2}	4.0×10^{-2}	4×10^{-2}
Alpha Total	4×10^{-2}	6×10^{-4}	6×10^{-3}	8×10^{-6}*

Other Radionuclides See WHC-CM-7-5, Parts B and D
*Below Minimum Detectable Activity

EMERGENCY NUMBERS

	2701-AB	PUREX BADGEHOUSE	3-4266 or 3-4265	PAX 283
	293-A		PAX 332	
	MO-023	-NA- unoccupied		
	MO-035	MATERIALS CONTROL TRAILER	3-1504 or 3-5266	
*	MO-273	PUREX/UO3 ADMINIS./ENGRS. TRAILER	3-1792 or 3-1273	
	MO-323	INTERNAL SURVEILLANCE TRAILER	3-1607 or 3-2020	
*	MO-347	TRAINING TRAILER	3-1240 or 3-1046	
*	MO-355	QUALITY ASSURANCE TRAILER	3-3789 or 3-2115	
*	MO-405	PUREX/UO3 PROGRAMS TRAILER	3-3785 or 3-4025	
	MO-409	LABORATORY TRAILER	3-3120 or 3-1147	
	MO-666	ALL CRAFTS TRAILER	3-5230 or 3-1431	
	MO-707	MAINTENANCE ENGINEERING TRAILER	3-1265 or 3-3014	
*	MO-946	TRAINING CLASSROOM TRAILER	3-3655 or 3-2659	
*	KAISER ENGINEERS HANFORD TRAILERS		3-1288 or 3-1281	PAX 274

* Trailers located outside the double security fence

PUREX OPERATIONS SHIFT OFFICE	3-4055 OR 3-2833	PAX 247
PUREX DISPATCHER	3-2199	PAX 245

PUREX RADIO BASE STATIONS AND PORTABLE RADIO (P) NUMBERS:

OUTSIDE AREA STAGING AREA MANAGER	P-9
INSIDE AREA STAGING AREA MANAGER	P-10
PUREX DISPATCHER	STATION 17
PUREX SHIFT OFFICE	P-24

6.7 SIGNIFICANT CONTAMINATION SPREAD

6.7.1 BUILDING EMPLOYEE RESPONSE

Personnel should respond to a Continuous Air Monitor (CAM) alarm by carrying out the following activities:

- Stop breathing.
- Move one physical barrier away from the alarm to safety.
- Contact Health and Safety Supervisor and stand by for survey and contamination status.
- If the room is found to be contaminated, Health and Safety group will place the room on airborne contamination status.
- Notify Operations shift surveillance manager and Building Emergency Director.

6.7.2 BUILDING EMERGENCY DIRECTOR RESPONSE

The Building Emergency Director should respond, as applicable, by initiating the following actions:

- Call the Patrol Operations Center on 3-3800 or 811 and form a liaison with the Westinghouse Emergency Duty Officer.
- If any two of the P&O Gallery CAM's alarm, contact the Power Operator to verify the shutdown of the P&O Gallery wall exhausters to divert all P&O Gallery exhaust to the White Room HEPA filtered exhaust system and the ECMP exhaust to the canyon.
- Organize a response team made up of the Operations surveillance manager, Health and Safety manager, PUREX Process Systems manager, Nuclear Facilities Safety Manager, and other responsible managers.
- Proceed with approved plan for containment and decontamination effort per Building Emergency Director's instructions.
- Reentry will be authorized by the Building Emergency Director with concurrence from the Operations surveillance manager and Health and Safety manager.
- Follow-up notification should be made to the Patrol Operations Center on 3-3800 or 811.

For more information on significant Contamination Spread, refer to the following manuals:

WHC-CM-4-10,Radiation Protection
WHC-CM-4-12, Operational Health Physics Practices Manual
WHC-CM-4-13, Operational Health Physics Procedures Manual

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EMERGENCY NUMBERS

	2701-AB	PUREX BADGEHOUSE	3-4266 or 3-4265	PAX 283
	293-A		PAX 332	
	MO-023	-NA- unoccupied		
	MO-035	MATERIALS CONTROL TRAILER	3-1504 or 3-5266	
*	MO-273	PUREX/UO3 ADMINIS./ENGRS. TRAILER	3-1792 or 3-1273	
	MO-323	INTERNAL SURVEILLANCE TRAILER	3-1607 or 3-2020	
*	MO-347	TRAINING TRAILER	3-1240 or 3-1046	
*	MO-355	QUALITY ASSURANCE TRAILER	3-3789 or 3-2115	
*	MO-405	PUREX/UO3 PROGRAMS TRAILER	3-3785 or 3-4025	
	MO-409	LABORATORY TRAILER	3-3120 or 3-1147	
	MO-666	ALL CRAFTS TRAILER	3-5230 or 3-1431	
	MO-707	MAINTENANCE ENGINEERING TRAILER	3-1265 or 3-3014	
*	MO-946	TRAINING CLASSROOM TRAILER	3-3655 or 3-2659	
	KAISER ENGINEERS HANFORD TRAILERS		3-1288 or 3-1281	PAX 274

* Trailers located outside the double security fence

PUREX OPERATIONS SHIFT OFFICE	3-4055 OR 3-2833	PAX 247
PUREX DISPATCHER	3-2199	PAX 245

PUREX RADIO BASE STATIONS AND PORTABLE RADIO (P) NUMBERS:

OUTSIDE AREA STAGING AREA MANAGER	P-9
INSIDE AREA STAGING AREA MANAGER	P-10
PUREX DISPATCHER	STATION 17
PUREX SHIFT OFFICE	P-24

6.8 CRITICALITY

The criticality alarm system covers the west end of the 202-A building. Remote alarm indicator lights are located on the annunciator panel in the dispatcher's office.

All alarms should be interpreted as real except for planned and announced practices and drills.

6.8.1 BUILDING EMERGENCY DIRECTOR RESPONSE

Upon activation of the criticality alarm system, the Building Emergency Director is responsible for the following actions:

- Have the Staging area manager proceed to the staging area.
- If necessary, evacuate all non-essential personnel. Inform control room personnel and dispatcher to remain and activate the steady siren.
- Have dispatcher notify crane operators of the situation and to stay within the shielded cab and immediately motor to the east CMP (Crane Maintenance Platform).
- Evaluate area radiation monitor readout of crane cab.
- Call 811 or 3-3800 and inform the Westinghouse Emergency Duty Officer, and relay pertinent information. Request assistance as required.
- Inform Patrol to restrict access and exit via the 2701-AB Badgehouse. Access to be limited to emergency response personnel only.
- Segregate personnel in SWP clothing for contamination surveys. Segregate personnel who may have been involved in the criticality and perform a "quick-sort" survey. Emergency radiation detection equipment is located in the emergency kit in the Material Control Trailer, MO-035.
- Consult with the Criticality Safety Representative, Health and Safety Manager, and Process Engineering, to evaluate the available information to determine if the criticality alarm is real or false. Obtain information from the following sources:

- The criticality alarm system readout in the PIV Room. An Instrument Technician should be assigned with a required Health Physics Technician escort to determine dose rates.

- Area radiation monitor readout in the dispatcher's office.
- All stack monitor readouts and alarms. NOTE: The PR stack monitor may not alarm or show an increase as it monitors only alpha release.
- Results from the "quick-sort" survey performed on personnel.
- Personal observations from personnel who may have been involved.
- Background radiation levels around the perimeter of the building.

- Account for all personnel, report unaccounted/missing personnel to the Building Emergency Director.

If it is determined that a criticality accident has occurred, or there is a strong possibility, the following steps are to be taken by the Building Emergency Director:

- Request priority radiation monitoring assistance from other facilities. Determine radiation levels at staging area.
- If staging area is >300 c/m, or during adverse weather, instruct personnel to board evacuation buses. Personnel will be transported to the 200E Powerhouse, 284-E, for further processing.
- Request Patrol to establish road blocks to prevent personnel from approaching the area.
- Instruct Health and Safety group to define the gamma and neutron radiation levels and possible alpha contamination in the vicinity of the facility and the exclusion area fence. Post areas as necessary and record findings.

If there are no positive signs of a criticality, the Building Emergency Director shall consult with the Emergency Duty Officer and consider performing the following items:

- Request Health and Safety to initiate a dose rate and contamination urvey within the west end of the facility.
- Have Control Room operators maintain facility in a safe and secure condition.
- Reentry into the building and affected areas shall be authorized by the Building Emergency Director with concurrence from the Emergency Duty Officer and Nuclear Facility Safety.
- At any time; if dose rates, personnel contamination, information from interviews, indicate any abnormality, the alarm shall be considered real and the emergency response procedure for a criticality event shall be followed.

6.8.2 BUILDING EMPLOYEE RESPONSE

Any employee hearing the criticality alarm should:

- Immediately <u>RUN</u> to the nearest exit and get 100 feet away from the building.
- Proceed to the staging area maintaining 100 feet distance from the building and await further instructions from the Staging Area Manager.

EMERGENCY NUMBERS

	2701-AB	PUREX BADGEHOUSE	3-4266 or 3-4265	PAX 283
	293-A		PAX 332	
	MO-023	-NA- unoccupied		
	MO-035	MATERIALS CONTROL TRAILER	3-1504 or 3-5266	
*	MO-273	PUREX/UO3 ADMINIS./ENGRS. TRAILER	3-1792 or 3-1273	
	MO-323	INTERNAL SURVEILLANCE TRAILER	3-1607 or 3-2020	
*	MO-347	TRAINING TRAILER	3-1240 or 3-1046	
*	MO-355	QUALITY ASSURANCE TRAILER	3-3789 or 3-2115	
*	MO-405	PUREX/UO3 PROGRAMS TRAILER	3-3785 or 3-4025	
	MO-409	LABORATORY TRAILER	3-3120 or 3-1147	
	MO-666	ALL CRAFTS TRAILER	3-5230 or 3-1431	
	MO-707	MAINTENANCE ENGINEERING TRAILER	3-1265 or 3-3014	
*	MO-946	TRAINING CLASSROOM TRAILER	3-3655 or 3-2659	
	KAISER ENGINEERS HANFORD TRAILERS		3-1288 or 3-1281	PAX 274

* Trailers located outside the double security fence

PUREX OPERATIONS SHIFT OFFICE	3-4055 OR 3-2833	PAX 247
PUREX DISPATCHER	3-2199	PAX 245

PUREX RADIO BASE STATIONS AND PORTABLE RADIO (P) NUMBERS:

OUTSIDE AREA STAGING AREA MANAGER	P-9
INSIDE AREA STAGING AREA MANAGER	P-10
PUREX DISPATCHER	STATION 17
PUREX SHIFT OFFICE	P-24

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6.9 EXPLOSIVE MATERIALS/MUNITIONS HAZARDS

The Operations shift surveillance manager, until relieved by the Building Emergency Director will be responsible for directing the following activities:

- Identify the character, exact source, amount and extent of any released materials, (request support from Process Engineering for this effort), and maintain communications with the Building Emergency Director.
- If the emergency involves a hazardous waste storage area, contact the PUREX Facility Hazardous Waste Coordinator to identify the materials involved.
- Contact the Patrol Operations Center at 811 or 3-3800 and provide as much information as possible. Request additional assistance as needed.
- Assign a person to meet the Fire Department at the Gamewell panel at door 60. Relay pertinent information and be ready to assist in any way. Direct the Fire Department to the location of the alarm or fire.
- Set up a forward command post.
- Confer with Health and Safety and Nuclear Facility Safety for criticality/contamination controls and area postings.
- Ensure that the Fire Department Hazardous Material Response Team (HMRT) has been notified (refer to Hazardous Material Plan, Section 6.0, of the Westinghouse Emergency Preparedness Plan, WHC-CM-4-1).
- Establish a command post, and if necessary, man the post with a facility representative and a Fire Department representative.

NOTE: MSDSs, Material Safety Data Sheets, provide immediate information to support decisions that need to be made by the Building Emergency Director in the event of release of hazardous material. It should be used for immediate response to a spill or release to isolate the area, and/or stop the leak. Stabilization/cleanup activities to be handled under a separate recovery plan.

- A canyon fire shall be extinguished remotely using the systems provided. Follow procedure PO-001-050 for operating the fire fog/fire foam system.

The following items shall be considered to specifically verify a canyon fire:

- Observe the air tunnel temperature in the Power Control Room and the main stack temperature at 292-AB.
- Have electrician verify cell temperature indication.
- Observe tank temperatures in suspect cell(s).
- Observe cell differential pressure indicators.
- Observe cell cover blocks from canyon viewing windows.
- Remove cell cover blocks and visually inspect cell.

- Evaluate the need to shut down the affected exhaust ventilation system or supply system to prevent breaching of building containment.
- Activation of the fire alarm does not mean immediate evacuation is required. The Building Emergency will determine the need for evacuating all or nonessential personnel and shall follow the evacuation emergency response procedure.
- After the emergency has been terminated, all personnel involved, equipment used, and clothing worn shall be surveyed by the Health and Safety group for contamination.
- The damaged area will be examined to determine the cause of the fire/explosion and the extent of the damage, the location and status of equipment affected will be recorded.
- Items considered to be evidence with regard to cause of the incident shall be preserved as well as practical.

Re-entry into the facility shall be authorized only by the BED.

EMERGENCY NUMBERS

	2701-AB	PUREX BADGEHOUSE	3-4266 or 3-4265	PAX 283
	293-A		PAX 332	
	MO-023	-NA- unoccupied		
	MO-035	MATERIALS CONTROL TRAILER	3-1504 or 3-5266	
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PUREX OPERATIONS SHIFT OFFICE	3-4055 OR 3-2833	PAX 247
PUREX DISPATCHER	3-2199	PAX 245

PUREX RADIO BASE STATIONS AND PORTABLE RADIO (P) NUMBERS:

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INSIDE AREA STAGING AREA MANAGER	P-10
PUREX DISPATCHER	STATION 17
PUREX SHIFT OFFICE	P-24

7.0 PREVENTION OF RECURRENCE/SPREAD OF FIRES, EXPLOSIONS, OR RELEASES

To try to ensure that fires, explosions, or releases do not occur, reoccur, or spread, all PUREX operations have been reviewed to identify potential hazards and Plant Operating Procedures have been developed to minimize the occurrence of unplanned incidents. Safety systems such as automatic fire sprinklers, automatic process shutdown controls, spill containment structures, and contaminated waste stream diversion systems have been installed to assure that if an emergency event occurs the affected areas will be kept to a minimum.

Should an emergency incident occur, upon completion of the emergency response to that incident, the Building Emergency Director is responsible for analyzing the events that lead to the incident and for conducting a critique, including cause(s), impacts, and lessons learned from the incident. The requirements of DOE Order 5484.1 must be followed to ensure that all appropriate parties are aware of, and participate in decisions on the best course(s) of action to take to prevent or minimize the possibility of future occurrences.

Specific steps that may be taken for a particular incident could include:

- Isolating the site of the initial incident by shutting off power, closing off ventilation systems, etc. to minimize the spread of a release and/or the potential for a fire or explosion;
- Inspecting containment structures for cracks or leaks;
- Removing released material and waste remaining inside of containment structures as soon as possible;
- Containing and isolating residual waste material using dikes and absorbents;
- Covering or otherwise stabilizing areas where residual released materials remain to prevent migration or spread from wind or precipitation runoff;
- Installation of new facilities, systems, or equipment to enable better management of hazardous or dangerous wastes or materials.

The PUREX facility is protected by fire detection and suppression systems. Loss of fire suppression systems require alternate coverage, i.e., fire watch, other suppression system.

Fire fighting in the PUREX facility is complicated by the presence of large amounts of radioactive material which may cause contamination or criticality. The avoidance of breaching containment of the facility is extremely important.

8.0 TERMINATION OF EMERGENCY

Normally, it is a function of the Building Emergency Director to declare the termination of an emergency. However, once the WHC Emergency Organization is activated, only the Area Emergency Director or the WHC Emergency Director shall declare that an emergency has ended. If the DOE RL-EACT is activated, only the RL Director shall officially terminate the emergency. In all cases, however, the Building Emergency Director must be consulted before reentry is initiated.

9.0 ACCIDENT RECOVERY

The recovery phase of an emergency is not handled under emergency criteria, but rather according to a recovery plan developed for the specific event. Thus, the facility manager will create an emergency organization encompassing all required aspects of engineering, operations, maintenance, and functional support, with assistance provided by the Solid Waste Engineering Group and the Industrial Hygiene and Safety Department. The recovery plan will include making proper notifications to official agencies (i.e., U.S. Department of Energy, U.S. Environmental Protection Agency or Washington State Department of Ecology); recapture (where possible), storage, and disposal of any material that is released; and storage and disposal of any contaminated soil or surface water, or any other material that results from a spill, toxic fume generation, fire or explosion. The appropriate Hazardous Waste Coordinators (Attachment A) will determine where to store the wastes if the existing storage areas cannot be used.

9.1 STORAGE AND TREATMENT OF RELEASED MATERIAL

Wastes resulting from the response to a fire, explosion, or release will be cleaned up as soon as possible after the emergency is contained and controlled. If there are potential hazards involved with the cleanup, a detailed recovery plan will be developed prior to beginning the cleanup and recovery. In this event, the cleanup will not be conducted under emergency criteria, but under the provisions of the specific recovery plan. The facility manager will establish a Recovery Organization including representatives from Engineering, Operations, Maintenance, Industrial Hygiene. Safety, Environmental Compliance, The Hazardous Materials Response Unit and others, as necessary, to develop, oversee, and carry out the recovery. If there are no apparent hazards the cleanup will be conducted following normal operating procedures. The cleanup wastes will be recovered using equipment appropriate for the waste, packaged in compatible containers and stored in compliance with WAC and/or RCRA requirements until proper treatment or disposal can be conducted. The appropriate Hazardous Materials/Waste Coordinators (see Attachment A) will determine where to store the wastes if the existing storage areas cannot be used.

9.2 INCOMPATIBLE WASTE

Incompatible wastes will be stored in segregated areas in a manner that will prevent any interactions if the containers should leak. This will be accomplished with spill containment provisions or physical separation of the incompatible materials by storage in separate locations. The appropriate Hazardous Waste Coordinators (see Attachment A) will determine where to store the wastes if the existing storage areas cannot be used.

9.3 POST-EMERGENCY EQUIPMENT MAINTENANCE

After conclusion of the response action, all equipment used in the response will be decontaminated, repaired, as necessary, and inspected by the Operations shift surveillance manager to assure that it is suitable for use in any future emergency. Irreparable or expendable emergency equipment or supplies used in the response will be replaced with adequate new equipment or supplies prior to the resumption of operations.

Post-Event Checklist for Evaluating Safety
Occupancy of Structures

Building No. _____
Date _____
Page 1 of 3

I. EFFECT ON BUILDING

	No Damage	Moderate Damage	Severe Damage
Outside walls			
Windows			
Plaster			
Drywall			
Ceiling tiles			
Light fixtures			
Lavatories			
Radioactive or toxic material containment systems			

II. VISUAL OBSERVATIONS OF BUILDING STRUCTURE

	Little or No Problem	Possible Problem	Real Problem	Not Occupiable
Masonry bearing walls				
Steel framing system				
Wood framing system				
Concrete framing system				

III. EVIDENCE OF SERVICE INTERRUPTION

	Yes	No	Current Status
Electricity			
Water			
Gas			
Steam			
Telephone			

Building No. _____
Date _____
Page 2 of 3

IV. SYSTEM STATUS

	Little or No Problem	Possible Problem	Real Problem	Not Occupiable
1. Radioactive Systems or equipment				
2. Chemical System				
- Toxic				
- Reactive				
- Corrosive				
- Explosive				
3. Pressure Systems				
- Compressed gas lines				
- Pressure vessels				
4. Fluid Systems				
- Radioactive Liquid Waste				
- Process sewer line				
- Process water line				
- Sanitary water line				
- Fire sprinklers				
- Liquid metal				
- Cryogenic				
5. Electrical				
6. Thermal				
- Steam				
7. HVAC				
8. Mechanical				
- Apparatus integrity				
- Physical connections				

Building No. _____
Date _____
Page 3 of 3

	Little or No Problem	Possible Problem	Real Problem	Not Occupiable
9. Safety				
- Eyewash/safety shower	_____	_____	_____	_____
- Fire alarm	_____	_____	_____	_____
- Crash phone alarms	_____	_____	_____	_____
- Sirens & Alarms	_____	_____	_____	_____

V. INTERNAL CONDITION

	Unmoved	Moved	Over-turned	Fallen & Broken	Fallen	Broken	Don't Know
Small objects	_____	_____	_____	_____	_____	_____	_____
Furniture	_____	_____	_____	_____	_____	_____	_____
Large objects	_____	_____	_____	_____	_____	_____	_____
Equipment	_____	_____	_____	_____	_____	_____	_____

VI. OCCUPANCY ASSESSMENT

	Yes/No
Occupiable with little or no recovery effort	_____
Occupiable with moderate recovery effort	_____
Some areas occupiable, others not	_____
Occupiable after major recovery effort	_____
Not occupiable	_____
Unable to judge	_____

Statement that supports item VI finding:

Assessment Team Members

_____ _____

_____ _____

_____ _____

_____ _____

Building Number _____

Date and Time of Appraisal _____

Time received in Emergency Control Center _____

Date/Time release by Area Emergency Director for occupation _____

ATTACHMENT A
FACILITY EMERGENCY RESPONSE ORGANIZATION LISTING
(WHC-IP-0684-202A)

PUREX BUILDING EMERGENCY DIRECTOR

PRIMARY: Facility Manager

First Alternate: Facility Deputy Manager

Second Alternate: Operations Manager

THE ON-DUTY OPERATIONS SHIFT SURVEILLANCE MANAGER IS THE BUILDING EMERGENCY DIRECTOR UNTIL RELIEVED BY THE PRIMARY BUILDING EMERGENCY DIRECTOR (FACILITY MANAGER) OR ONE OF THE ABOVE LISTED.

STAGING AREA MANAGERS

INSIDE PROTECTED AREA:

PRIMARY: Manager, Facility & Operational Assurance
ALTERNATES: Manager, Job Control
Supervisor, Waste Handling

OUTSIDE PROTECTED AREA:

PRIMARY: Manager, Plant Engineering

ALTERNATES: Manager, Support
Principal Act Engineer

THE ON-DUTY LABORATORY MANAGER IS THE STAGING AREA MANAGER DURING OFF-SHIFTS.

PERSONNEL ACCOUNTABILITY AIDES

202-A -- PUREX PLANT

PRIMARY: Manager, Power Operations
Alternates: Engineer, Operations Support
Engineer, Facility Operational Assurance

271-AB -- PUREX BUILDING ANNEX (MAINTENANCE and PLANNING AREA)

PRIMARY: Planner/Scheduler
Alternates: Manager, Maintenance Planning
Planner/Scheduler

2701-AB -- PUREX BADGEHOUSE

PRIMARY: SHIFT LIEUTENANT
(per post orders)

MO-023 -- UNOCCUPIED TRAILER

MO-035 -- PUREX MATERIALS CONTROL TRAILER

PRIMARY: Material Specialist
Alternate: Material Coordinator

MO-273 -- PUREX/UO3 ADMINISTRATION/ENGINEERS TRAILER

PRIMARY: Manager, Regulatory Compliance
Alternates: Manager, Effluent Systems
Manager, Technology Support

MO-323 -- PUREX SURVEILLANCE AND TESTING CONTROL TRAILER

PRIMARY: Manager, Surv. & Test. Ctrl.
Alternates: Planner/Scheduler
Planner/Scheduler

MO-347 -- PUREX TRAINING ADMINISTRATION TRAILER

PRIMARY: Manager, Training & Oversight
Alternates: Training Administrator
Training Instructor

MO-355 -- PUREX QUALITY ASSURANCE TRAILER

PRIMARY: Manager, Administration
Alternates: Activities Administrator
Staff Assistant

MO-405 -- PUREX PROGRAMS TRAILER

PRIMARY: Manager, Systems Engineering
Alternate: Engineer, Mechanical Engineering

MO-409 -- PUREX LABORATORY TRAILER

PRIMARY: Manager, Analytical Laboratory
Alternates: Supervisor, Laboratory
Supervisor, Laboratory

MO-707 -- PUREX MAINTENANCE ENGINEERING TRAILER

PRIMARY: Engineer
Alternate: Engineer

MO-946 -- PUREX TECHNICAL TRAINING TRAILER

PRIMARY: Training Instructor
Alternate: Assistant Instructor

FOR ALL KAISER ENGINEERS HANFORD TRAILERS AT PUREX
(KAISER SUPERINTENDENT/ENGINEERS TRAILER, KAISER ALL CRAFT TRAILER, KAISER ELECTRICIANS TRAILER, KAISER PIPEFITTERS TRAILER)

PRIMARY: Superintendent
Alternate: Engineer

VOLUNTEER BOMB SEARCH TEAM

REFER TO WHC-IP-0684-202A, PUREX FACILITY EMERGENCY RESPONSE ORGANIZATION PHONE LISTING.

VOLUNTEER HAZARDOUS WASTE COORDINATORS TEAM

REFER TO WHC-IP-0684-202A, PUREX FACILITY EMERGENCY RESPONSE ORGANIZATION PHONE LISTING.

VOLUNTEER EVACUATION BUS DRIVERS

REFER TO WHC-IP-0684-202A, PUREX FACILITY EMERGENCY RESPONSE ORGANIZATION PHONE LISTING.

APPENDIX 1
HAZARDOUS WASTE LOCATIONS AND EMERGENCY RESPONSE MATRIX

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HAZARDOUS WASTE LOCATION AND EMERGENCY RESPONSE MATRIX

PURPOSE: THE PURPOSE OF THIS MATRIX IS TO LIST THE REQUIRED RESPONSES (BY DOCUMENT REFERENCE) TO CREDIBLE EVENTS WITH RESPECT TO SPECIFIC AREAS/ITEMS, WHICH ARE A PART OF THE PUREX FACILITY.

THE KEYS TO CREDIBLE EVENTS AND HAZARD CODES ARE AS LISTED.

CREDIBLE EVENTS	* HAZARD CODES
SLR - SPILLS/LEAKS/RELEASES	MW - MIXED WASTE
F - FIRE	HLW - HIGH LEVEL WASTE
EX - EXPLOSION	LLW - LOW LEVEL WASTE
SE - SEISMIC EVENT	TRU - TRANSURANIC WASTE
	C - CORROSIVE
	I - IGNITABLE
	T - TOXIC MATERIALS

* CORROSIVE, TOXIC, AND IGNITABLE DEFINITIONS ARE FROM 40 CFR 261 SUBPART C. THE DEFINITIONS FOR THE VARIOUS TYPES OF RADIOACTIVE WASTE ARE FROM WHC-EP-0063, SECTION 2.

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NO.	AREAS/ITEM DESCRIPTION	LOCATION	CREDIBLE EVENT	HAZARD CODE	RESPONSE (REFERENCES) DOCUMENT	SECTION(S)
1.	PUREX Storage Tunnels for discarded radioactive equipment. Tunnels 218-E-14 and 218-E-15.	East end of the 202-A Building. The tunnels are an extension of the PUREX railroad tunnel and extend southward from the building.	SE	HLW, I, MW, T, TRU	WHC-IP-0263-202A PO-100-040	6.4.2 6.5.1 through 6.5.8
2.	PUREX Canyon Waste Piles (lead waste pile)	Upper surface of cover blocks and the hot-pipe trench side around the area of TK-D5.	SE	MW, T	WHC-IP-0263-202A	6.4.2 6.5.1
3.	Canyon Tanks:	In the 202-A Building Canyon: TK-E5 near the east end in E Cell. All Fxx tanks are located in F Cell with E-F11 being the easternmost of the F Cell tanks listed and TK-F18 being the western-most TK-G7 near center (east-west) and west of G-Cell.	F, SE		WHC-IP-0263-202A	6.3.3 6.4.2 6.5.1 6.5.3
	TK-E5			C, MW, T, TRU		
	E-F11, TK-G7			C,MW, T,LLW	PO-001-010	
	TK-F15, TK-F16			C,MW, T,HLW	PO-001-050 PO-001-065	
	TK-F18			C,MW T,LLW		

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NO.	AREAS/ITEM DESCRIPTION	LOCATION	CREDIBLE EVENT	HAZARD CODE	RESPONSE (REFERENCES) DOCUMENT	SECTION(S)
4.	The Sample Gallery	The Sample Gallery extends east and west in the 202-A Building. It is 20 feet wide and has a floor area of approximately 19,000 sq. ft. It is located above the Storage Gallery and below the P&O Gallery.	F, SE, SLR	C, LLW, MW, T, TRU	WHC-IP-0263-202A	6.3.3 6.4.2 6.5.1 through 6.5.8 6.9
					PO-001-190 PO-020-290 PO-100-230 PO-100-240 PO-100-250	
5.	PUREX Laboratory (Satellite Accumulation Area)	West end of Laboratory, isolated in a small room, on the first floor of the East Service Annex and on the same level as the P&O Gallery.	F, SE, SLR	C, MW, T, TRU	WHC-IP-0263-202A	6.3.3 6.4.2 6.5.1 through 6.5.8
					PO-020-290 PO-100-100 SD-CD-LB-003 LO-100-201 LO-100-202 LO-100-223 LO-100-224 LO-100-232 LO-100-233	

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NO.	AREAS/ITEM DESCRIPTION	LOCATION	CREDIBLE EVENT	HAZARD CODE	RESPONSE (REFERENCES) DOCUMENT	SECTION(S)
6.	Tanks U3 and U4 used for accumulation of PUREX Laboratory waste, Main Stack (291-A) condensate, flushings and railroad car decontamination rinsings.	Adjacent to the north side of Building 202-A and at the east end of the building.	SE, SLR	C, MW, T	WHC-IP-0263-202A PO-001-080 PO-240-200 PO-500-060	6.4.2 6.5.1 through 6.5.8
7.	PUREX Hot Shop and Hot Shop Lobby.	In 202-A Building at the west end of the cell row and at cell row level.	EX, F, SE, SLR	C, LLR, MW, T	WHC-IP-0263-202A PO-100-230 PO-100-240 PO-100-250	6.3.3 6.4.2 6.5.1 through 6.5.8
8.	Product Removal (PR) Room and N-Cell. The PR Room is used for filling and shipping containers and for sampling plutonium nitrate. N-Cell is used for the preparation of plutonium oxide powder.	The PR Room is at the west end of the Storage Gallery adjacent to L-Cell. N-Cell is in the Storage Gallery west of the PR Room.	F, SE, SLR	C, I, MW, T, TRU LLW	WHC-IP-0263-202A PO-001-075 PO-001-140 PO-020-290 PO-100-100 PO-100-250	6.3.3 6.4.2 6.5.1 through 6.5.8

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NO.	AREAS/ITEM DESCRIPTION	LOCATION	CREDIBLE EVENT	HAZARD CODE	RESPONSE (REFERENCES) DOCUMENT	SECTION(S)
9.	East and West Crane Maintenance Platforms used for maintenance of cranes, repair, modification, decontamination of items relevant to crane operation. The platforms are approximately 30 feet wide by 60 feet long.	Located at Crane Cab level on both east and west ends of the Craneway.	F, SE,	LLW, MW	WHC-IP-0263-202A PO-020-290 PO-100-230 PO-100-240 PO-100-250	6.3.3 6.4.2 6.5.4
10.	PUREX Hazardous Waste Accumulation Area, 214-A Building	The north end of the 214-A Building. The storage area is a single bay.	EX, F SE SLR	C, I, T	WHC-IP-0263-202A PO-020-290 PO-100-121	6.3.3 6.4.2 6.5.1 through 6.5.8
11.	Neutralization Tank, SPLP-K4, PDD Sample Pot (Not used. Previously used for sampling and neutralization.)	Located in the Canyon above the K4 concentrator in K-Cell.	SLR	C, MW	WHC-IP-0262-202A PO-020-290	6.5.3 6.5.6

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NO.	AREAS/ITEM DESCRIPTION	LOCATION	CREDIBLE EVENT	HAZARD CODE	RESPONSE (REFERENCES) DOCUMENT	SECTION(S)
12.	Demineralizer regenerant, 211-A Building. The regenerants are batched as needed. The cation units regenerated with sulphuric acid and the anion unit are regenerated with sodium hydroxide.	Approximately 50 feet north of the 202-A Building.	F, SE, SLR	C	WHC-IP-0263-202A PO-020-020 PO-020-290 PO-100-121 PO-100-200	6.3.8 6.4.2 6.5.3 6.5.4 6.5.6
13.	Hazardous Waste Satellite Accumulation Areas:	Maintenance Shop	EX, F SE		WHC-IP-0263-202A	6.3.8 6.4.2 6.5.2
	a. Mercury (Light bulb Crusher)	Near Electrical Shop		T	PO-020-290 PO-020-121	6.5.4 6.5.5
	b. Aerosol Cans	Near Hallway Shop		T		6.8
	c. Oil and Solvent Rags	Near North Shop Door		I, T		
	d. D.O.P. Light Ballast	Near North Shop Door				
14.	Sample Gallery Mixed Waste Satellite Accumulation Areas	Sample Gallery:	EX, F, SE		WHC-IP-0263-202A	6.3.8 6.4.2
	a. Mercury (light bulb Crusher)	Near west end of Sample Gallery		MW, T		6.5.2 6.5.4
	b. Aerosol Cans	Near door to SWP Lobby		MW, T		6.5.5 6.8
	c. Oil and Solvent Rags	Near door to SWP Lobby		I, MW T	PO-001-090 PO-020-290 PO-020-230	

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NO.	AREAS/ITEM DESCRIPTION	LOCATION	CREDIBLE EVENT	HAZARD CODE	RESPONSE (REFERENCES) DOCUMENT	SECTION(S)
15.	Canyon Lobby Satellite Accumulation Areas	Canyon Lobby	SE		WHC-IP-0263-202A	6.4.2
	a. TRU			TRU	PO-001-090 PO-020-290	
	b. TRU Mixed Waste			MW, T, TRU	PO-100-100	
16.	Sample Gallery 90-Day Accumulation Areas	Just west of stair-well to SWP Lobby	EX, F, SE, SLR		WHC-IP-0263-202A	6.3.3 6.4.2 6.5.1 through 6.5.8 6.9
	a. Mixed Waste			MW		
	b. TRU			TRU	PO-001-090 PO-020-290	
	c. TRU-Mixed Waste			TRU MW	PO-100-230 PO-100-100	

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APPENDIX 2

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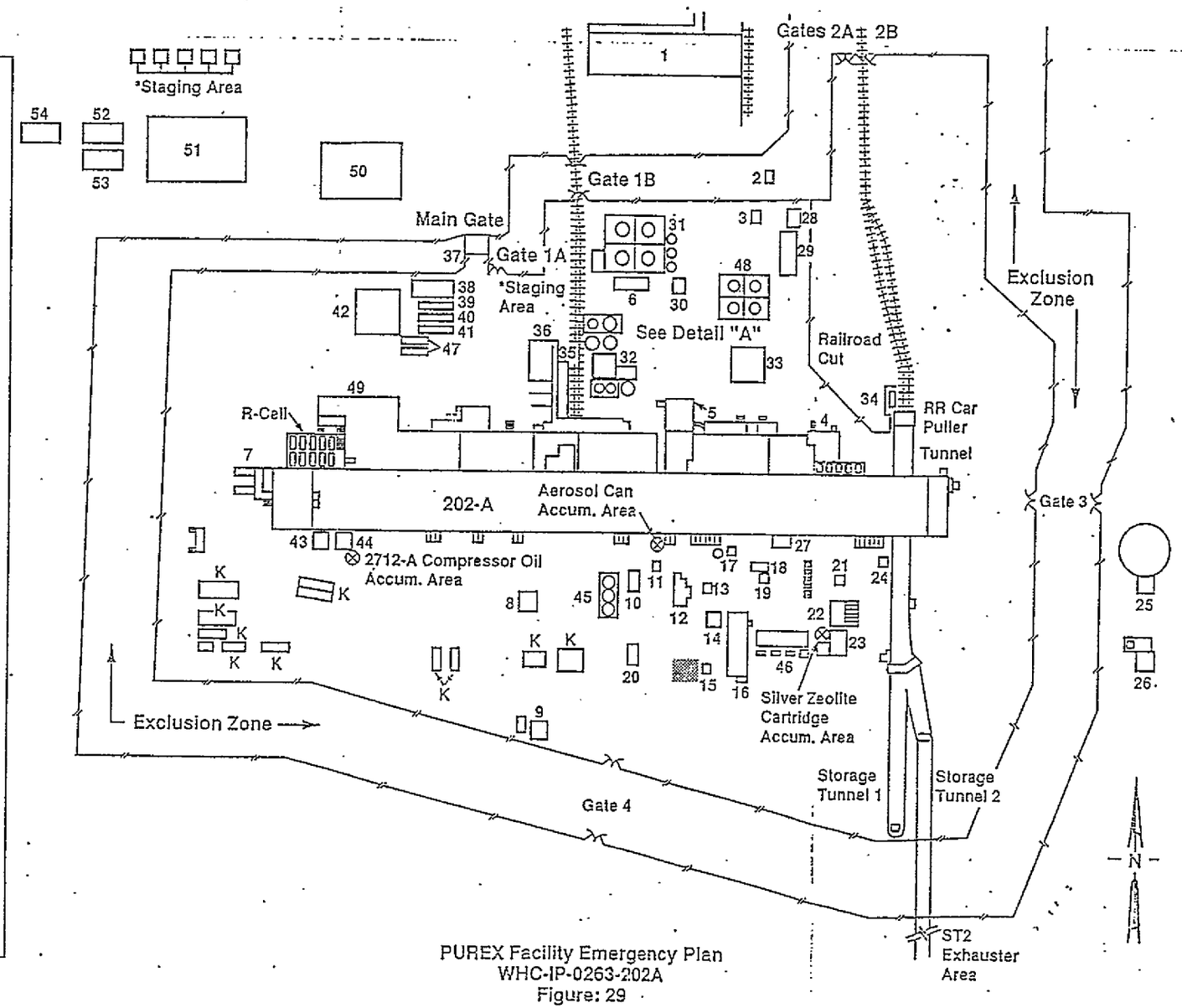
PUREX Facility Regulated Hazardous Waste Locations

Legend

1. 275-EA Warehouse
2. CSL PIT
3. 295-AC CSL (Chem. Sewer)
4. 206-A Fractionator
5. Laboratory Sample Receiving Dock
6. 203-A UNH Pump House/Control Room
7. PR-Dock
8. 295-AB PDD (Process Distillate Discharge)
9. A-4 PIT/PDD PIT
10. 213-A Reg. Maint. Workshop
11. 291-AB Sample Shack
12. Shielded Valve Pit
13. 291-AC Instrument Shack
14. 291-AG Instrument Shack
15. 291-AJ Instrument Shack
16. 291-AE #4 Filter Bldg.
17. 295-AA SCD (Steam Condensate Discharge)
18. 291-AH Ammonia Off Gas Filter Bldg.
19. 291-AH Ammonia Off Gas Sampler Bldg.
20. South End Change Shack
21. 294-A Instr. Shack
22. 293-A Dissolver Off Gas Bldg.
23. 292-AB Main Stack Bldg.
24. 295-A ASD (Ammonia Scrubber Discharge)
25. 201-A Pump PIT
26. 295-AD CWL (Cooling Water Line)
27. 212-A Load Out
28. 252-A
29. 281-A Emergency Generators
30. MO-332
31. 203-A Storage Area
32. 211-A Demineralizer Bldg.
33. MO-409 Laboratory Trailer
34. Railroad Storage Shed
35. 214 A, B, C, D
36. 2714-A
37. 2701-A Badge House
38. MO-035 Material Control Trailer
39. MO-707 Maintenance Engineering Trailer
40. MO-323 Internal Surveillance Trailer
41. MO-655 All Crafts Trailer
42. MO-023 Unoccupied
43. 2711-A-1
44. 2712-A
45. Empty Tanks
46. 291-A Exhaust Fans
47. 202-A-1 Storage Unit
48. Sodium Hydroxide Tanks (Empty)
49. 271-AB
50. MO-273 PUREX/UO_3 Administration/Engrs. Trailer
51. MO-405 PUREX/UO_3 Programs Trailer
52. MO-355 Quality Assurance Trailer
53. MO-347 Training Trailer
54. MO-346 Technical Training Trailer

⊗ Satellite Accumulation Area



PUREX Facility Emergency Plan
WHC-IP-0263-202A
Figure: 29

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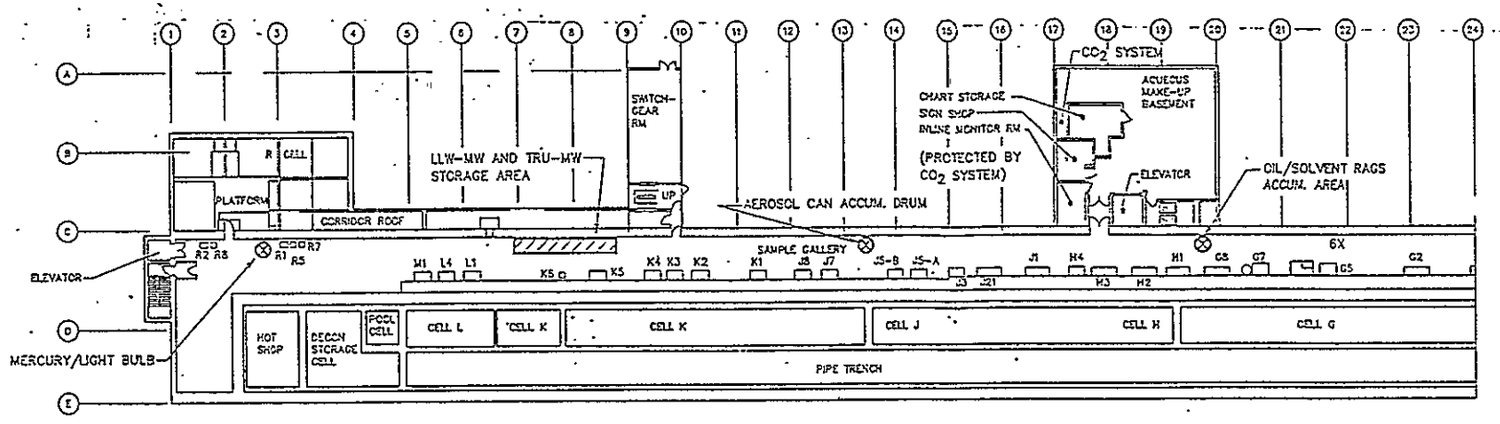
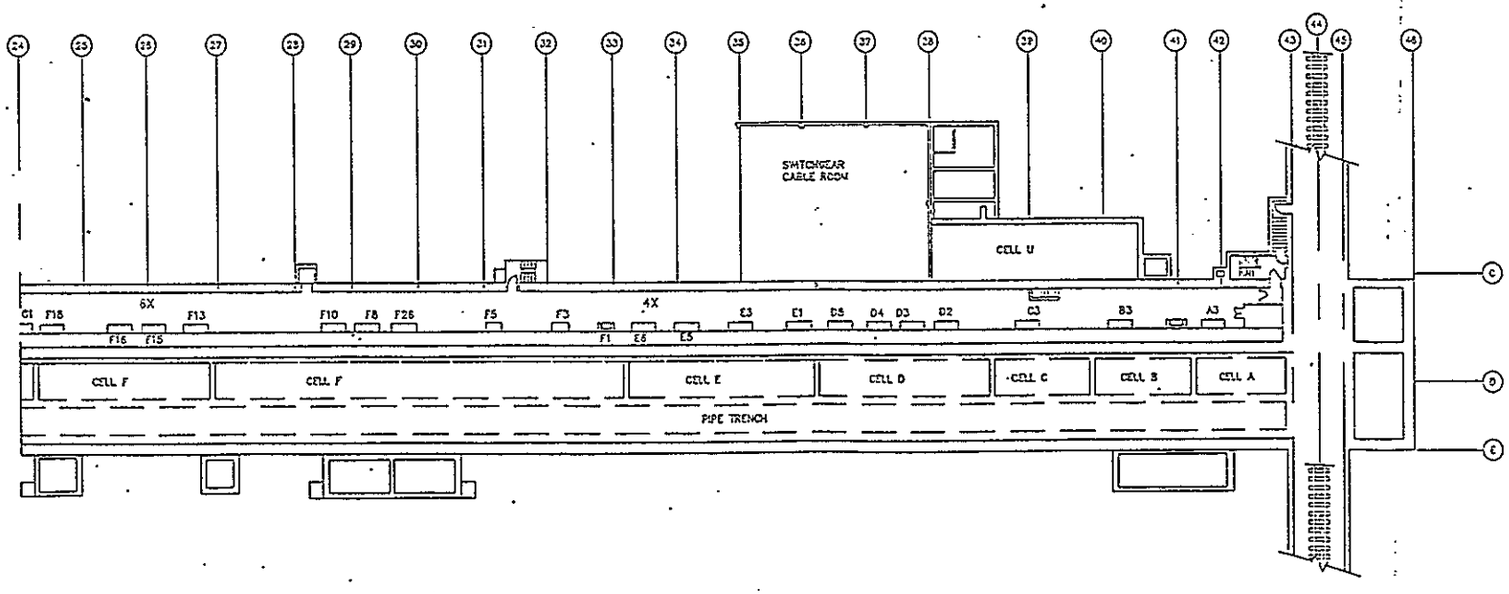


NORTH

LEGEND

⊗ SATELLITE ACCUMULATION AREAS

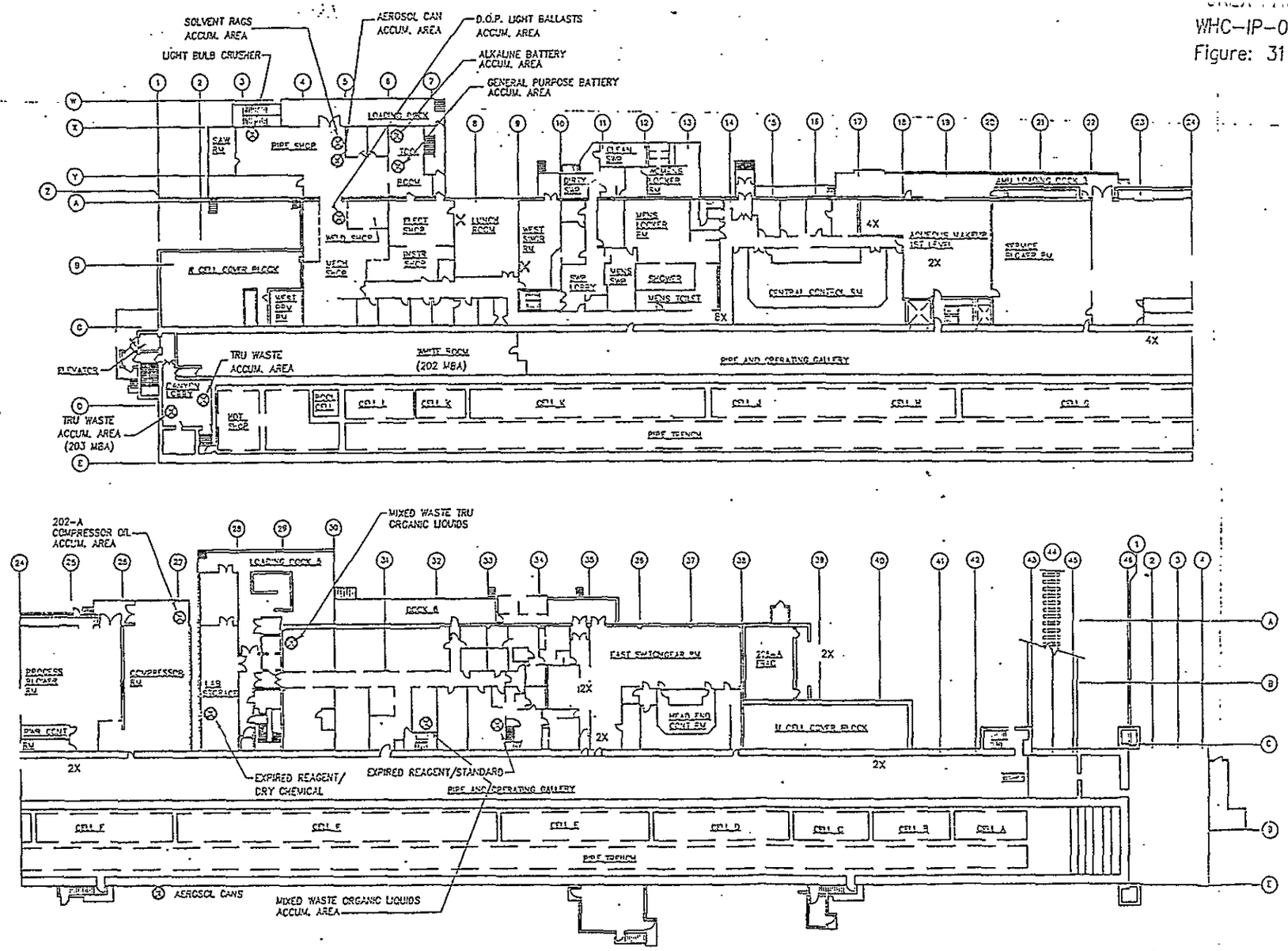


Appendix 3

SAMPLE GALLERY REGULATED HAZARDOUS WASTE LOCATIONS

ELEVATION – 700'-3"

CADFILE: HAZ-SAM.DWG



LEGEND

⊗ SATELLITE ACCUMULATION AREAS

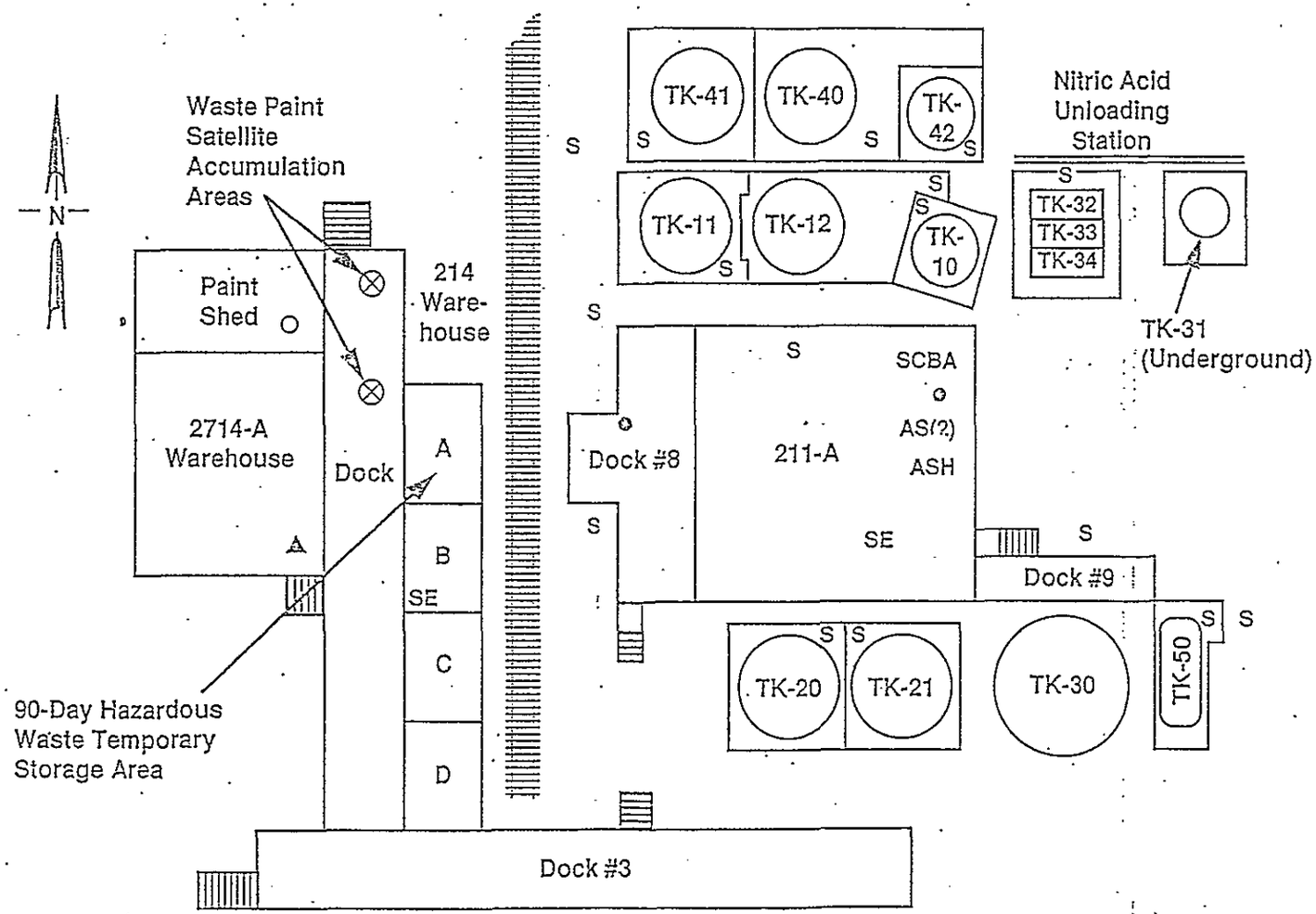
P & O GALLERY REGULATED HAZARDOUS WASTE LOCATIONS

ELEVATION – 712'-0"

CADFILE: HAZ-PO.DWG

Detail "A" - 211-Area PUREX Facility

Emergency Equipment/Regulated Hazardous Waste Locations



PUREX Facility Emergency Plan
WHC-IP-0263-202A
Figure: 32

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APPENDIX 3
REGULATED HAZARDOUS WASTE LOCATIONS

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APPENDIX 4
BOMB THREAT INFORMATION FORM

Westinghouse Hanford Company

PLACE THIS CARD ON BACK OF YOUR TELEPHONE

QUESTIONS TO ASK

1. When is bomb going to explode?
2. Where is it right now?
3. What does it look like?
4. What kind of bomb is it?
5. What will cause it to explode?
6. Did you place the bomb?
7. Why?
8. What is your address?
9. What is your name

EXACT WORDING OF THE THREAT

FOLD

Sex of Caller _____ Race _____

Age _____ Length of Call _____

Number at which call is received

Time _____ Date ____/____/____

80-9100-201 (12/87)

BOMB THREAT

CALLER'S VOICE

- ☐ Calm
- ☐ Angry
- ☐ Excited
- ☐ Slow
- ☐ Rapid
- ☐ Soft
- ☐ Loud
- ☐ Laughter
- ☐ Crying
- ☐ Normal
- ☐ Distinct
- ☐ Slurred
- ☐ Nasal
- ☐ Stutter
- ☐ Lisp
- ☐ Raspy
- ☐ Deep
- ☐ Ragged
- ☐ Clearing throa
- ☐ Deep breathin
- ☐ Cracking Voice
- ☐ Disguised
- ☐ Accent
- ☐ Familiar

If voice is familiar, who did it sound like?

BACKGROUND SOUNDS

- ☐ Street Noises
- ☐ Crockery
- ☐ Voices
- ☐ PA System
- ☐ Music
- ☐ House noises
- ☐ Motor
- ☐ Office machinery
- ☐ Factory machin
- ☐ Animal noises
- ☐ Clear
- ☐ Static
- ☐ Local
- ☐ Long distance
- ☐ Booth
- ☐ Other

THREAT LANGUAGE

- ☐ Well spoken (Educated
- ☐ Foul
- ☐ Irrational
- ☐ Incoherent
- ☐ Taped
- ☐ Message read by threat make

REMARKS _____

Report call immediately to

Call 811

Call Bldg. Emergency Director

Date _____

Name _____

Position _____

Phone No. _____

CARD PLACEMENT
1. Fold card on lines indicated
2. Attach to back of telephone with paper clips, red "Bomb Threat" lettering toward front.

80-9100-201R1

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APPENDIX 8A

TRAINING COURSE DESCRIPTIONS

APPENDIX 8A

CONTENTS

8A.1 GENERAL COURSES . . . . . APP 8A-1

8A.2 UNIT-SPECIFIC COURSES . . . . . APP 8A-4

8A.3 JOB-SPECIFIC COURSES . . . . . APP 8A-5

8A.4 ENVIRONMENTAL AND HAZARDOUS MATERIAL SAFETY TRAINING . . . . APP 8A-14

8A.1 GENERAL COURSES	
Title	Radiation Safety Training
Description	Course instructs radiation workers in the fundamentals of radiation protection and the proper procedures for monitoring exposures.
Target audience	Radiation workers
Delivery	Classroom
Evaluation	Written test and practical dress/undress exercise
Length	7 hours
Frequency	24 months by completion of radiation safety requalification
Title	Radiation Safety Requalification
Description	Course instructs radiation workers in the fundamentals of radiation protection and the proper procedures for monitoring exposures.
Target audience	Radiation workers
Delivery	Classroom or computer-based training
Evaluation	Written test and practical dress/undress exercise
Length	7 hours
Frequency	24 months
Title	New Employee Safety Training
Description	Course covers U.S. Department of Energy Orders and applicable policies pertaining to employer and employee rights and responsibilities, general radiation training, hazardous waste, fire prevention, personal protective equipment, safety requirements, accident reporting, and avenues for addressing safety concerns.
Target audience	All new employees
Delivery	Classroom
Evaluation	Not applicable
Length	3 hours
Frequency	Not applicable

1	Title	Hanford General Employee Training
2	Description	Course covers U.S. Department of Energy orders and policies pertaining to employer and employee rights and responsibilities, general radiation training, hazardous communications and hazardous waste, fire prevention, personal protective equipment, safety requirements, accident reporting, and avenues for addressing safety concerns.
3	Target audience	All employees
4	Delivery	Computer-based training/interactive video
5	Evaluation	Computer generated questions
6	Length	4-6 hours
7	Frequency	12 months
8		
9	Title	On-the-Job Training Instructor Training
10	Description	Course provides an instructional approach to the planning, implementation, and evaluation of on-the-job training. Includes role-model demonstration exercise and practice with critique.
11	Target audience	Identified bargaining unit, exempt personnel
12	Delivery	Classroom
13	Evaluation	Practical exercise
14	Length	12 hours
15	Frequency	Not applicable
16		
17	Title	Building Emergency Director Training
18	Description	Course provides an overview of building emergency director responsibilities, identifies the building emergency organizations, reviews building emergency plan, and discusses drill and exercise requirements.
19	Target audience	Primary and alternate building emergency directors and members of a building emergency organization
20	Delivery	Classroom
21	Evaluation	Written test
22	Length	2 hours
23	Frequency	12 months

Title	Orientation to U.S. Department of Energy Order 5000.3A Occurrence Reporting
Description	Course is designed to familiarize personnel with the U.S. Department of Energy Order 5000.3A *Occurrence Reporting and Processing of Operations Information.* Course provides information on Order requirements and the changes made to occurrence reporting and processing of operational information.
Target audience	Personnel involved in occurrence reporting
Delivery	Classroom
Evaluation	Not applicable
Length	1.5 hours
Frequency	Not applicable

Title	Managers Conduct of Operations
Description	Indepth discussion of U.S. Department of Energy Order 5480.19, conduct of operations requirements for U.S. Department of Energy sites, and application of requirements to the TSD units.
Target audience	Management
Delivery	Classroom
Evaluation	Not applicable
Length	16 hours
Frequency	Not applicable

Title	First-Line Managers Conduct of Operations
Description	Indepth discussion of U.S. Department of Energy Order 5480.19, conduct of operations requirements for U.S. Department of Energy sites, and application of requirements to TSD units plus practical plant walkthrough.
Target audience	Management
Delivery	Classroom and walkthrough unit
Evaluation	Not applicable
Length	24 hours
Frequency	Not applicable

8A.2 UNIT-SPECIFIC COURSES	
Title	PUREX Plant Orientation
Description	Course is a video tape accompanied by oral discussion on PUREX Facility manuals, radiation work permits, safety showers, radioactive and nonradioactive hazards, material safety data sheets, evacuation, staging areas, instruction for evacuation, special work permit procedures, as low as reasonably achievable policy, continuous alarm monitor alarms, security, self-survey, and specific radiation hazards.
Target audience	All personnel assigned to perform work in the PUREX Facility
Delivery	Classroom
Evaluation	Not applicable
Length	1 hour
Frequency	Not applicable
Title	Building Emergency Plan Checklist (Appendix 7A)
Description	Course provides the information managers are required to discuss with employees. The checklist is contained in the building emergency plan. The building emergency plan covers designated PUREX Facility buildings.
Target audience	All PUREX Facility employees, including contractor personnel
Delivery	Classroom
Evaluation	Not applicable
Length	2 hours
Frequency	12 months

8A.3 JOB-SPECIFIC COURSES	
Title	General Radio-Chemical Operator Training
Description	Course consists of self-study, using a manual that covers in general terms the following topics for 200 Areas processing and TSD units including the PUREX Facility: • Introduction • Mathematics • Chemistry • Security • Industrial safety • Emergency preparedness • Radiation safety • Environmental protection • Criticality prevention • Nuclear materials management • Instrumentation • Process and equipment.
Target audience	Nuclear operators (i.e., operator trainee, 18-month nuclear operator, 30-month nuclear operator, 42-month nuclear operator, and nuclear process operator) and PUREX shift surveillance managers.
Delivery	Classroom or self-study
Evaluation	Written test
Length	Average = 80 hours
Frequency	12 months for operator trainee through nuclear operator 42-month levels; 24 months for nuclear process operator level; (not applicable for PUREX shift surveillance managers).
Title	PUREX Unit-Specific Training-Nuclear Operators
Description	Course is designed to establish a general understanding and comprehension of the PUREX Plant operation and process for operation personnel.
Target audience	Nuclear operators assigned to the PUREX Plant (i.e., operator trainee, 18-month nuclear operator, 30-month nuclear operator, 42-month nuclear operator, and nuclear process operator) and PUREX shift surveillance managers.
Delivery	Self-study
Evaluation	Written test
Length	Average = 80 hours
Frequency	24 months (not applicable for PUREX shift surveillance managers).

Title	PUREX Nuclear Operator- Solid Waste Handling
Description	Course is designed for the PUREX Plant nuclear operators who sort, store temporarily, package, and prepare for shipment, the normal and extraordinary solid/mixed/hazardous waste including failed equipment generated by the normal operations of the PUREX Plant.
Target audience	Nuclear operators, shift surveillance managers, and other identified solid, mixed, and hazardous waste handlers.
Delivery	Classroom or self-study
Evaluation	Written test
Length	40 hours
Frequency	24 months

Title	PUREX Emergency Procedures and Abnormal Plant Conditions Training for Nuclear Process Operators
Description	Course consists of a review of abnormal and emergency conditions that could occur in the PUREX Plant associated alarms and communications, and proper responses.
Target audience	Nuclear Process Operators, beginning 12 months after completion of general radio-chemical operator and plant specific training.
Delivery	Self-study
Evaluation	Written test
Length	Average = 20 hours
Frequency	14 months **SPECIAL NOTE:** To comply with the U.S. Department of Energy training requirement for nonreactor nuclear facility operations personnel, nuclear process operators must complete emergency training at least annually. This course must be completed by nuclear operators at the nuclear process operator level in conjunction with the general radio-chemical operator and plant-specific requalification courses. To achieve this, the requalification courses will be completed one year, the emergency procedures and abnormal plant conditions training the next year, then the requalification courses, then the emergency procedures and abnormal plant conditions training, etc. In this way, nuclear process operators complete annual emergency training.

1	Title	PUREX Shift Surveillance Manager Certification
2	Description	Course covers the following topics: • Administrative information • Plant technical information • Plant safety analysis reports • Operational safety requirements • Radiation work procedures • Jobs conducted in the area of assigned responsibility • Processes • Equipment.
3	Target audience	Shift Surveillance Managers and PUREX Operations Manager
4	Delivery	Self-study and on-the-job training
5	Evaluation	Written test and on-the-job training checklist
6	Length	Average = 36 hours
7	Frequency	24 months
8		
9	Title	PUREX Shift Surveillance Manager Emergency Procedures and Abnormal Plant Conditions Training
0	Description	Course is designed to be a review of abnormal and emergency conditions that could occur in the PUREX Plant, associated alarms and communications, and proper responses: • General • Plant • Processes • Equipment.
11	Target audience	Shift Surveillance Managers and PUREX Operations Manager
12	Delivery	Self-study and on-the-job training
13	Evaluation	Written test
14	Length	Average = 16 hours
15	Frequency	12 months

1	Title	Health Physics Technician Trainee Certification
2	Description	Course consists of the following topics: • Academics • Radiation protection practices • Emergency response • Radiation safety • Criticality safety • Industrial safety • Practical exercises - Dress/undress - Establishing radiation areas and control points - Surveying radiation-generating machines - Release surveying - Estimating exposure - Detailed radiological survey.
3	Target audience	Health physics technician trainee
4	Delivery	Classroom
5	Evaluation	Written test
6	Length	Average = 170 hours
7	Frequency	Not applicable. The health physics technician trainee must complete the Health Physics Technician Certification within 15 to 18 months of this course completion, including on-the-job training courses.

1	Title	Health Physics Technician Trainee General On-the-Job Training
2	Description	Course includes the following topics: • Manuals • Records and reports • Exposure control - Dosimetry - Survey techniques • Instrumentation • Qualitative respirator fit • Routine radiological control • Job planning - Radiological postings - Hazards analysis • Abnormal conditions and emergencies - Criticality - Radiation area injuries - Personnel decontamination - Radioactive spills - Area evacuation - Continuous alarm monitor alarm response.
3	Target audience	Health physics technician trainee
4	Delivery	On-the-job training
5	Evaluation	On-the-job training checklist
6	Length	Average = 200 hours
7	Frequency	24 months
8		
9	Title	Health Physics Technician Trainee PUREX Plant On-the-Job Training
10	Description	Course includes the following tasks: • Decontamination and decommissioning • General monitoring and applicable routines • Isolation and stabilization monitoring • High-efficiency particulate air filter change • Construction coverage • Routine coverage • Storage tunnels.
11	Target audience	Health physics technician trainee
12	Delivery	On-the-job training
13	Evaluation	On-the-job training checklist
14	Length	Average = 200 hours
15	Frequency	24 months

1	Title	Health Physics Technician Certification
2	Description	Course includes the following topics: • Academics • Radiation protection practices • Radiological work planning and briefing • Radiation safety • Criticality safety • Emergency response • Practical exercise--radiation detection instrumentation.
3	Target audience	Health physics technician
4	Delivery	Classroom
5	Evaluation	Written test
6	Length	Average = 168 hours
7	Frequency	Not applicable. The health physics technician must complete the Senior Health Physics Technical Certification within 15 to 18 months of this course completion, including on-the-job training.
8		
9	Title	Health Physics Technician General On-the-Job Training
10	Description	Course includes the following topics: • Manuals • Records and reports • Exposure control - Dosimetry - Survey techniques • Instrumentation • Qualitative respirator fit • Routine radiological control • Job planning - Radiological postings - Hazards analysis • Abnormal conditions and emergencies - Criticality - Radiation area injuries - Personnel decontamination - Radioactive spills - Area evacuation - Continuous alarm monitor alarm response.
11	Target audience	Health physics technician
12	Delivery	On-the-job training
13	Evaluation	On-the-job training checklist
14	Length	Average = 200 hours
15	Frequency	24 months

1	Title	Health Physics Technician PUREX Plant On-the-Job Training
2	Description	Course includes the following tasks: • Decontamination and decommissioning • General monitoring and applicable routines • Isolation and stabilization monitoring • High-efficiency particulate air filter change • Construction coverage • Routine coverage.
3	Target audience	Health physics technicians
4	Delivery	On-the-job training
5	Evaluation	On-the-job training checklist
6	Length	Average = 200 hours
7	Frequency	24 months
8		
9	Title	Senior Health Physics Technician Certification
10	Description	Course consists of the following topics: • Academics • Radiation protection practices • Emergency response • Radiation safety • Criticality safety • Radiological problem solving • Practical exercises.
11	Target audience	Senior health physics technician
12	Delivery	Classroom
13	Evaluation	Written test
14	Length	Average = 168 hours
15	Frequency	24 months

1	Title	Senior Health Physics Technician General On-the-Job Training
2	Description	Course includes the following topics: • Manuals • Records and reports • Exposure control - Dosimetry - Survey techniques • Instrumentation • Qualitative respirator fit • Routine radiological control • Job planning - Radiological postings - Hazards analysis • Abnormal conditions and emergencies - Criticality - Radiation area injuries - Personnel decontamination - Radioactive spills - Area evacuation - Continuous alarm monitor alarm response.
3	Target audience	Senior health physics technician
4	Delivery	On-the-job training General on-the-job training
5	Evaluation	On-the-job training checklist
6	Length	Average = 200 hours
7	Frequency	24 months
8		
9	Title	Senior Health Physics Technician PUREX Plant On-the-Job Training
10	Description	Course includes the following tasks: • Decontamination and decommissioning • General monitoring and applicable routines • Isolation and stabilization monitoring • High-efficiency particulate air filter change • Construction coverage • Routine coverage.
11	Target audience	Senior health physics technicians
12	Delivery	On-the-job training
13	Evaluation	On-the-job training checklist
14	Length	Average = 200 hours
15	Frequency	24 months

Title	PUREX Plant Health Physics Technicians (All) Emergency Procedures and Abnormal Plant Conditions
Description	Course consists of the following topics and alternates from year to year between classroom training and testing, on-the-job training, and on-the-job training checklist: • Continuous air monitor alarm • Contamination spread • Personnel decontamination • Criticality alarm • Chemical spill or problem • General emergencies (e.g., fire).
Target audience	Health physics technician trainee, health physics technician, senior health physics technician
Delivery	Classroom or on-the-job training
Evaluation	Written test or on-the-job training checklist
Length	Average = 16 hours
Frequency	12 months

8A.4 ENVIRONMENTAL AND HAZARDOUS MATERIAL SAFETY TRAINING[1]		
	Course name	Description
1.	Hazard Communication and Waste Orientation	Course provides an overview of the federal and hazard communication programs and hazardous waste disposal programs.
2.	Generator Hazards Safety Training	Course provides the hazardous material/ waste worker with the fundamentals for use and disposal of hazardous materials.
3.	Hazardous Materials/Waste Job-Specific Training	Course provides specific information on hazardous chemicals and waste management at the employees' TSD unit.
4.	Initial Radiation Worker Training	Course provides radiation workers with the fundamentals of radiation protection and the proper procedures for maintaining exposures ALARA.
5.	Waste Site-Basics	Course provides required information for the safe operation of hazardous waste TSD units regulated under 40 CFR 264 and 265 pursuant to RCRA.
6.	Scott 'SKA-PAK'[2] Training-SKA	Course instructs employees in the proper use of the Scott 'SKA-PAK'[2] for entry, exit, or work in conditions 'immediately dangerous to life and health' and instructs employees to recognize and handle emergencies.
7.	Cardiopulmonary Resuscitation	Course of the American Heart Association that provides certification in cardiopulmonary resuscitation for the single rescuer (Heartsaver Course).
8.	Fire Extinguisher Safety	Course provides videocassette presentation that covers types of portable fire extinguishers and the proper usage for each.

[1]Chapter 8.0, Tables 8-4 and 8-5 present a compilation of training requirements.

[2]Scott SKA-PAK is a trademark of Figgie International, Incorporated.

	Course name	Description
9.	Waste Site-Advanced	Course provides environmental safety information for RCRA and/or CERCLA operations and sites. Topics include regulations and acronyms, occupational health and safety, chemical hazard information, toxicology, personal protective equipment and respirators, site safety, decontamination, and chemical monitoring instrumentation.
10.	Waste Site Field Experience	Course is a 3-day field experience under the direct supervision of a trained, experienced supervisor.
11.	Hazardous Waste Shipment Certification	Course provides an indepth look at federal, state, and onsite requirements for nonradioactive hazardous waste management and transportation.
12.	Certification of Hazardous Material Shipments	Course provides training in hazardous material regulations of the U.S. Department of Transportation, as required by law, to those who certify the compliance of Hanford Facility hazardous material shipments. The main focus is on the proper preparation and release of radioactive material shipments.
13.	Hazardous Waste Site Supervisor/Manager	Course provides specialized training to operations and site management in the following programs: safety and health, employee training, personal protective equipment, spill containment, and health hazard monitoring procedures and techniques.

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APPENDIX 11A

THE PUREX STORAGE TUNNELS ENGINEERING STUDY

APPENDIX 11A

THE PUREX STORAGE TUNNELS ENGINEERING STUDY

This Appendix contains the PUREX Storage Tunnels Engineering Study on closure alternatives consisting of 141 pages.

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1.0 INTRODUCTION

The Plutonium Uranium Extraction (PUREX) storage tunnels have been used for the long-term storage of failed and/or nonserviceable equipment since 1960. A Part A Permit Application for the storage tunnels has been completed, and this waste management unit is currently operating under interim status. A Part B Permit Application must be submitted to the U.S. Environmental Protection Agency (EPA) and the Washington Department of Ecology (Ecology) in accordance with the *Hanford Federal Facility Agreement and Consent Order* (hereinafter referred to as the Tri-Party Agreement), milestone M-20-11, (Ecology et al. 1989, p. D-16).

This engineering study considers two categories of disposal alternatives: (1) clean closure of the storage tunnels by retrieving the equipment and (2) in situ disposal. The following alternatives were considered in detail:

- backfilling with gravel
- injecting with grout
- combining grout injection and backfilling
- retrieving and disposing in the PUREX Plant
- retrieving and physical processing (size reduction) in the PUREX Plant and disposing
- retrieving and transporting to the Waste Receiving and Processing (WRAP) facility (Module 2)
- retrieving and transporting off the Hanford Site for treatment and disposal
- constructing a new facility for retrieving, processing, and treatment of equipment for disposal.

A no action alternative is not considered viable within the regulatory framework governing the disposal of the equipment.

1.1 BACKGROUND

Irradiated fuel elements from the Hanford Site production reactors are processed at the PUREX Plant for the recovery of uranium and plutonium. The PUREX Plant is located in the 200 East Area of the Hanford Site (Figure 1), approximately 23 miles north of the city of Richland, Washington.

Large processing equipment from the PUREX Plant, which has been in direct contact with highly radioactive material, has failed or become nonserviceable. The equipment, due to size, radiation levels, lack of available packaging, or convenience, has been placed in two storage tunnels. The first of these tunnels, 218-E-14 (hereinafter referred to as Tunnel 1), was constructed in 1956, and the other, 218-E-15 (hereinafter referred to as Tunnel 2), in 1964. The equipment is placed on flatbed or gondola railcars prior to storage in the tunnels. The railcars provide a platform for retrievable storage.

The documentation of equipment preparation for placement in the tunnels in past years does not provide the specific details which are needed to evaluate the equipment in terms of the current regulatory criteria. There is limited information on radiation levels associated with the equipment.

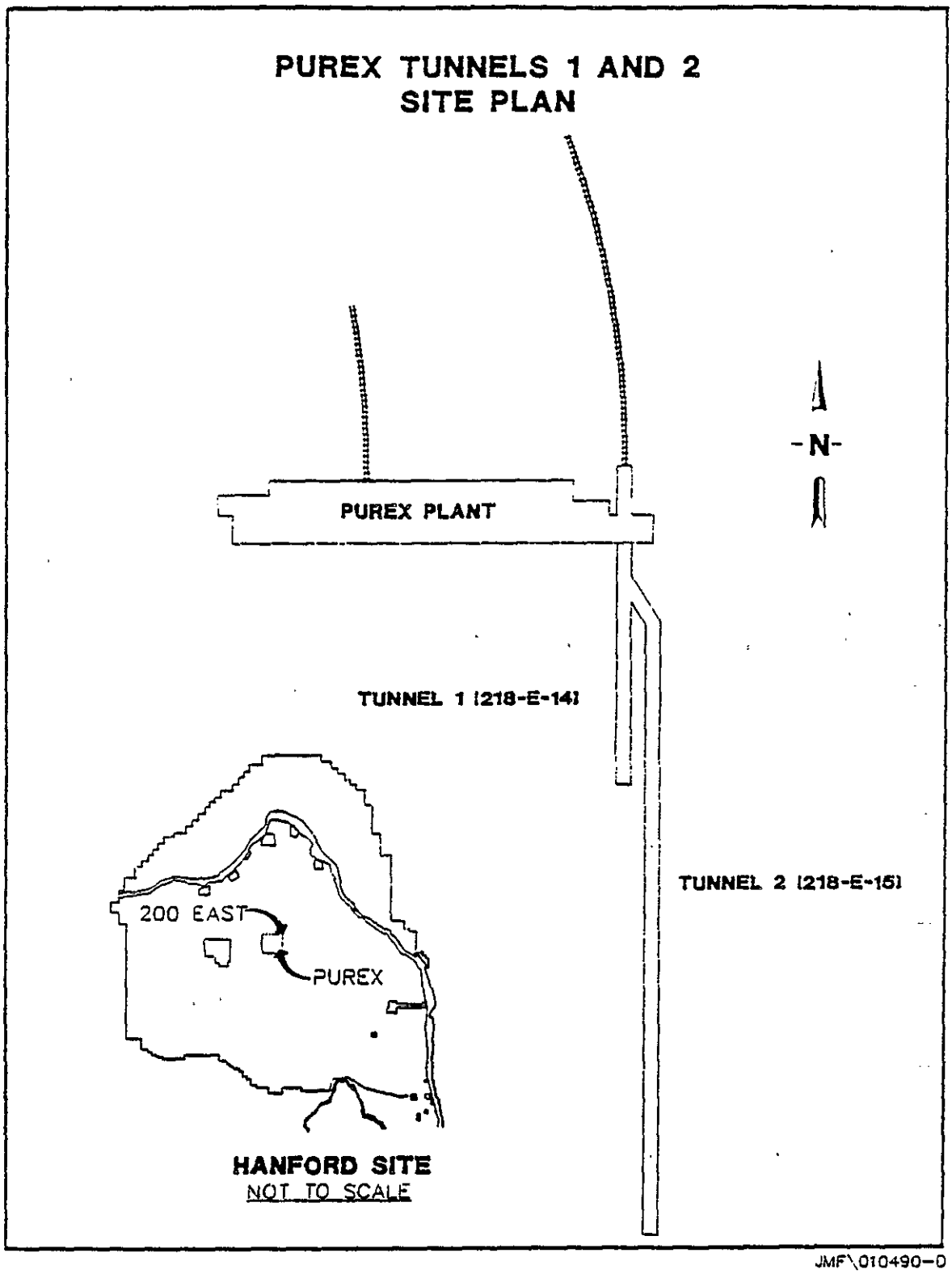


Figure 1. PUREX Storage Tunnels 1 and 2 Site Plan.

Some of the equipment is known to contain dangerous wastes, primarily in the form of elemental mercury, elemental lead, and silver salts. The presence of other potential hazardous components has not been identified to date. High radiation levels (25 R/hr at 150 feet), in conjunction with physical constraints, prevent human entry into the storage tunnels for further characterizing the equipment. Previous characterization was achieved through knowledge of the PUREX process. The equipment may also contain transuranic (TRU) isotopes in unknown quantities and is considered to require remote handling.

Tunnel 1 first received waste in 1960 and was filled to capacity by 1965, with the placement of the eighth railroad car. Tunnel 2 first received waste in 1967. Currently, there are 17 cars containing equipment in Tunnel 2. Only a few of the railcars are suspected or known to contain dangerous waste. These will be classified as mixed waste (MW) (DOE 1988).

The PUREX Plant is scheduled to process the remaining irradiated fuel elements from the N Reactor. As a result of the continued processing, it is expected that additional equipment will be placed in Tunnel 2 for storage.

1.2 SCOPE

The purpose of the engineering study is to identify a preferred alternative for disposing of equipment located in the storage tunnels and support development of a closure alternative for the tunnels. The study is limited to the equipment currently stored in the tunnels and will not consider any equipment presently in the PUREX Plant or previously removed from the PUREX Plant to other onsite disposal/storage areas. Also, the study does not consider similar equipment that may exist at other former processing facilities onsite.

An evaluation matrix was chosen for the purpose of evaluating the proposed alternatives. Each alternative is ranked according to the criteria chosen for the study. A preferred alternative is proposed based on the outcome of the evaluation.

2.0 PUREX STORAGE TUNNEL DESCRIPTION

The storage tunnels are two earth-covered, parallel branches of a tunnel, extending south out of the east end of the PUREX Plant. The process equipment has remained in the tunnels due to high radiation levels and/or physical constraints (e.g., equipment dimensions are larger than available packaging).

Equipment to be sent to the tunnels is placed on railcars. The railcars serve as transportation and storage platforms for the equipment. A remote-controlled, battery powered locomotive is used to push the loaded railcars into the storage tunnel. The equipment and railcars may remain in the tunnel for radioactive decay to occur or until retrieval actions are initiated. These retrieval actions include preparation and/or packaging of the equipment

for repair or permanent disposal. Each piece of equipment is retrievable. However, since the equipment is stored on a single, dead-end rail spur, it can only be removed in the reverse order of placement.

The storage tunnels were designed and constructed to minimize personnel exposure to high levels of radiation associated with the storage of process equipment. Most of the equipment in the tunnels was placed there prior to 1980, before current *Resource Conservation and Recovery Act of 1976* (RCRA) requirements were applicable to Federal facilities.

An inventory of tunnel equipment has been documented in PUREX Plant records from management programs (Canyon Change Order System and PUREX Railroad Tunnel's Record Keeping System). The majority of the equipment is suspected to be categorized as remote-handled transuranic (RH-TRU) or remote-handled low-level waste (RH-LLW). A few pieces of equipment are known to contain dangerous waste and may be further categorized as remote-handled mixed waste (RH-MW). The remote-handled (RH) category was assigned due to the size, gross contamination, and/or high radiation levels associated with the equipment.

Appendix A contains the inventory of equipment in Tunnels 1 and 2. As mentioned previously, detailed records were not kept as railcars were loaded into the tunnels. Also, some equipment may have been removed from the tunnel for reconditioning during the early 1960s. Therefore, the listing includes, to the best degree possible, information pertinent to equipment and provides general figures and photographs for some process equipment.

2.1 TUNNEL 1

Construction of Tunnel 1 was completed in 1956 as part of the PUREX Plant construction project. The storage tunnel consists of three sections: a water-fillable door, a storage area, and the ventilation shaft. Sketches of Tunnel 1 are provided in Figures 2 and 3, and constructions photographs are provided in Appendix B.

The water-fillable door is located at the north end of the storage area and provides a barrier for the storage area from the railroad extension tunnel. The door is constructed of 1/2-inch steel plate. It is hollow to permit filling with water and acts as a radiation shield when closed. The door is 24.5 feet tall, about 22 feet wide, and 7 feet deep (thick). When the door is in the open position, it is encased in a concrete structure, which is partially above grade and visible from outside the Plant fence. The door position is controlled by electric hoists located on top of the door casing. The pumps and valves for filling and or draining the door are located in a small room to the northwest of the enclosure. The control panel for operation of the water-fillable door is located in the PUREX canyon building on the north wall at the east end of the Pipe and Operating Gallery.

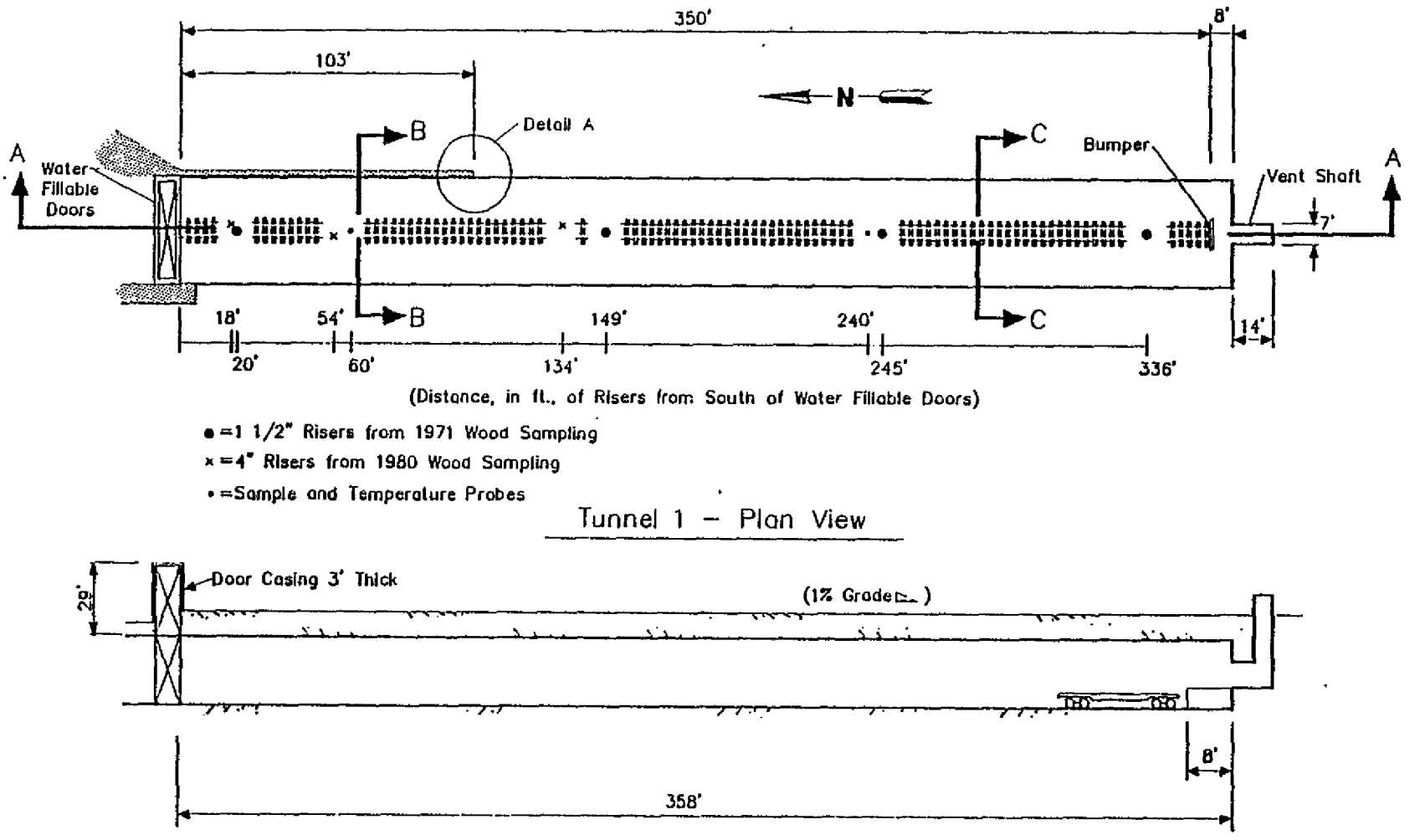
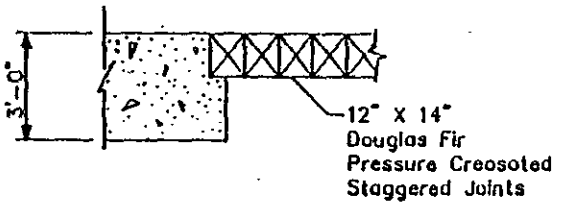
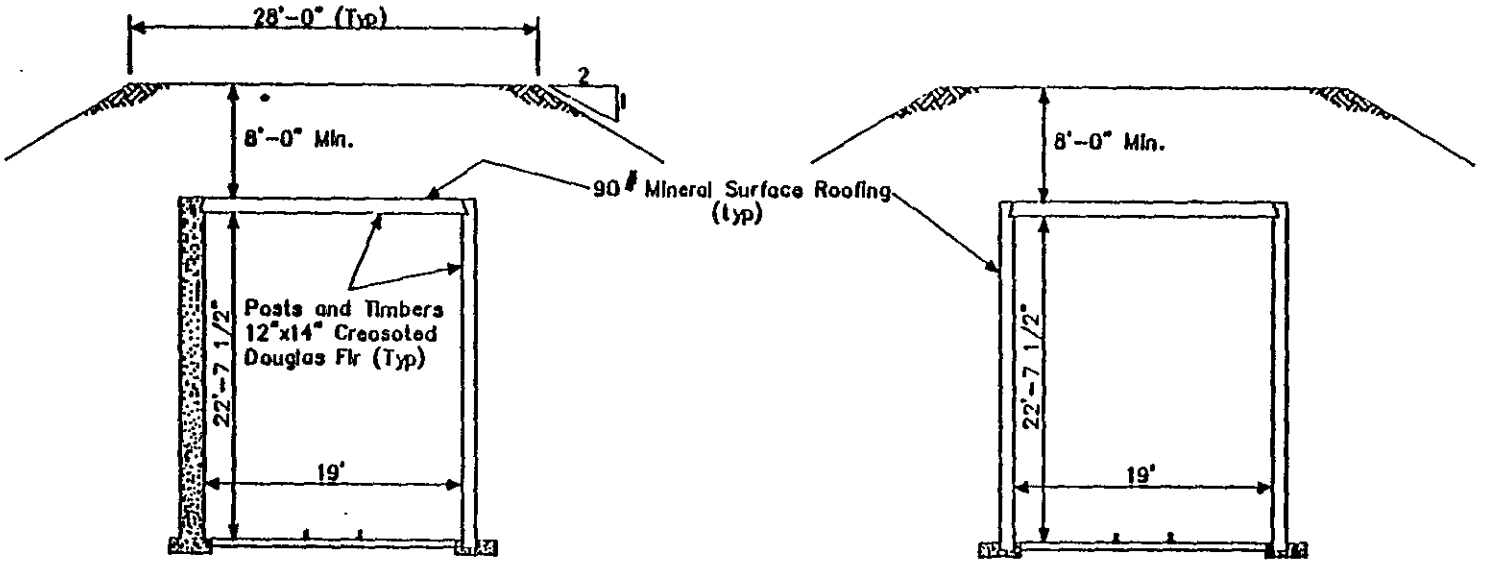


Figure 2. Sketch of PUREX Storage Tunnel 1 (218-E-14).



PUREX Tunnel 1 – Detail A



Section BB

Section CC

PUREX Tunnel 1 – Section Views

JMF\010590-B

Figure 3. PUREX Storage Tunnel 1 Section Views.

The storage area is the portion of the tunnel extending south from the water-fillable door. The overall inside dimensions of Tunnel 1 are 358 feet in length, 22 feet in height, and 19 feet wide. The ceiling and walls are constructed of 12 by 14 inch creosote pressure-treated, Douglas Fir timbers. The first 100 feet of the east wall is constructed of 3-foot thick reinforced concrete. Ninety-pound, mineral surface roofing material was used to cover the exterior surface of the timbers. The entire structure was then covered with earth fill to provide a minimum cover depth of 8 feet. The earth cover was contoured for stability as shown in Figure 3. In addition, natural vegetation growth has been permitted to minimize water and wind erosion. The timbers forming the walls rest on reinforced concrete footings 3 feet wide by 1 foot thick. The floor consists of a railroad track laid on a gravel bed. Space between ties is filled to top-of-tie with gravel ballast.

Top-of-track elevation is 693 feet at the water-fillable door and slopes downward at a 1% grade to an elevation of 689 feet 5 inches. A railcar bumper is 8 feet from the south end of the tracks. The storage capacity of the tunnel is eight railroad cars, 40 to 42 feet in length.

A ventilation shaft is located at the south end of the tunnel. The shaft is approximately 5 ft by 5 ft in cross section and is constructed of reinforced concrete. The ventilation shaft protrudes approximately 1 foot above grade and is capped with a single stage, high efficiency particulate air (HEPA) filter, a 10,000 ft^3/min exhaust fan, and a 20-foot tall stack.

The first two railcars were loaded and placed in the storage tunnel in June 1960. The tunnel storage capacity was met in January 1965 with the placement of the eighth railcar. After positioning the last car, the water-fillable door and the tunnel exhaust ventilation system were deactivated. Access riser ports installed during previous activities may permit storage tunnel monitoring. The location of these access risers is shown in Figure 2, along with the dates of installation. Although the ventilation system is deactivated, a slight negative pressure is maintained in the tunnel due to the negative pressure maintained in the connecting tunnel extension. The negative pressure serves to reduce potential airborne contamination by maintaining airflow within the PUREX Plant ventilation system.

2.2 TUNNEL 2

Construction of Tunnel 2 was completed in 1964. Tunnel 2 also consists of three sections: a water-fillable door, a storage area, and the ventilation shaft. (See Figures 4, 5, and 6 for sketches of Tunnel 2.)

The water-fillable door is located at the north end of the storage area and serves as a barrier between the storage area and the railroad extension tunnel. The door is identical to the door of Tunnel 1 (Section 2.1).

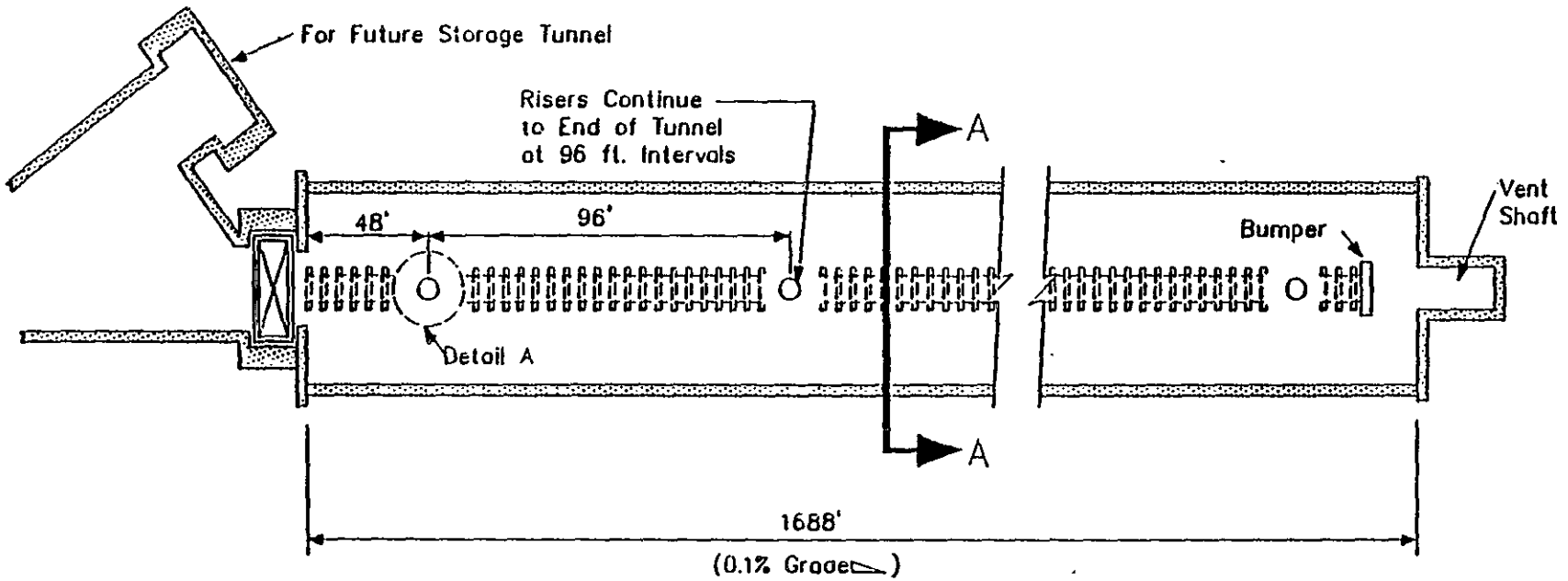


Figure 4. Sketch of PUREX Storage Tunnel 2 (218-E-15).

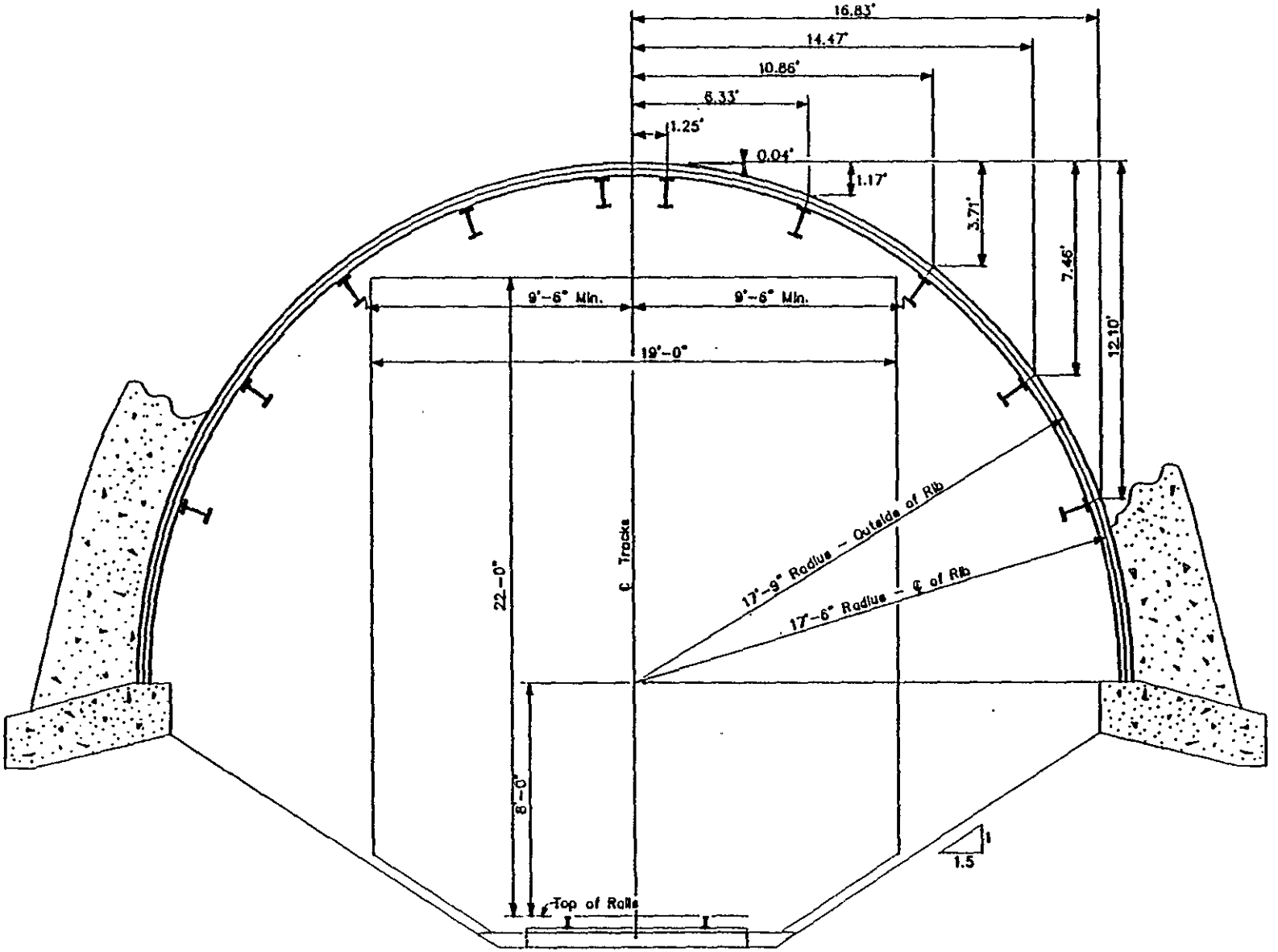


Figure 5. PUREX Storage Tunnel 2 Section A-A.

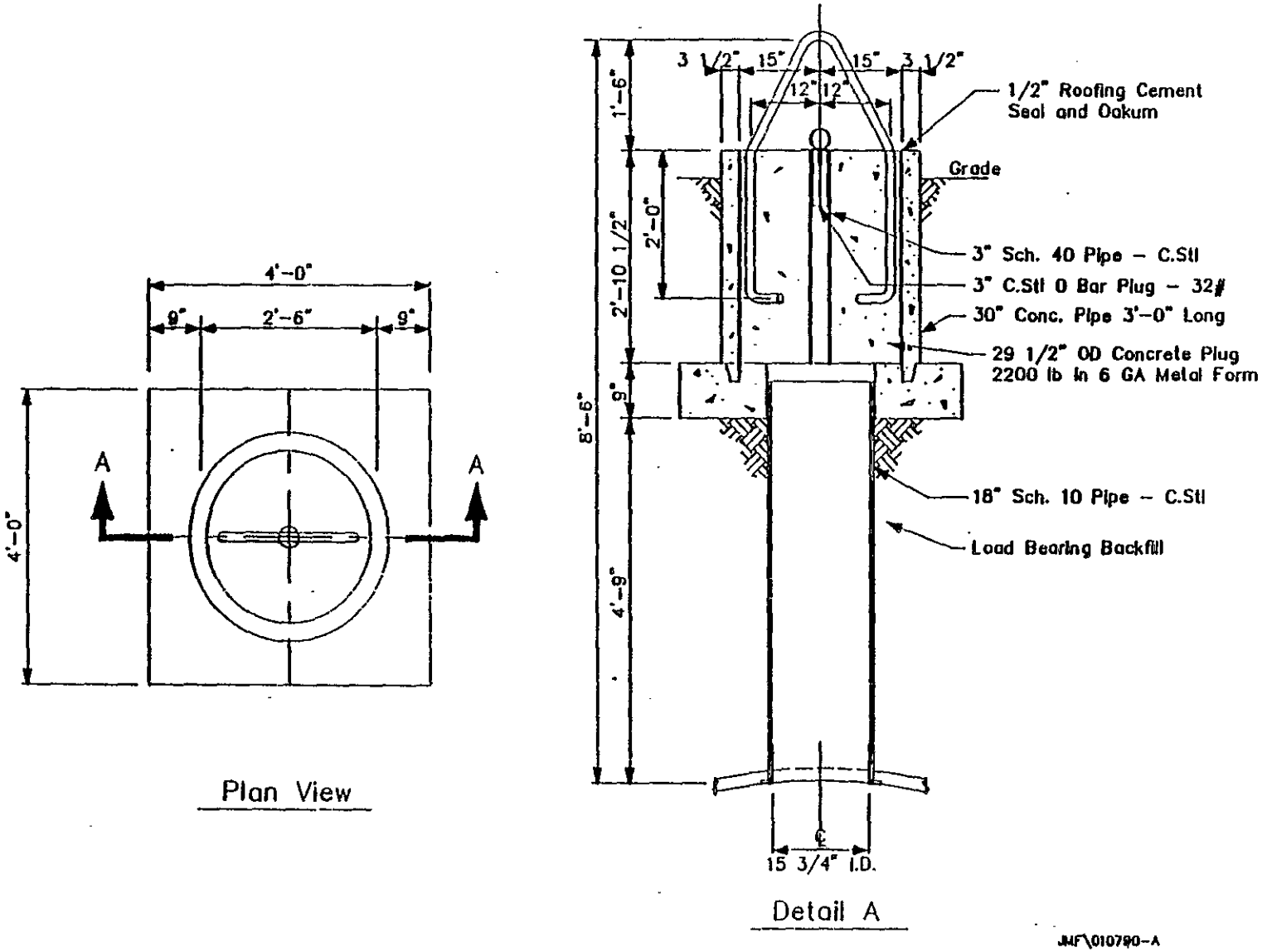


Figure 6. PUREX Storage Tunnel 2 Riser Port.

The storage area of Tunnel 2 is the portion of the tunnel extending south from the water-fillable door. The tunnel is constructed of a 34-foot diameter, carbon steel (3/16-inch plate), Quonset-shaped roof. The internal and external surfaces of the roof were coated with a bituminous material. The roof is supported by internal wide flange beams attached to reinforced concrete arches. This structure is supported on reinforced concrete footings approximately 6 feet wide by 4 feet thick. The storage area is covered to a minimum depth of 8 feet of earth fill. The fill was contoured to provide slope stability. In addition, natural vegetation growth has been permitted to minimize both water and wind erosion. The nominal inside dimensions of Tunnel 2 are 1,688 feet in length, 26 feet in height, and 34 feet in width. However, due to the door clearance, the usable storage area (width and height above top-of-rail) is 22 feet high and 19 feet wide, the same as Tunnel 1. The floor consists of a railroad track laid on a gravel bed.

The space between ties is filled to top-of-tie with gravel ballast. Commencing at each end of the 8-foot ties, the stabilized earthen floor is sloped upward on a 1-foot (vertical) to 1 1/2-feet (horizontal) grade. A railroad car bumper is located 8 feet from the south end of the tracks to act as a stop. Top-of-track elevation is 693 feet above sea level at the water-fillable door and slopes slightly downward at a 0.1% grade to an elevation of 691 feet 4 inches at the south end of the track. The storage capacity of Tunnel 2 is approximately 40 railcars (40 to 42 feet in length).

The ventilation shaft is located at the south end of the tunnel. The shaft is approximately 5 ft by 5 ft in cross section and is constructed of reinforced concrete. The shaft extends above grade and is equipped with an exhaust system consisting of a single stage HEPA filter, a 10,000 ft^3/min exhaust fan, and a 20-foot tall stack. The exhaust system is currently active. However, the fan has been adjusted to approximately 4,000 ft^3/min of air flow. Air infiltrates around the water-fillable door through construction openings (seams, holes) and through porous fill materials. The exhaust air is sampled continuously. Weekly particulate samples are collected and analyzed for total alpha and beta radiation activity.

The first railcar was placed into the storage area in December of 1967. Through March 1, 1990, a total of 17 railcars have been placed into the storage area of Tunnel 2.

3.0 ASSUMPTIONS AND REGULATIONS

3.1 ASSUMPTIONS

The following assumptions were made in order to complete the study and to develop a preferred disposal alternative for inclusion in the Part B permit application:

- Closure activities for the storage tunnels will be initiated in conjunction with closure activities for the PUREX Plant. Consideration of the ultimate disposal of processing vessels and support equipment presently in the PUREX canyon building will impact the ultimate disposal of the equipment in the tunnels.

- The only free liquid contained in the equipment is metallic mercury. Other liquids which may have been in or on the equipment have evaporated by the time of disposal.

- The equipment located in the tunnels is declared as suspect TRU waste and will be included in appropriate databases. This is necessary for TRU waste to be included in the Waste Isolation Pilot Project (WIPP) disposal campaign.

- The tunnels will be permitted as a miscellaneous unit in accordance with 40 CFR 264, subpart X (EPA 1989).

- The equipment will not be classified as high level waste.

- The small physical volume (estimated) of dangerous waste, when compared to the large volume of highly radioactive waste, will not pose a significant environmental threat.

- The WIPP is operational and accepting waste.

- Equipment to be used in disposal alternatives (whether presently available at the Hanford Site, other U.S. Department of Energy [DOE] facilities, or in conceptual design) will perform as designed with minimum modification. This includes the present PUREX Plant building equipment proposed for use in retrieval of railcars into the spent fuel receiving area of the plant railroad tunnel.

- Future placement of equipment into the tunnels is expected to continue until the present mission of the PUREX Plant is completed. The types and characteristics of future equipment will be similar to the present equipment in the tunnels.

- Residual dangerous waste is removable from the tunnels.

- Necessary facilities for the disposal of waste will be developed for the Hanford Site.

- The final closure strategy for the tunnels will be fully integrated with the closure of the PUREX Plant and the Tri-Party Agreement operable unit(s) closure.

- Funding will be sufficient to conduct the preferred disposal alternative in accordance with the regulatory requirements in effect at time of closure activities.

3.2 REGULATORY FRAMEWORK

The equipment in the storage tunnels is highly radioactive and is known to contain a small volume of extremely hazardous waste (EHW). Thus, the tunnels will be considered a MW facility under the jurisdiction of the EPA and

Ecology under RCRA, and the DOE under the *Atomic Energy Act of 1954* (AEA), as amended, until the EHW is removed from the tunnels. Activities related to permitting the tunnels are also conducted in accordance with the Tri-Party Agreement.

The RCRA regulates the generation, treatment, storage, transportation and disposal of the dangerous constituents, while the AEA regulations govern the handling and disposal of the radioactive constituents. The Hazardous Solid Waste Amendments of 1984 (HSWA) to RCRA also have a direct bearing on the disposal alternatives considered by the study. All regulations and guidance relevant to the storage tunnels are listed in Appendix C.

The HSWA and Ecology provide specific standards for land disposal restrictions of treated/untreated hazardous waste constituents. The EHW, elemental mercury, elemental lead, and silver nitrate, contained in the equipment is governed by these land disposal restrictions. The restrictions direct waste management practices towards the destruction or treatment of the waste to an acceptable form prior to disposal. The standards developed by the EPA generally are in the form of a concentration limit based on use of a best demonstrated available technology (BDAT).

Waste treatment is not limited to the BDAT, but must be at least as effective in reducing the potential hazard of the waste. The treatment technologies to reduce the toxicity and/or potential migration are listed here in a descending order of preference: (1) recycling and recovery, (2) destruction, (3) immobilization, and (4) land disposal of wastes. The Washington Administrative Code (WAC) 173-303-140 prohibits land disposal of EHW except on a case-by-case basis. Exceptions to EHW land disposal regulations must demonstrate that the best management methods have been applied, that additional management would prevent the use of a best management method, and that land disposal does not pose a greater risk to public health and environment. The WAC 173-303-700 regulations set forth specific requirements for operating a treatment, storage, or disposal facility for EHW at the Hanford Site. Although the number of EHW disposal locations at the Hanford Site is not specified by Ecology regulations (WAC 173-303), good management practices will result in consolidation of EHW disposal locations.

The EHW in the tunnels is primarily contained within the stainless or carbon steel that was used to construct the process equipment and support structures. Lead used as shielding on some valves may not be contained in steel. This type of construction and the location of the EHW within the equipment severely limits the processes which may be used for treatment. The present practice of amalgamation of mercury with zinc (Stickney 1988) may be considered as a treatment if the mercury is removable from the failed dissolver thermowell. The lead counterweights could possibly be refined to remove radioactive contamination, but the possibility of unrestricted release of the processed material is doubtful. The silver nitrate (silver salts) are located in a silver reactor and probably can only be treated by entombing the vessel in a cementitious grout to immobilize the silver. The ability to segregate the EHW constituents would greatly reduce the potential volume of MW requiring treatment, storage or disposal from the tunnels.

The potential for the radiation levels of the equipment to limit access for inspection, sampling, and disposal activities may adversely impact disposal activities under the EPA/Ecology RCRA regulations. Disposal activities under EPA/Ecology regulations may also be inconsistent with the as-low-as-reasonably-achievable (ALARA) principle practiced under AEA regulations in the case of the PUREX storage tunnels, due to the high radiation fields.

4.0 ALTERNATIVE DESCRIPTIONS

Prior to undertaking any of the alternatives for the closure of the PUREX storage tunnels, the tunnels should be surveyed to accurately determine layout and contents and to record the levels of radiation at various locations in the tunnels. This information is currently not available. All data on process equipment, railcar layout, and radiation measurements in the document have been obtained from limited existing documentation and from process knowledge.

The following sections describe methods for remote viewing, radiation monitoring, in situ disposal, and retrieval/clean closure and provide a summary of advantages and disadvantages of the disposal alternatives.

4.1 REMOTE VIEWING/RADIATION MEASUREMENTS

Prior to the implementation of the PUREX storage tunnels disposal/decommissioning alternative prescribed by this study, Tunnels 1 and 2 should be viewed and scanned to determine current physical and radiological conditions. In fact, the best disposal alternative may be decided by the current condition of the tunnels. Sending a human reconnaissance team into the tunnels for the initial mapping and surveying of the tunnels is not possible, as it would be contrary to good health and safety work practices, including ALARA. For this reason, it is necessary to implement remote viewing and surveying methods.

Two options will be considered as possible means to survey and map the tunnels. One option is to lower surveillance/viewing equipment through the risers located in the roofs of the tunnels. Another method is to send the equipment over the tops of the cars along the ceiling of the tunnels. Each of these methods is limited in its operating area due to the construction of the tunnels and the size of the process equipment which was sent into them. From construction drawings, it is known that room is severely limited along the sides of Tunnel 2. The available space in Tunnel 1 is unknown; the actual tunnel dimensions are known (Figure 2), but the actual configuration of the process equipment in the tunnel is not accurately known. The remote viewing methods which could be used to accurately describe the tunnels are further described below.

4.1.1 Port Risers

Risers are located on the ceiling spine of the two storage tunnels. In Tunnel 2, these risers are 15 3/4 inches in diameter and are located 96 feet apart for the entire length of the tunnel (Figure 4). In Tunnel 1, the risers range from 90 to 110 feet apart and are up to 4 inches in diameter (Figure 2). The current condition of the risers is unknown and needs to be investigated.

Using the risers to drop radiological probes, cameras, and lighting into the tunnels, the physical layout of the tunnels and the processing equipment, along with the levels of radiation can be accurately mapped to provide the information necessary to evaluate decommissioning the tunnels. Many types of cameras and support equipment (e.g., pan and tilt, remote control units) can be used. A description of the design requirements is provided below.

The camera will need to provide clear pictures of the process equipment in the tunnels, either on film or video. It will be necessary to log the position of the photos taken. The photo equipment should be able to record the sides of the equipment and railcars. It should also attempt to record, to the fullest extent possible, the carriages of the cars. Lighting and electricity need to be provided, as there are no utilities located in the tunnels. The system needs to be operated remotely due to ALARA requirements and needs to be sized to fit in the existing risers. This will minimize radiation exposure to the workers.

4.1.2 Remote-Controlled Robot

Another option for remote viewing of the tunnels would require research and development of techniques to send a remote-controlled robotic device through the tunnels. The option requires that the equipment be sent over the process equipment by attaching it to the ceiling of the tunnel. Space along the sides or floor cannot be guaranteed due to the lack of information on the process equipment sizes and the positioning of the equipment on the railcars. Such detailed information is only available on the last few cars placed in Tunnel 2. Detailed records for the earlier car placement is not available.

Designing a system with the capabilities to propel itself the length of the tunnel to photograph and survey the contents is complex. Substantial time and funds will be required for such a project. The project would need to be initiated well in advance of PUREX tunnel closure to assure necessary equipment would be developed and procured.

4.2 IN SITU DISPOSAL ALTERNATIVES

The large and irregularly sized and shaped equipment and potential high radiation levels limit transport to other site facilities under current DOE and Westinghouse Hanford Company (Westinghouse Hanford) operating procedures and may not be considered the most feasible option in terms of ALARA and packaging requirements. Accordingly, methods for disposing of the equipment in place warrant consideration.

Three options for in situ tunnel disposal have been considered: gravel backfill, grout injection, and a combination of both. All are described in further detail below.

The option of consolidating the equipment from Tunnel 1 into Tunnel 2 should be given additional consideration for the in situ alternatives. This action would eliminate the need to grout and/or backfill Tunnel 1 in addition to Tunnel 2. Consolidation of the tunnels consists of removing the cars from Tunnel 1 and placing them in Tunnel 2 one at a time. After this action is complete, Tunnel 1 will be decontaminated and decommissioned.

4.2.1 Gravel Backfill

The first in situ alternative to be considered is one in which the tunnel is backfilled with gravel to prevent ground subsidence, and the tunnel openings are permanently sealed from the environment. A work breakdown structure of this alternative is provided in Figure 7. A method for gravel filling has been designed and developed into a prototype module to prove the adequacy of the concept for application at the Hanford Site. (The equipment was developed for potential application to single-shell tanks.) The method is based on using a modified, commercially available, centrifugal throwing device (rock thrower) and was used in prototype in 1985 to distribute crushed basalt of uniform size within a subsurface structure. The equipment needed for application in filling the tunnel(s) would be similar to the design proposed for the prototype test conducted in 1985. Some modifications may be necessary to meet specific tunnel requirements.

In order to fill the tunnel with gravel, surface preparation of the tunnel(s) is required. The rock throwing device will be inserted in newly constructed risers in the tunnel roof (Figure 8). The risers will be located in a series along the roof of the tunnel to provide distribution of the gravel throughout the tunnel. To insert the risers, excavations will require the removal of soil and roofing material. The 42-inch diameter risers will be attached to the roof structures and sealed. The shielding material will be backfilled around the risers to allow placement of a portable support tower over the riser.

The support tower provides the acceleration for the gravel fill (the acceleration achieved by dropping the gravel down the tower is translated to throw the rocks laterally). The fill material supply operation is similar to conventional sand and gravel operations which require consistent material transport and supply using automated controls.

Video monitoring of the filling operations will be conducted to permit interim evaluation of the fill technique. This will provide the operator with information necessary to make adjustments in the distribution of the fill material.

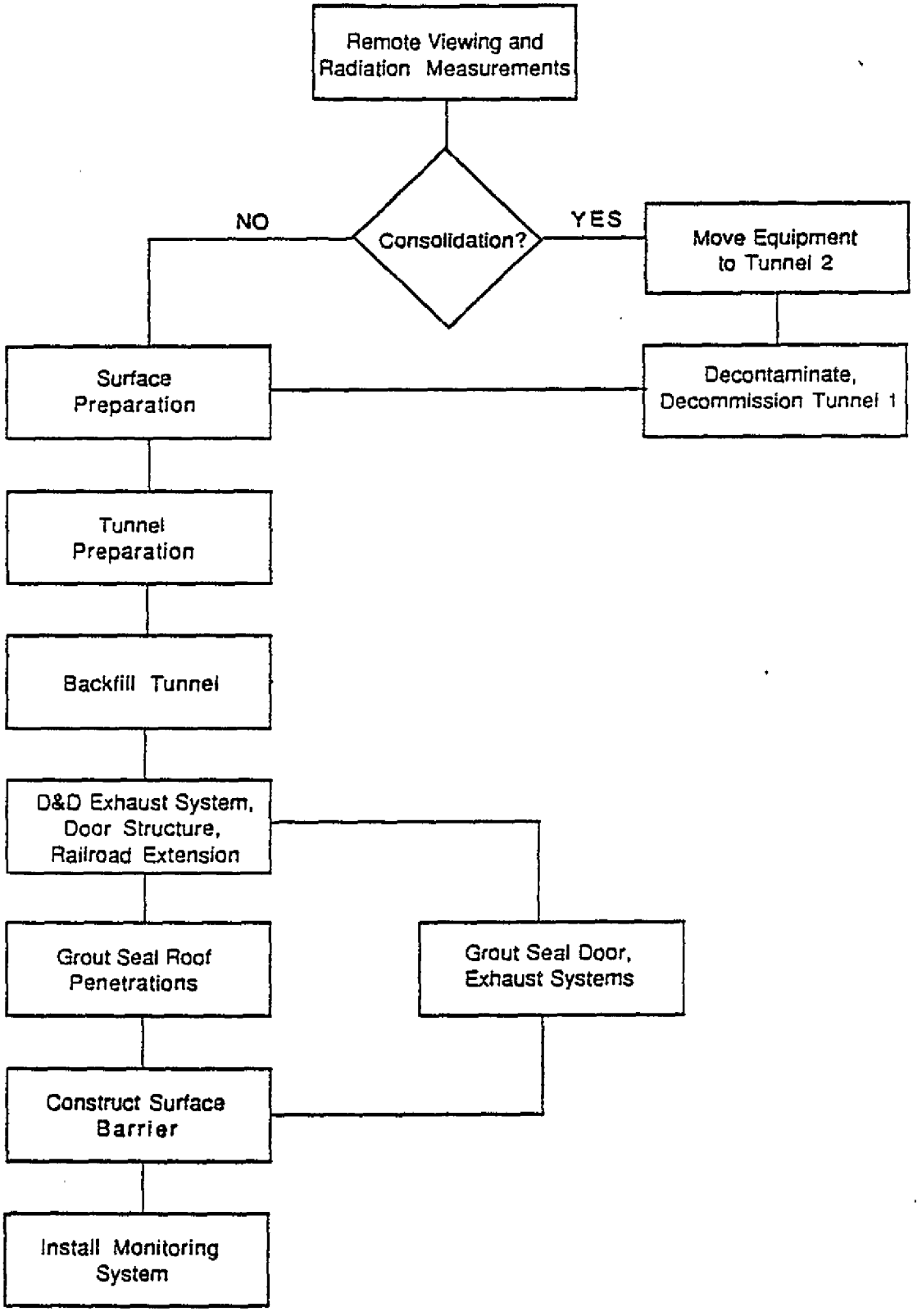


Figure 7. Gravel Backfill Alternative Flow Diagram.

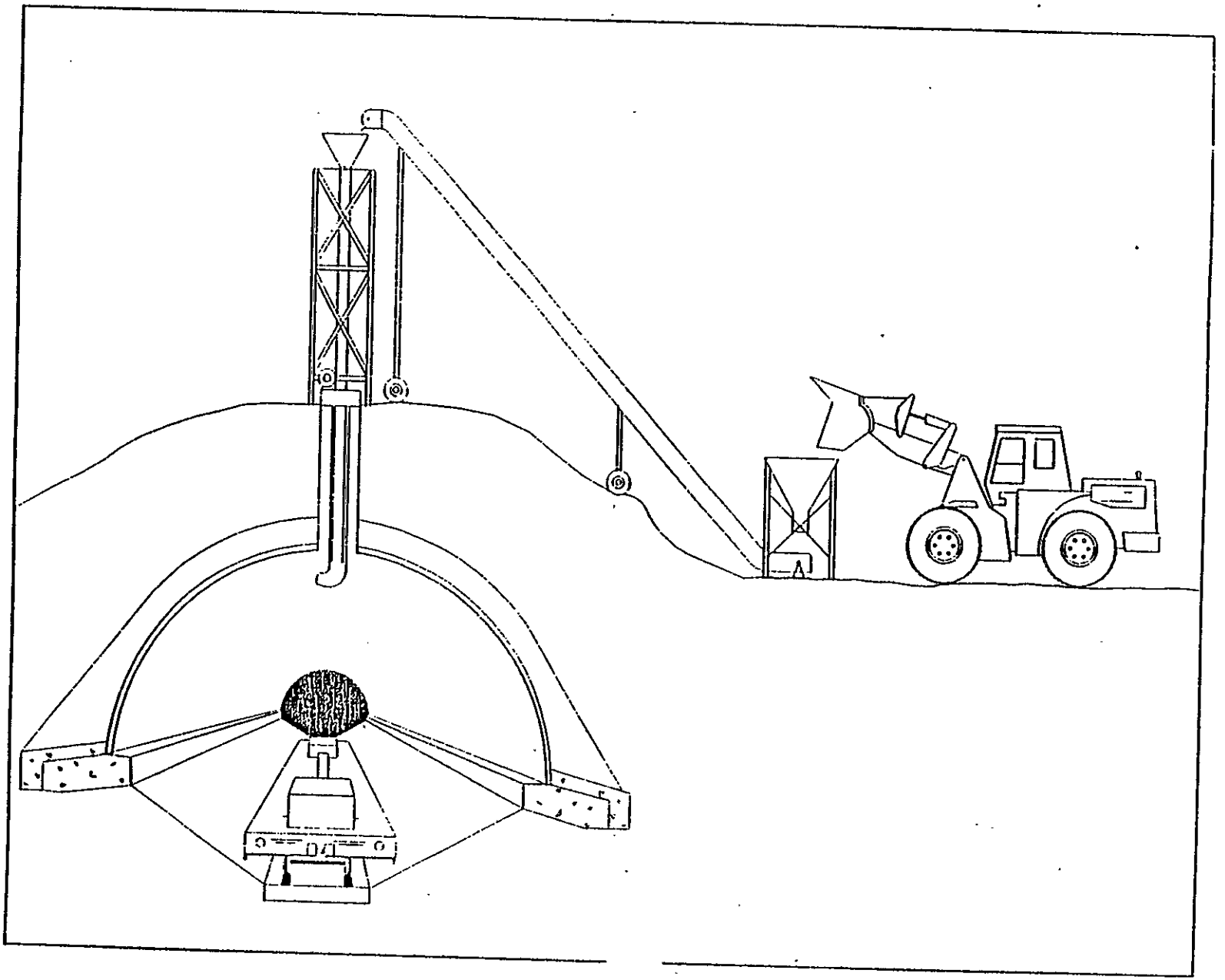


Figure 8. PUREX Storage Tu[illegible]k-Throwing Device.

During filling operations, the tunnel will be maintained at a negative pressure by use of a HEPA filtered exhaust system. The exhauster is necessary to prevent the potential for atmospheric releases of radionuclides. Dangerous waste constituents are not expected to become airborne during the filling operation.

After the rock thrower has been withdrawn from a riser, the riser will be capped until the fill operation is complete. When the gravel backfilling is complete, the risers will be grout-sealed to prevent future access. Prior to grout sealing the risers, the surface structures associated with the tunnels will be decontaminated and grout-sealed.

As a final closure operation for the tunnels, a preliminary surface barrier will be constructed. This will require that the railroad tunnel extension be decontaminated and decommissioned to allow dismantlement of the extension. This will pave the way for grading the site and final barrier construction. Surface barrier construction will be integrated with the final Tri-Party Agreement operable unit remedial actions and closure plans. A monitoring system to detect migration of any waste constituents from the disposal site will be installed in conjunction with the final 200-PO-2 operable unit remedial actions.

A generalized design for final barrier will consist of several layers of soil and geosynthetic materials. The materials are used to reduce and/or minimize the potential for infiltration of surface waters. The soil and soil layers with the incorporated drainage trench and pipe provide the mechanism to remove water which may infiltrate the cover. This should minimize the potential for water to contact the waste in the tunnel. The vegetative cover and riprap layers minimize potential wind and water erosion when combined with an adequately graded cover. The cover design will comply with the RCRA/Ecology landfill cover requirements and will be modified as necessary to meet radioactive disposal site performance objectives for DOE sites when these objectives are defined. The performance objectives may be similar to the performance objectives stated in the U.S. Nuclear Regulatory Commission regulations pertaining to near-surface radioactive waste disposal facilities (NRC 1988, Subpart C). Figure 9 presents a cross-section of the generalized cover.

4.2.2 Grout Injection

Stabilization and solidification of materials within the PUREX storage tunnels may be accomplished through grout injection (Figures 10 and 11). This technology (Phillips and Hinschberger 1989, pp. 103 to 106 and Phillips and Gilbert 1987, pp. 55-62), in concert with surface engineered barriers, may result in both physical stabilization and chemical isolation, leading to immobilization of contaminants while the public and the environment are protected for hundreds to thousands of years.

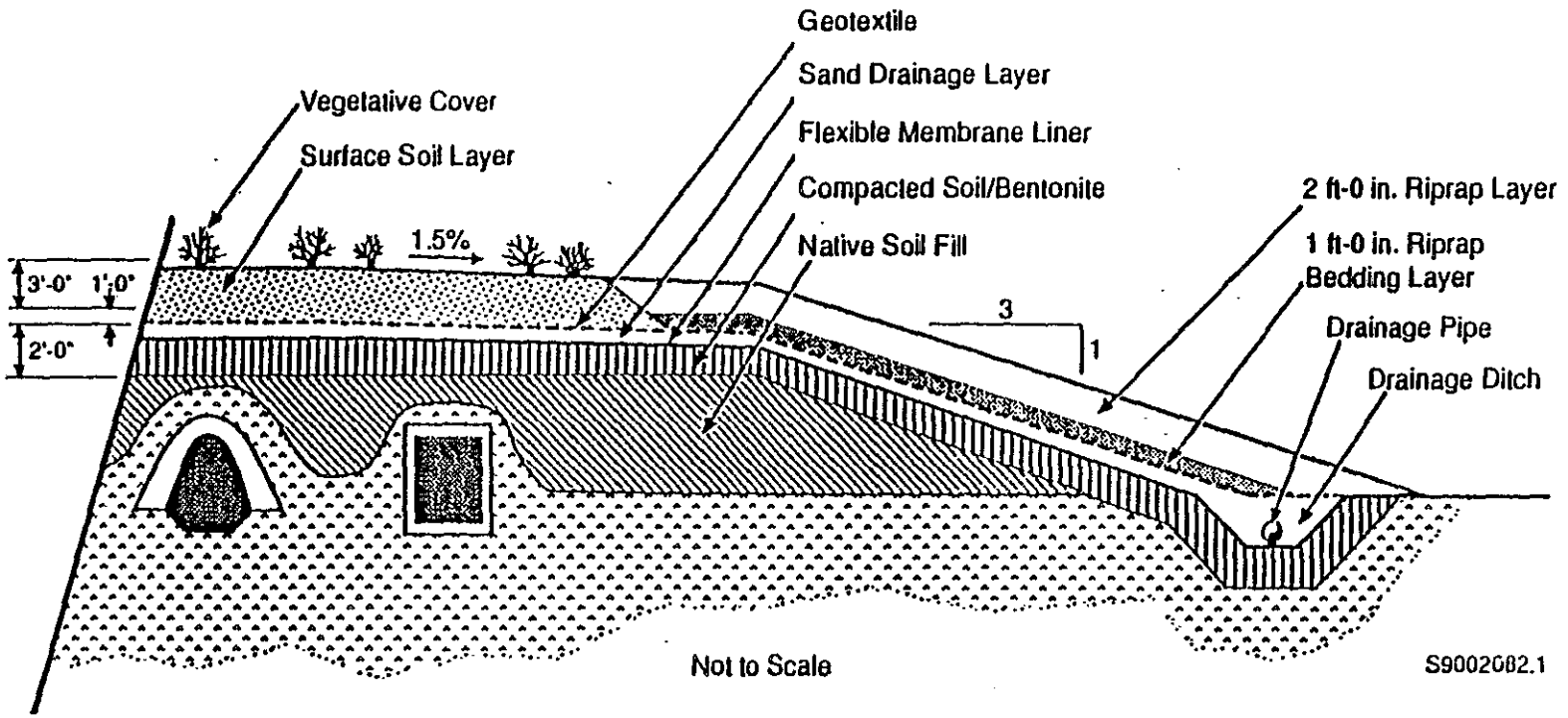


Figure 9. Generalized PUREX Storage Tunnel Cover.

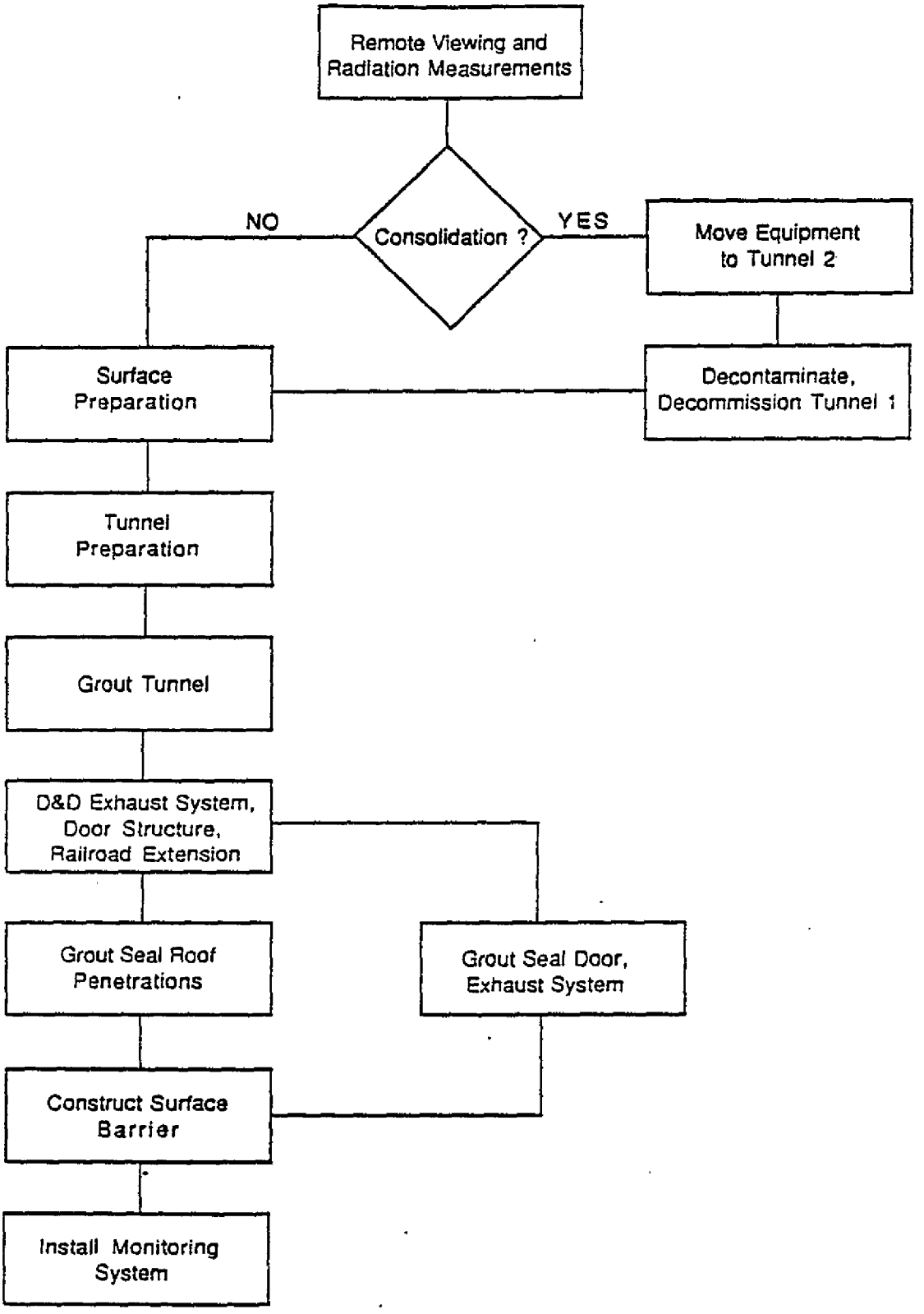


Figure 10. Grout Injection Alternative Flow Diagram.

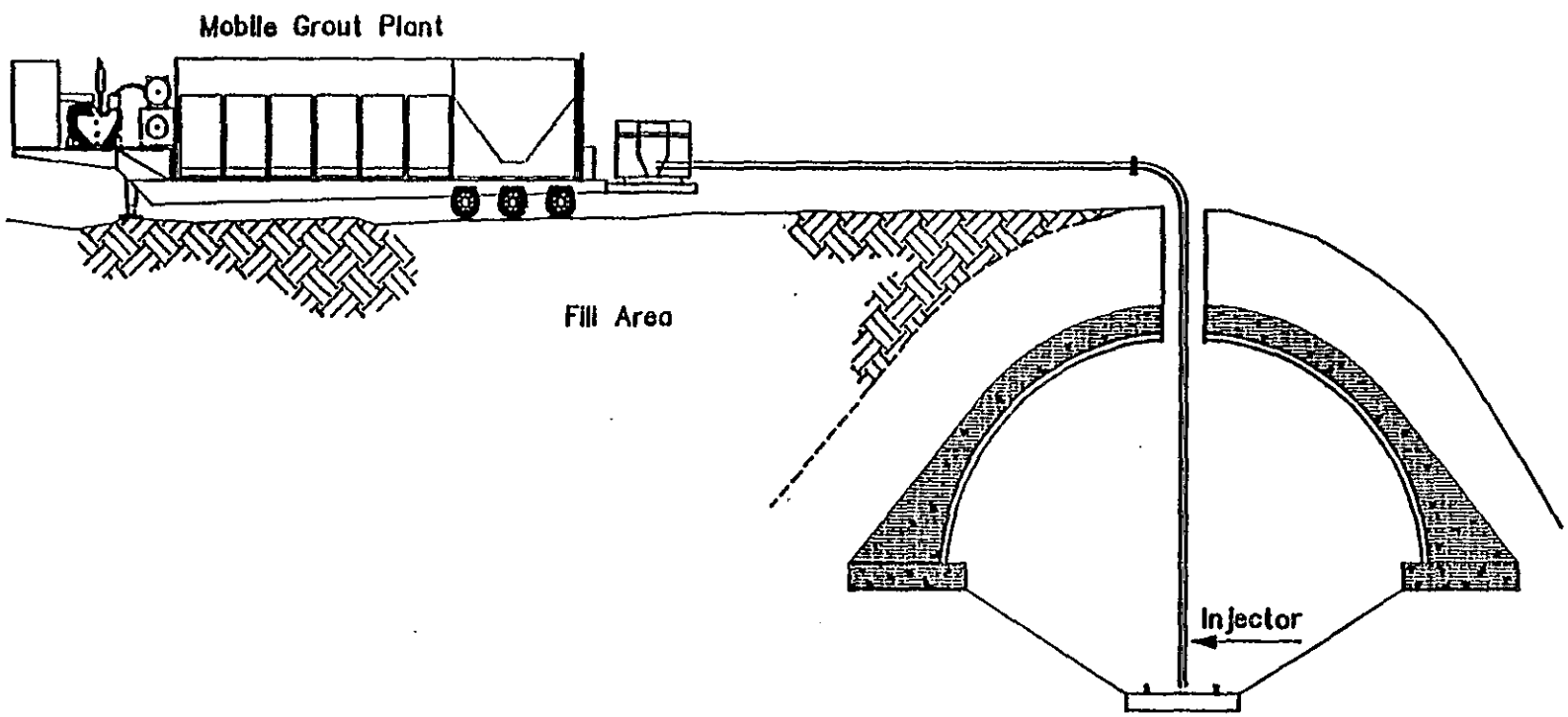


Figure 11. PUREX Storage Tunnel with Grout Injector.

Westinghouse Hanford has developed a primary system for in situ treatment of liquid waste disposal sites containing large void volume. This system is easily modified for application to treatment of PUREX storage tunnels process equipment. Another system currently under development at Westinghouse Hanford is used for treatment of liquid and solid materials. This secondary system, used in series with the above system, is also easily modified for use as treatment of PUREX storage tunnel process equipment. A summary of equipment, materials, and operations of these systems is delineated.

Either dynamic consolidation and simultaneous slurry injection or zeolite fluidized-bed injection may be applied to treatment of the equipment using remote operations techniques. The decision as to the type of process to be used will be decided after remote viewing of the tunnels is complete, and further waste characterization is available.

4.2.2.1 **Dynamic Consolidation.** One type of in situ treatment, dynamic consolidation, uses a grout slurry to stabilize the waste. Injectors for introduction of slurry materials into the tunnel are placed in the roof of the tunnel through the cased access risers. The air displaced by slurry injection will require treatment, either by existing HEPA filter systems or use of ventilation and HEPA filtration located within the slurry injector casing annulus.

It may be necessary to section the tunnels into smaller treatment modules. Sectioning can be conducted by driving sheet piling through excavated and shored access areas.

Slurry injection is conducted in stages through vertical slotted injectors placed through the tunnel roof extending to the tunnel floor (Figure 11). A particulate base slurry consisting of cement, fly ash, smectite clays, retarders, and water is brought to the tunnel injection site from the Hanford Site dry materials feed facility. Particulate slurry is pumped into the tunnel in lifts of approximately 1 1/2 feet to facilitate curing and dissipation of heat. Injection in lifts also negates the problem of buoyant waste forms and potential structural damage to the tunnel roof.

The system is completely mobile and field operable as a self-contained unit. Support equipment for the system consists of a large mobile crane, a vibratory hammer-extractor for sheet piling and injector placement, and a mobile process control and quality control laboratory.

The consolidation and slurry injection can also be used in numerous other configurations, with varied treatment materials and methodologies.

4.2.2.2 **Zeolite Fluidized-Bed Injection.** A system used in conjunction with the previously described system utilizes a fluidized-bed materials transfer technology for injection of zeolite into open void volume waste disposal structures. This system also uses remote operations to reduce the potential for radiation exposure to the operator. An example of operation of this system for the treatment of PUREX storage tunnels is provided as follows.

Injectors for zeolite injection are articulated and capable of rotating 360°, hence access from the tunnel base to roof is possible. The injectors are placed through the cased access risers located along the longitudinal axis of the tunnel roof.

Filtration of displaced air is accomplished much the same as with the dynamic consolidation. Slurry injection coaxial filters and on-line HEPA filter modules can be used.

Injection is conducted by pneumatic materials transfer from the fluidized bed into injectors placed at the base of the tunnel. Zeolite or any other dry granular material (sand) is continuously blown into the tunnel, beginning below the cars, until complete filling of the tunnel to the roof is achieved. The additional injection of inorganic polymer material into the interstitial void volume can be accomplished through the same riser. Injection of a granular material, followed by polymer slurry injection provides a monolithic structure equivalent in morphology with that of the previously described particulate slurry system. Further, inorganic polymer injection is capable of immobilizing contaminants below the tunnels.

The system is completely self-contained and capable of operating under all terrain conditions. Closure activities will be completed as described in Section 4.2.1.

4.2.3 Combination Grout Injection and Gravel Backfill

This alternative combines grout injection (Section 4.2.2) with gravel backfill (Section 4.2.1). Initially, grout will be injected into the tunnels to fill the basal portion of each tunnel, eliminating void spaces beneath the railcars. The remaining void space will be backfilled with gravel. A flow chart of the activities for this alternative can be found in Figure 12. Closure activities will be completed as described in Section 4.2.1.

4.3 RETRIEVAL/CLEAN CLOSURE DISPOSAL ALTERNATIVES

Retrieval and process disposal alternatives consider retrieving each loaded railcar from the tunnels and transporting it to the spent fuel receiving area of the railroad tunnel in the PUREX Plant. Summaries of advantages and disadvantages of each retrieval and process disposal alternative are provided in Table 1. Before describing the various retrieval alternatives, this section has been provided to describe all operations common to the retrieval and process disposal alternatives.

The railcars will be retrieved one at a time by the remotely operated electric locomotive located in PUREX Plant. The locomotive will connect to the railcar to be extracted and pull the car into the railroad tunnel extension and into the canyon building. The southern knuckles of the railcars were disabled to prevent coupling of the cars. This has been standard procedure since the first cars were placed in the tunnels. With the southern knuckles disabled, it is assured that only one car at a time is withdrawn. The northern knuckles were left intact and are operational. The carriage well bearings are assumed to be in a condition such that they do not to prevent the locomotive from moving the cars. The cars located in Tunnel 1, positions 1 and 2, will be retrieved as a single unit.

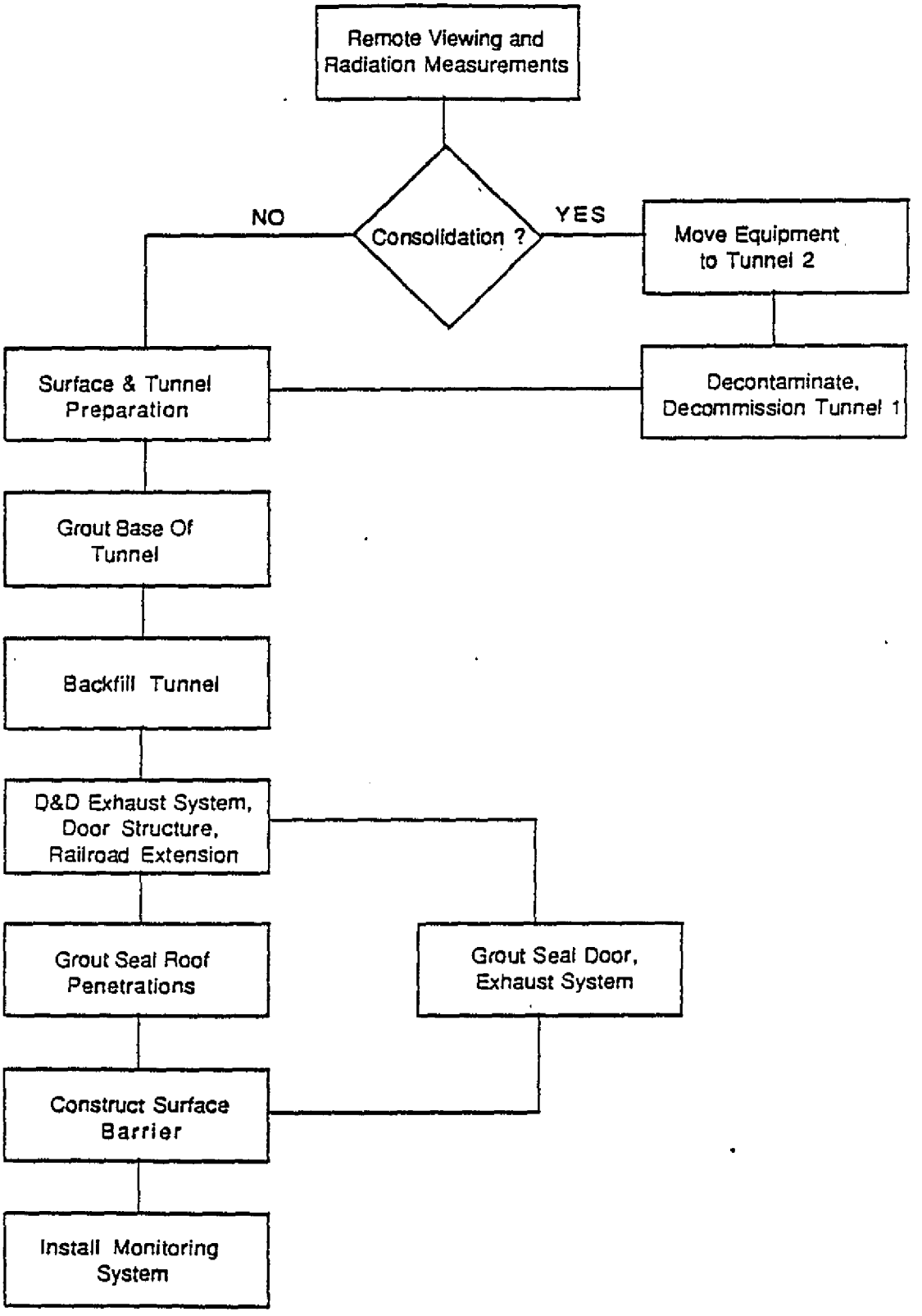


Figure 12. Grout Injection/Gravel Backfill Combination Alternative Flow Diagram.

Table 1. Summary of Disadvantages and Advantages for PUREX Storage Tunnels Disposal Alternatives, Page 1 of 3

Alternatives	Advantages	Disadvantages
Gravel Backfill	No waste handling Prototype unit developed at the Hanford Site Fill material readily available onsite	Regulatory acceptability low (waiver/variance required) Dangerous waste not treated Potential for structural damage to tunnel during installation of risers Filling equipment susceptible to wear (i.e., maintenance) Ability to provide adequate filling of tunnel void spaces uncertain No liner leachate collection system Waste located near surface Monitoring System required
Grout Injection	Technology is widely used in radioactive and dangerous waste applications Waste is immobilized/stabilized Remote application of technology Potential for partial filling of internal void spaces Grout injection projects currently performed onsite	Dangerous waste not treated Regulatory acceptability low (waiver/variance required) No liner leachate collection system Numerous penetrations of tunnel to create modules for injection Waste located near surface Monitoring system required
Gravel Backfill and Grout Injection	As listed for Gravel Backfill and Grout Injection	As listed for Gravel Backfill and Grout Injection Requires multiple equipment setups to perform filling activities

Table 1. Summary of Disadvantages and Advantages for PUREX Storage Tunnels Disposal Alternatives, Page 2 of 3

Alternatives	Advantages	Disadvantages
PUREX Plant Disposal	Clean closure of tunnels Waste is immobilized/stabilized by grout Structural design of canyon building provides additional barrier to environment Minimized handling of the equipment (through remote handling)	Dangerous waste not treated Limits further potential uses of PUREX canyon building Requires monitoring system Require construction of a massive surface barrier Regulatory acceptability low (waivers/ variance required)
PUREX Plant Processing	Clean closure of tunnels Waste segregation reduces volume of mixed waste for disposal Remote technology application improves ALARA Dangerous waste will be treated prior to disposal Regulatory acceptability	Construction of remote hot cell capabilities for size reduction, waste characterization, waste segregation, and packaging required Requires use of PUREX canyon building and support facilities (temporary)
WRAP Facility Processing	Clean closure of tunnels Reduced volume of mixed waste Treatment of dangerous waste Decontamination of railcars at WRAP Regulatory acceptability	WRAP Module 2 not designed to accept PUREX equipment due to size and expected radiation levels Packaging development required for large equipment with high radiation levels

Table 1. Summary of Disadvantages and Advantages for PUREX Storage Tunnels Disposal Alternatives, Page 3 of 3

Alternatives	Advantages	Disadvantages
Offsite Processing	Clean closure of tunnels Wastes removed from the Hanford Site Treatment of dangerous constituents	Packaging and transportation of large equipment Lose direct control of waste, therefore, future liabilities uncertain Regulatory acceptability low No permitted facility available for treatment and disposal of mixed waste
New Facility	Clean closure of tunnels State-of-the-art technologies incorporated Treatment of dangerous waste constituents Regulatory acceptability	Regulatory effort for a new permitted facility Duplication of WRAP facility function Construction of a limited-use facility Cost of processing 25 railcars of equipment excessive New building requiring D&D

After a loaded railcar is retrieved from a tunnel, the car will be placed beneath the horizontal door of the railroad tunnel extension (Figure 13). Detailed remote viewing and radiation measurements will be obtained at that time. Procedures similar to present transfer procedures for the remote transfer of the equipment from the railcar to the upper canyon area will be developed and instituted. The railcar will then be resurveyed, decontaminated to controlled release limits, and transported to other Hanford Site facilities for further decontamination and decommissioning (D&D) procedures. The ultimate disposition of the railcars will be based on the Hanford Site procedures in effect at the time.

4.3.1 Retrieval and Disposal/Storage in PUREX Plant

After placement in the upper canyon area, the equipment will be removed from storage boxes and, if size permits, placed in the process cells along with existing process cell equipment. The process cells will have been prepared to receive the equipment during the cleanup phase of closure operations for the PUREX Plant. This assumes in situ disposal of the PUREX Plant. A flow diagram for the work to be accomplished is in Figure 14.

The internal void spaces of the equipment will be filled with grout before filling the void spaces of the process cell. This is necessary to prevent the equipment from floating to the top of the process cell during the in situ stabilization procedure.

After in situ stabilization, the cell covers will be replaced over the grouted cell. Equipment which does not fit into the process cells will be placed on the canyon building deck. The equipment on the deck will be grouted in place using similar procedures. Grouting will prevent floating, provide stability, and immobilize the radioactive and dangerous waste constituents. After all process equipment has been grouted in placed, the canyon and building will be filled with grout. Canyon grout filling will be conducted in stages to allow ease of operations and to limit actual area for filling.

Storage boxes will be decontaminated to applicable release limits, removed from the canyon area, and transported to other Hanford Site facilities for disposition.

The tunnels will be decontaminated to allow entry for verification sampling. Sampling will test for dangerous waste constituents known to have been stored in the tunnels. Verification sampling and any minor cleanup of dangerous waste materials will be handled in accordance with approved operating procedures. After the removal of any remaining dangerous waste constituents has been completed, the tunnels will be decontaminated and decommissioned in accordance with the applicable procedures. Decommissioning may require dismantlement of the tunnels, depending on the use of the PUREX Plant for waste storage/disposal and on the remedial actions selected for the Tri-Party Agreement operable unit 200-PO-2.

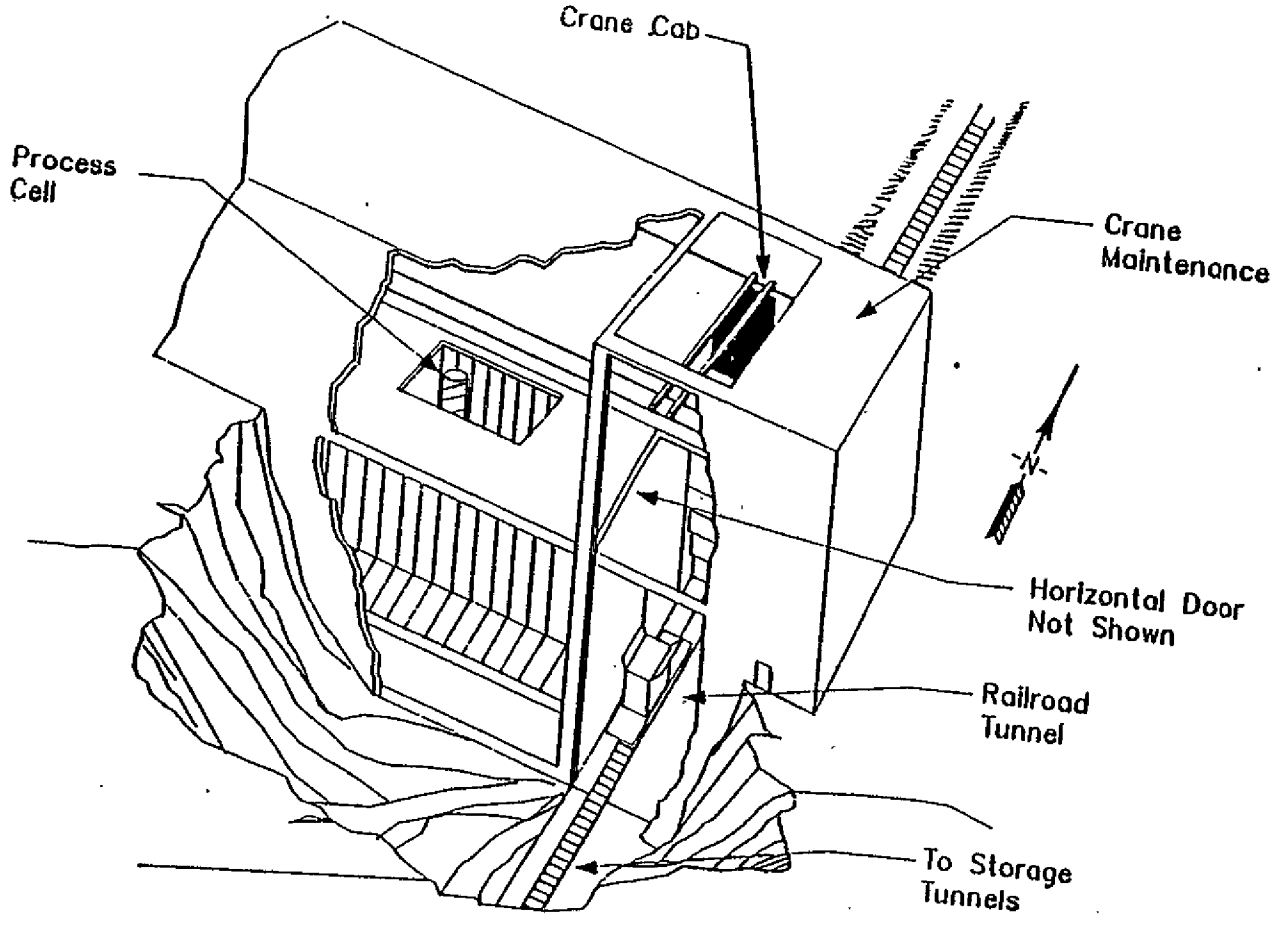


Figure 13. Equipment Retrieval in PUREX Plant.

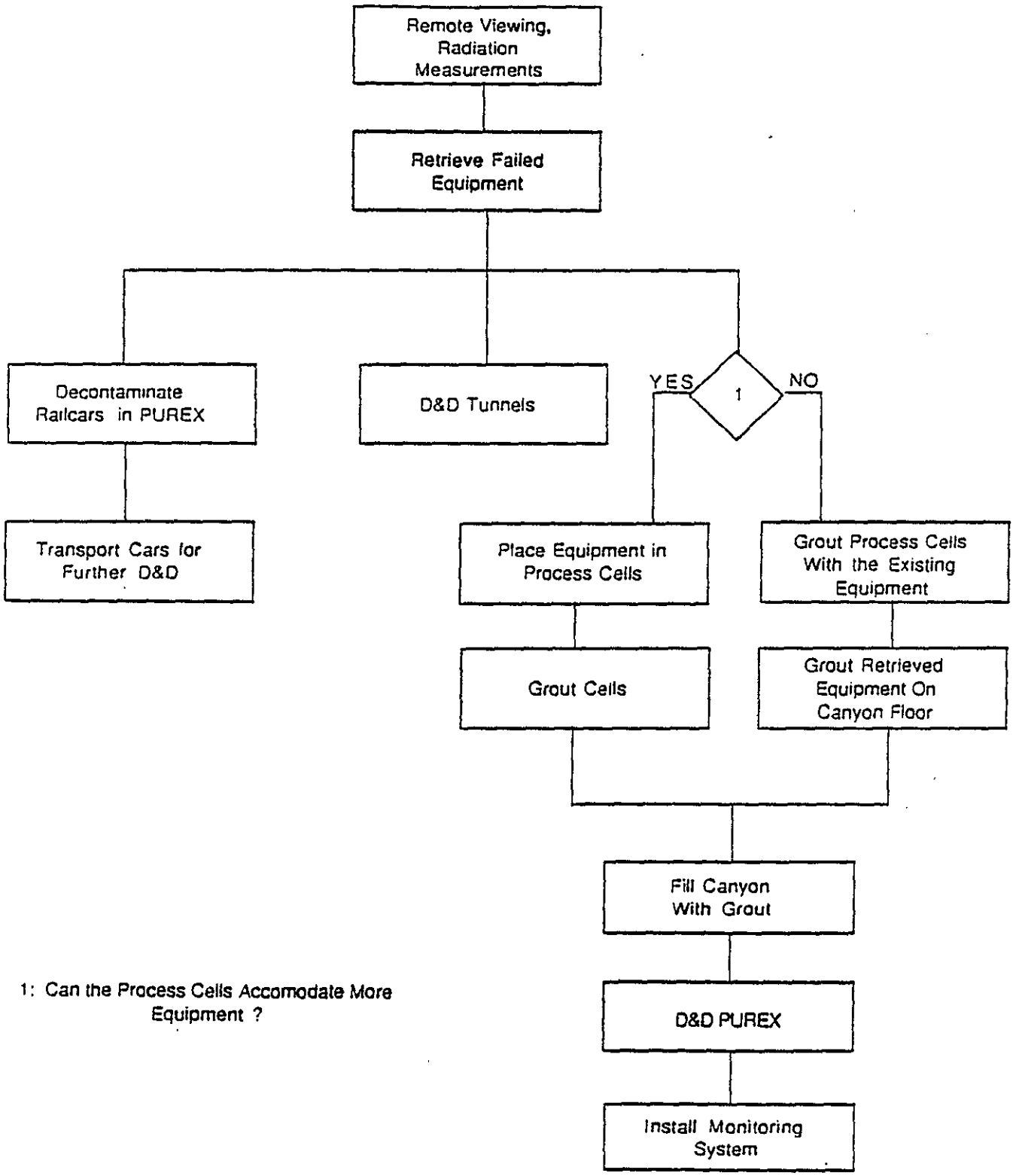


Figure 14. Retrieval, Dispose at PUREX Plant Alternative Flow Diagram.

The PUREX canyon building will be isolated by severing and plugging external and internal services as needed. The construction of a surface barrier over the facility is not proposed, as the PUREX Plant will be an above/below ground vault for storage/disposal of MW. Constructing a surface barrier and marking system over the canyon building will create controlled runoff which may adversely impact other portions of the Tri-Party Agreement operable unit. Monitoring of the above-grade building structure will be accomplished through visual observation. Subsurface monitoring will be accomplished through a vadose zone and ground water monitoring systems incorporated into the operable unit monitoring plan.

4.3.2 Retrieval and Process in PUREX Plant/Dispose Onsite

This alternative incorporates retrieval activities described in Section 4.3 for equipment removal from the PUREX storage tunnels. After retrieval of the process equipment, it will be processed in the PUREX Plant (Figure 15). Wastes will be disposed in accordance with current regulations.

An area of the upper canyon or a process cell will be modified to incorporate necessary technology to process the equipment. Modifications will include installation of remote-handling equipment, shielding, closed-circuit TV, and ancillary equipment necessary to decontaminate, size reduce, sample, and characterize the waste. Size reduction may be accomplished through flame cutting, water jet cutting, sawing, or other available technologies. If physical modification of existing canyon areas is not feasible, then design and development of a transportable shielded size reduction device, capable of being moved by the overhead crane, will be necessary for personnel to perform remote size reduction. Equipment will be radiologically decontaminated in a hot cell area to allow use of the PUREX Plant liquid waste system.

After remote decontamination, the large equipment will be disassembled if possible. Reasons for downsizing are threefold: size reduction of the equipment to the physical and radiological constraints of approved packaging, characterization of the downsized pieces, and segregation of the MW fraction of the inventory. The LLW will be packaged in approved packaging and certified for disposal in the LLBG. A current list of available packaging can be found in Appendix D. Low activity packages will be contact handled in accordance with operating procedures and waste acceptance criteria for the burial grounds. High activity LLW will be placed in newly designed and approved packaging for transport to LLBG drag-off trenches. On arrival at the drag-off trench, the package will be removed from the railcar and positioned in a disposal trench. The package will be filled with grout to eliminate internal voids and to provide structural stability (Appendix E).

The TRU wastes will be packaged in accordance with WIPP and the WRAP waste acceptance criteria. The precertified TRU packages will be transported to the WRAP facility for final certification and packing in TRUPACT-2 containers for transported to the WIPP site.

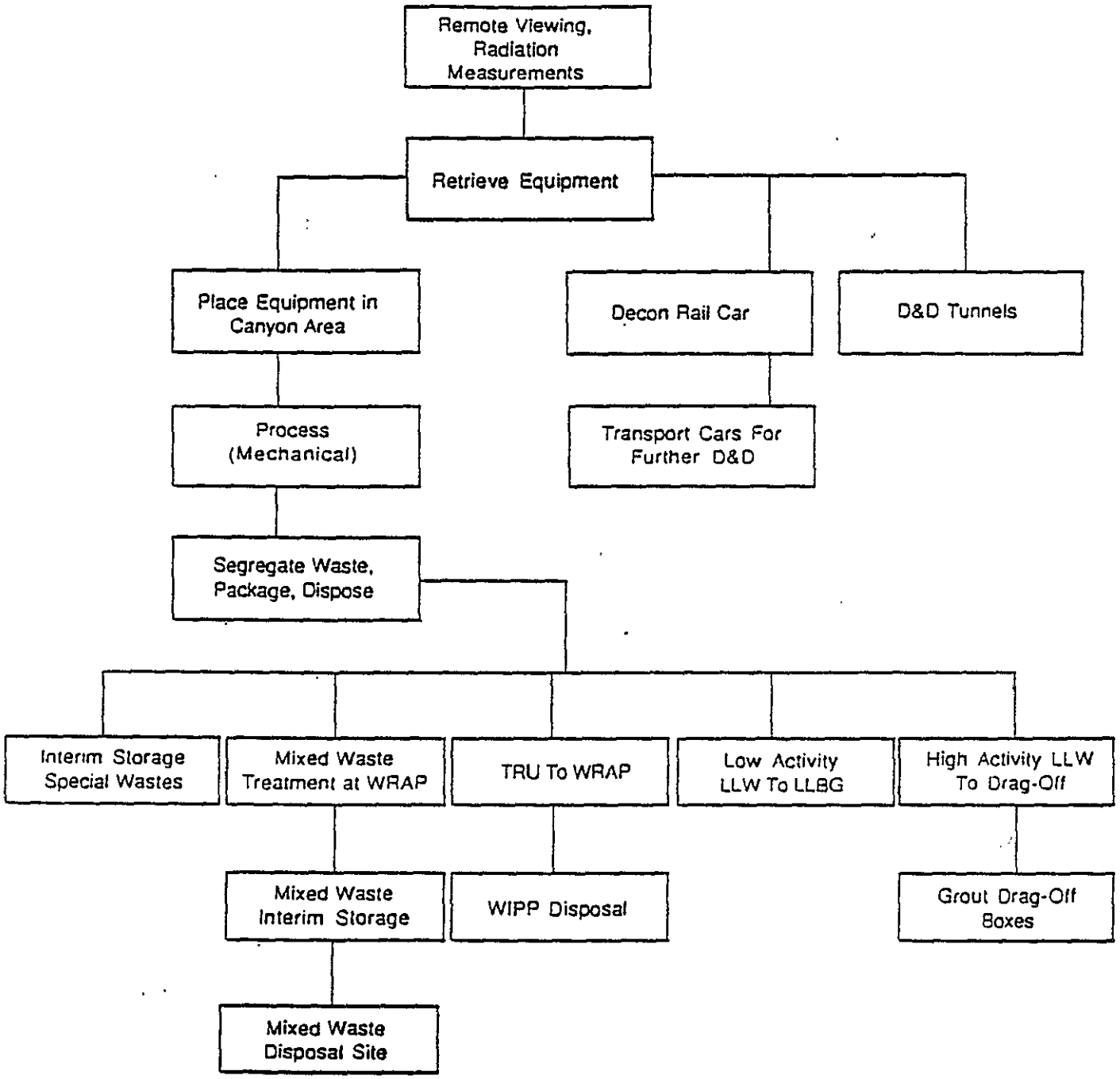


Figure 15. Retrieval, Process at PUREX Plant Alternative Flow Diagram.

Special wastes (greater than Class C wastes [NRC 1989]) will be processed and packaged in approved packaging. These wastes will then be transported to an appropriate Hanford Site storage facility. The wastes will be stored until final disposition of the packages may be accomplished.

The MW will be segregated from the other waste categories to reduce the volume of waste requiring processing and disposition as MW. The elemental mercury wastes are contained in stainless steel thermowells and capped to prevent spillage. The EPA currently does not have a best available technology for treatment of and or removal of the mercury from the thermowells. Therefore, using the current Westinghouse Hanford policy (Stickney 1988) of adding zinc powder to create an amalgam, or the proposed process to mineralize the mercury (creating mercury sulfide) may be the treatment of choice. The amalgamation process would be easiest to initiate remotely and would also reduce the potential for inadvertent spreading of mercury during processing and storage. Decontamination of wastes will be handled in accordance with waste management procedures using the PUREX liquid waste system and solid radioactive and/or dangerous waste acceptance criteria.

The tunnels will be decontaminated to allow entry into the tunnels for verification sampling. Sampling will test for dangerous waste constituents known to have been stored in the tunnels. Verification sampling and any minor cleanup of dangerous waste materials will be handled in accordance with approved operating procedures. After the removal of any remaining dangerous waste constituents has been completed, the tunnels will be decontaminated and decommissioned in accordance with the applicable procedures. Decommissioning may require dismantlement of the tunnels, depending on the use of the PUREX Plant for waste storage/disposal and on the remedial action selected for the Tri-Party Agreement operable unit 200-PO-2.

4.3.3 Retrieval and Process at WRAP Facility

Equipment will be retrieved from the storage tunnels as described in Section 4.3. The equipment will be removed from the railcars and placed in the upper canyon area where decontamination, partial disassembly, and size reduction is conducted. Remote disassembly and size reduction will reduce the equipment to a size which is compatible with packaging approved for use to transfer equipment to the WRAP facility. Packaging and transfer procedures shall be consistent with DOE and *Hanford Radioactive Solid Waste Acceptance Criteria* (Stickney 1988) and/or dangerous waste handling criteria and WRAP waste acceptance criteria. The WRAP facility will provide further size reduction and remote handling capabilities to process and treat the equipment for disposal/storage according to waste category. A flow diagram for this alternative can be found in Figure 16.

Railcars, retrieved from the tunnels, will be decontaminated to applicable release limits for transport to the WRAP facility or other Hanford Site facilities for additional D&D and ultimate disposition in accordance with the waste management and surplus equipment plans.

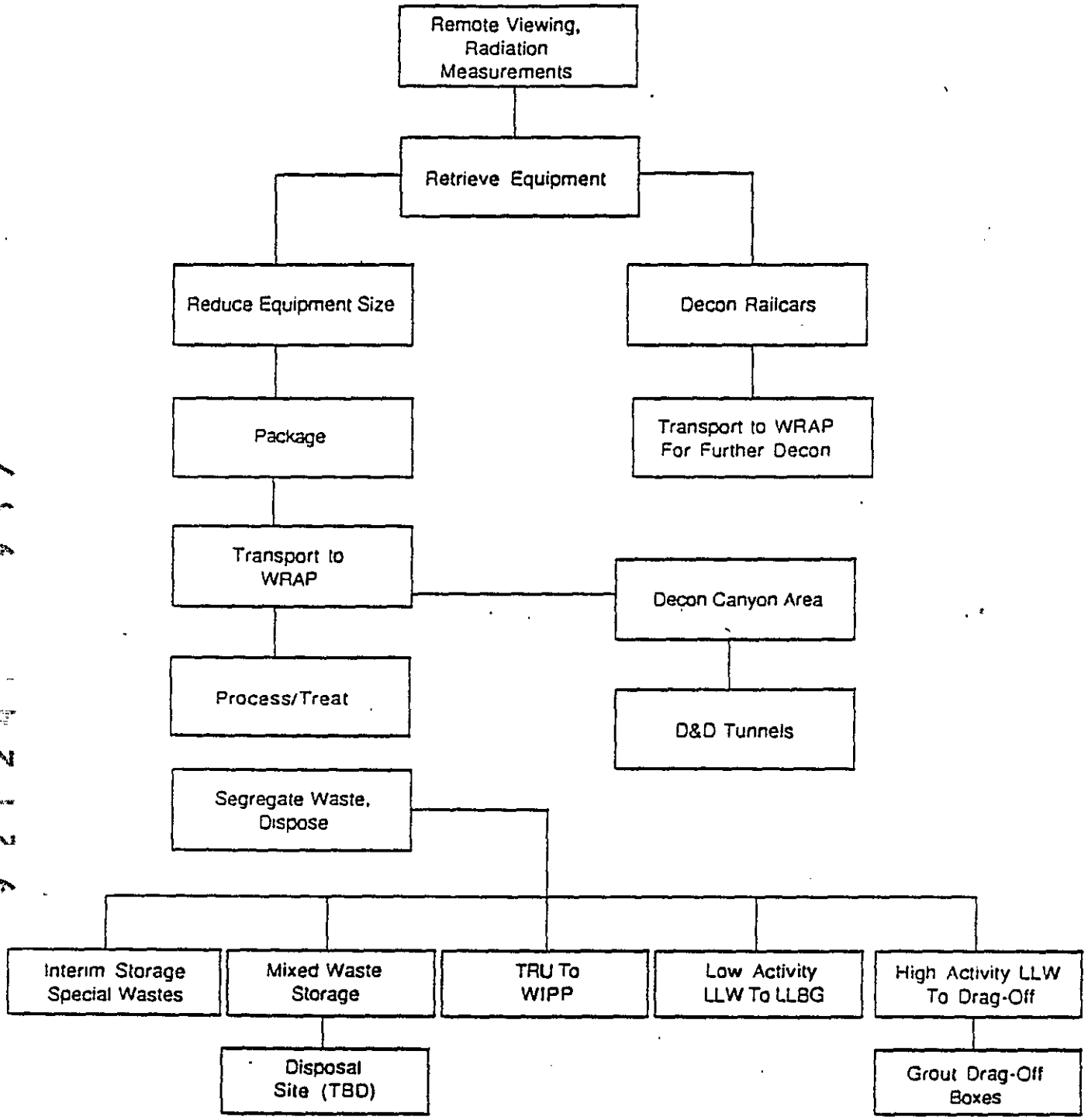


Figure 16. Retrieval, Process at WRAP Facility Alternative Flow Diagram.

The tunnels will be decontaminated to allow entry into the tunnels for verification sampling. Sampling will test for dangerous waste constituents known to have been stored in the tunnels. Verification sampling and any cleanup of dangerous materials will be handled in accordance with approved operating procedures. After the removal of any remaining dangerous waste constituents has been completed, the tunnels will be decontaminated and decommissioned in accordance with the applicable procedures. Decommissioning may require dismantlement of the tunnels, depending on the use of the PUREX Plant for waste storage/disposal and on the remedial action selected for the Tri-Party Agreement operable unit 200-PO-2.

The WRAP facility will provide processing of radioactive and MW at the Hanford Site. The facility has been proposed as two projects (Modules 1 and 2), to facilitate designing and bringing the project on line in a timely manner. Module 1 will provide the primary capability to process contact handled TRU drums and handle TRUPACT-2 shipping (Pauly 1990). Module 2 will provide for the processing of LLW and MW, including size reduction, remote handling, and decontamination capabilities (Pauly 1990).

Radioactive wastes will be processed to segregate the TRU from the LLW. The resulting wastes will be dispositioned according to the waste acceptance criteria for the ultimate disposal facility (WIPP, LLBG). The WRAP facility as proposed is a processing facility, not a waste storage and/or disposal facility. Waste storage capacity is dedicated to provide for consistent flow of material into and out of the facility. Therefore, waste transported to the WRAP facility in accordance with the facility acceptance criteria will only be processed to the extent possible according to the throughput capabilities of the facility (shipment scheduling required).

Proposed treatments for the suspect MW at the WRAP facility are as follows (Pauly 1990):

- Mercury will be mineralized to mercuric sulfide (low solubility/nontoxic), solidified, and placed in approved packaging for storage/disposal at a permitted location.

- Lead will be decontaminated for reuse, or treated by a refining process to form lead ingots (for recycle) with a slag (dross) containing contaminants. The slag will be solidified and placed into approved packaging for storage/disposal at a permitted location.

- Silver salts contained in the silver reactors may be encapsulated by cement in approved packaging for storage/disposal at a permitted location.

4.3.4 Retrieval, Processing, and Disposal Offsite

Offsite processing of the equipment requires removal of the waste from the tunnels, size reduction and packaging of the waste. Transport across State borders requires additionally that the Governors of each State be notified for approval. This initial processing will occur in the PUREX Plant to fulfill all shipping packaging requirements. The processing will be completed as described in Section 4.3.2 (Figures 15 and 17).

4.3.5 Construct a New Facility

This alternative considered two options for constructing a new facility. Figure 18 provides a basic flow diagram for activities in this alternative. One option is to construct a fixed facility over either end of the railroad tunnel at the east end of the PUREX canyon building. This structure will employ a construction design equivalent to the needs for handling large equipment and processing capabilities for dismantling the equipment for packaging into burial packages (Figure 19). Transport of the final packages would be by railcar to the burial grounds.

The other option is to construct a similar shielded structure as indicated in the first option. The structure is mobile and traverses the length of the tunnels. The internal operations of the facility provide the means to excavate the tunnel roof, open the tunnel roof, and extract the equipment and railcar into the upper portion of the structure through a horizontal door. Once in the upper area, the equipment and railcars are disassembled, treated as necessary to meet waste acceptance criteria for burial, packaged into approved packaging, decontaminated, off-loaded onto trucks, and transported to a final burial location at the Hanford Site. The excavated tunnel(s) is covered by a temporary structure until all waste has been removed. Then the tunnels are decommissioned, and the area is regraded. Figures 19 and 20 provide a conceptual view of the facility.

4.4 NO ACTION ALTERNATIVE

This study assumes that the storage tunnels will remain an integral part of PUREX operations. Thus, the tunnels will remain open to accept equipment until the mission of the PUREX Plant is completed and closure is initiated. However, an issue that must be addressed in the permit application is the closure method for the facility with the disposition of tunnel waste. The strategy adopted for the permit and this study is that the tunnels will be closed in conjunction with the closure of the PUREX Plant.

A no action alternative is not a viable existing long-term option. In conjunction with the preparation of this study, a RCRA Part B permit application is being prepared to allow the tunnels to continue operation as a storage facility. The permit application is due to Ecology by September 28, 1990.

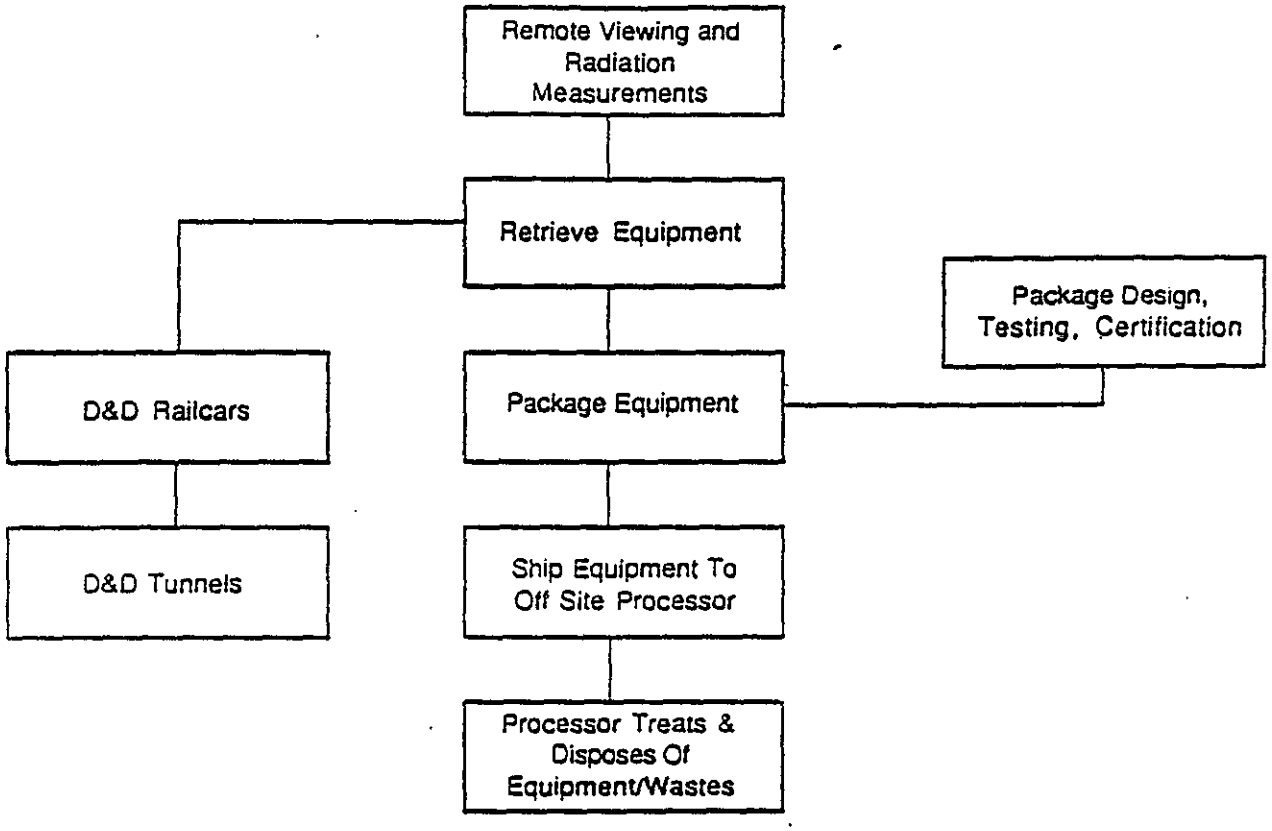


Figure 17. Retrieval, Process Offsite Alternative Flow Diagram.

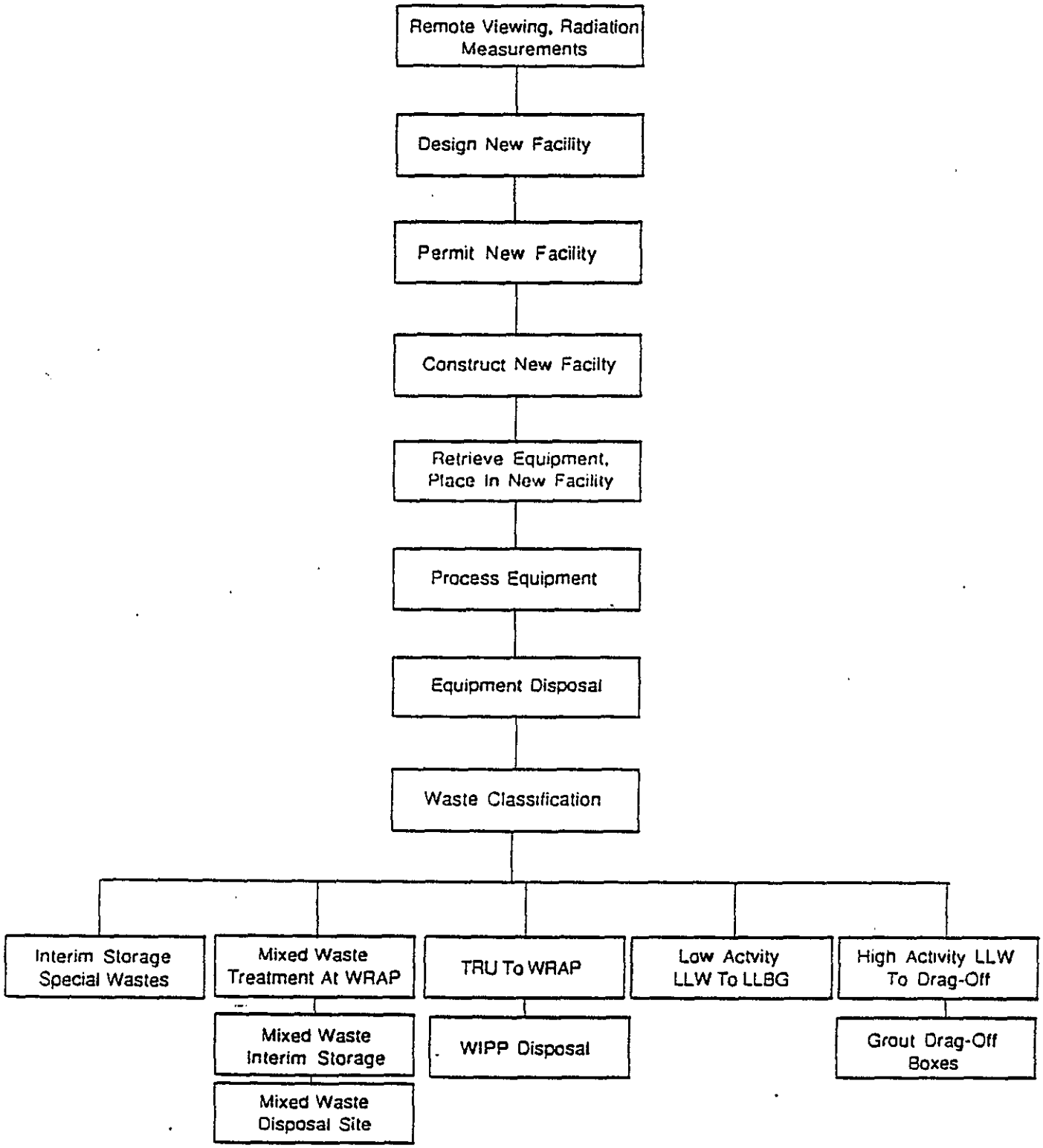


Figure 18. Construct a New Facility Alternative Flow Diagram.

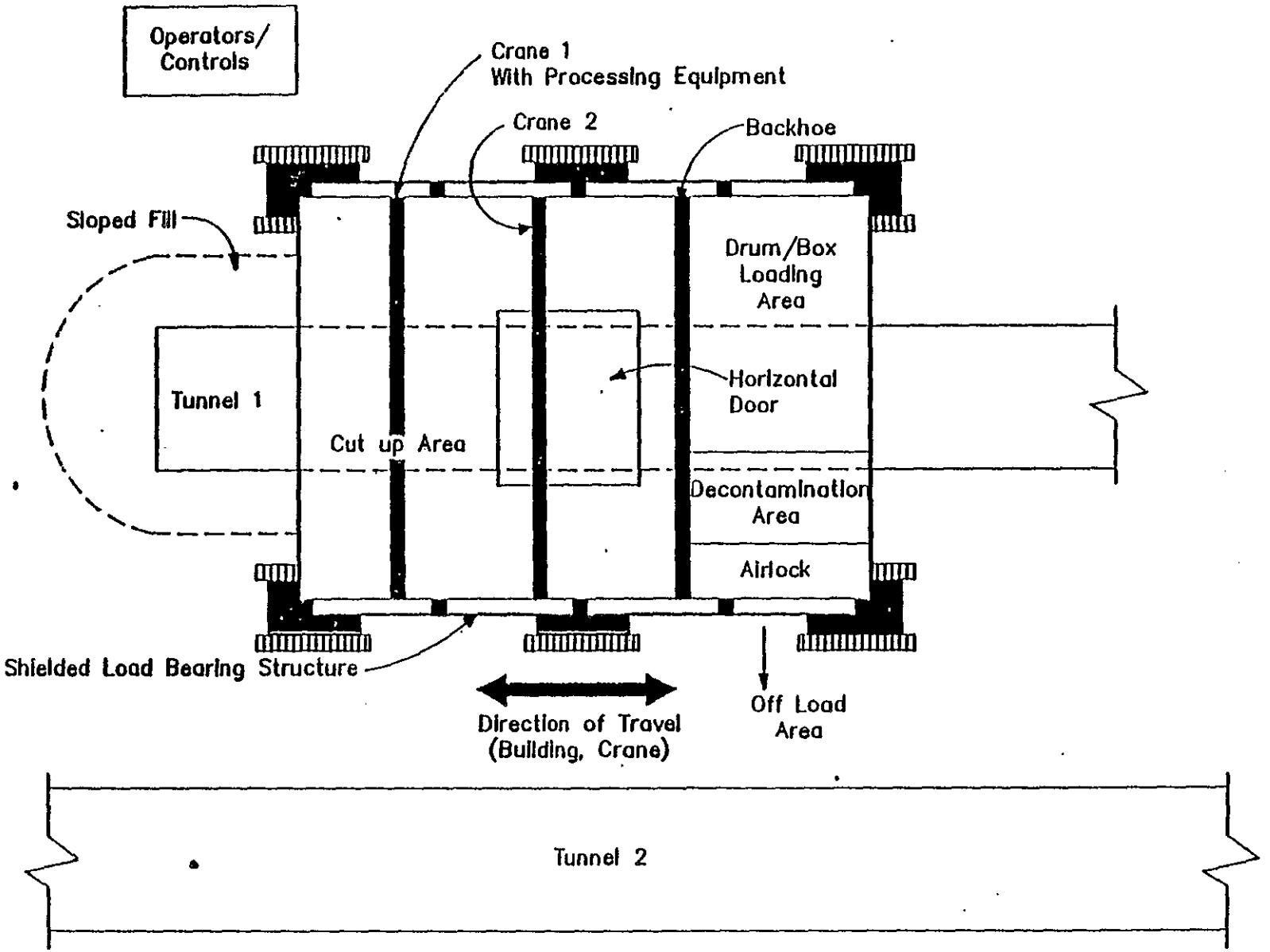


Figure 19. New Facility Conceptual Diagram.

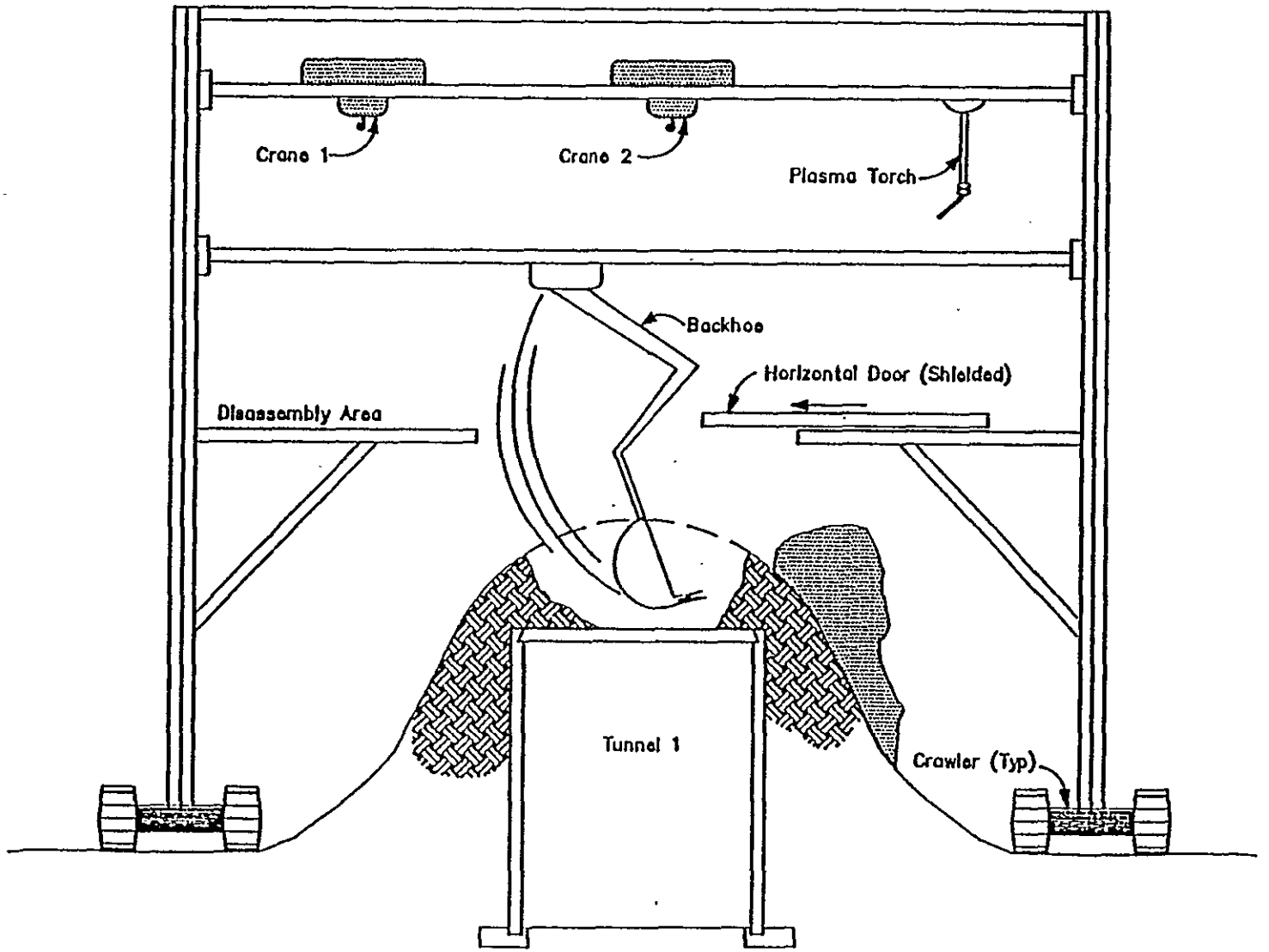


Figure 20. New Facility Cross Section.

5.0 ALTERNATIVE EVALUATION

5.1 CRITERIA

Eight disposal concepts for the equipment were considered for this study. An evaluation matrix was used to compare the alternatives and arrive at a preferred alternative for disposal of the equipment. The matrix consisted of seven criteria for comparison of the alternatives. The criteria are ALARA evaluation, regulatory acceptability, cost, potential for negative environmental impact (short-term), available technology, packaging/transportation feasibility, and industrial health and safety. Each criterion was assigned a weighting factor to indicate relative importance. Personnel protection was considered to be the most important item with an overall weighting factor of 5.5 [ALARA evaluation (4.0) plus industrial health and safety (1.5)]. Compliance within the present regulatory framework (regulatory acceptability) was considered the next most important. Potential for environmental releases, which can be remediated during the alternative, cost (capital and annual), technology availability, and packaging/transportation feasibility follow in importance. The following criteria and associated weighting factors demonstrate the importance of each criterion:

Criterion	Weighting Factor
ALARA evaluation	4.0
Regulatory acceptability	4.0
Short-term environmental impact	3.5
Costs	3.0
Technology availability	2.0
Packaging/transportation feasibility	2.0
Industrial health and safety	1.5.

5.2 SCORING AND SELECTION

Each alternative was evaluated against the criteria, with a raw score (varying from 0 to 5 points) assigned for each criterion. The raw score was then multiplied by a weighting factor to obtain a weighted score. The weighted scores were summed to compare the alternatives. A maximum of 100 points is possible.

A preferred alternative for each category and an overall preferred alternative were then selected. The assignment of raw scores is subjective, based upon good engineering judgement, as there is minimal information available to develop quantitative criteria. The criteria and scoring are discussed in the following subsections.

5.2.1 ALARA Evaluation

The ALARA principle is based on the use of engineered barriers to ensure protection of personnel. Protective equipment and administrative controls serve as secondary means for achieving protection.

The disposal alternatives present potential for exposure to ionizing radiation. Each alternative was evaluated according to the potential personnel exposure. An alternative which provides minimal exposure to ionizing radiation is assigned a higher raw score than an alternative which exposes personnel to high levels of ionizing radiation. The raw scores were assigned as follows (Table 2):

Raw Score	Description
5	No expected personnel exposures
4	Low potential exposure to radiological hazards for facility personnel.
3	Low to moderate potential exposure to radiological hazards for facility personnel.
2	Moderate to high potential exposure to radiological hazards for facility personnel and/or low potential for other site personnel.
1	Moderate to high potential exposure to radiological hazards for facility personnel, low to moderate potential for other site personnel, and/or low potential for general public.
0	Low to Moderate potential exposure to radiological hazards for general public.

Table 2. ALARA Evaluation Scores.

Alternative	Raw Score	Weighting Factor	Weighted Score
Gravel backfill	2	4.0	8
Grout Injection	3	4.0	12
Gravel + Grout	2	4.0	8
PUREX Plant Disposal	2	4.0	8
PUREX Plant Process	2	4.0	8
WRAP Facility	2	4.0	8
Offsite	1	4.0	4
New Facility	2	4.0	8

5.2.1.1 Gravel Backfill. Gravel backfilling the tunnels requires excavation of the soil shield to permit access to the tunnel(s) roof area to install access risers for the rock throwing apparatus. The preparatory actions have the potential to generate moderate to high external radiation exposures to the personnel performing the installation, but the potential for internal exposure is minimal when proper protective measures are used. This alternative is expected to affect facility personnel with moderate to high external radiation exposures. A score of 2 is assigned.

5.2.1.2 Grout Injection. Grout injection uses the current riser openings for grout injection. Without removing the earth shield, personnel exposures will be low to moderate. This alternative is expected to affect facility personnel with low to moderate external radiation exposures. A score of 3 is assigned.

5.2.1.3 Gravel Backfill and Grout Injection. The combination of grout injection and backfill operations will cause personnel exposures similar to gravel backfill alone (worst case scenario). A score of 2 is assigned.

5.2.1.4 Retrieval, Disposal in PUREX Plant. The equipment is handled remotely during retrieval activities including placement in the PUREX canyon building. Grouting activities will also be performed remotely. Initial decontamination of the railcars in the railroad tunnel and D&D activities will require personnel entry into the areas. This alternative is expected to affect facility personnel with moderate to high radiation exposures. A score of 2 is assigned.

5.2,1.5 Retrieval, Process at PUREX Plant. Retrieval and processing for disposal will use remote techniques where possible. The remote processing of equipment allows facility personnel to perform the various activities with minimal exposure. However, maintenance of remote equipment, the decontamination of the railcars, and decommissioning of the tunnels will require personnel entry to perform portions of these activities. Transportation of waste packages to other locations at the Hanford Site has the potential for low to moderate external exposures to other site personnel. This alternative is expected to affect facility personnel with moderate to high external radiation exposures and possibly affect other site personnel with a low external hazard from transportation and handling of the waste at the disposal areas. A score of 2 is assigned.

5.2.1.6 Retrieval, Process at WRAP Facility. This alternative requires the transport of the equipment to the WRAP facility. This requires the equipment to be placed in packaging acceptable to the WRAP facility and compliant with site transportation criteria. The decontamination of the railcars and the tunnels will require personnel entry to perform portions of these activities. This alternative is expected to affect facility and other site facility personnel with moderate to high external radiation exposures. A score of 2 is assigned.

5.2.1.7 Retrieval, Process Offsite. The alternative requires the use of U.S. Nuclear Regulatory Commission/U.S. Department of Transportation-approved packaging to enable shipment to an offsite location. Packaging should provide the necessary protection for the carrier and the general public. A severe transportation accident scenario could hypothetically expose the general public to moderate or high radiation along with potential exposure of facility personnel during packaging and decontamination activities. A score of 1 is assigned.

5.2.1.8 Retrieval, Process at New Facility. Construction of a new facility will provide for the latest technology designs to limit potential exposures during processing. Once emptied, the tunnels would be decontaminated and decommissioned as stated in previous alternative descriptions. This alternative is expected to affect facility personnel only with low to high external radiation exposures and possibly low internal exposures from tunnel entrances. A score of 2 is assigned.

5.2.2 Regulatory Acceptability

The complexity of regulatory requirements which may apply to the disposal alternatives are due in part to the dual regulation of MW. Regulatory acceptability or compliance may be the critical path for determining whether an alternative is viable. A concerted effort to comply with the regulations may impose undue health and/or safety risks in addition to infeasible economic considerations. Accordingly, the proposed disposal alternatives were evaluated for regulatory constraints as follows (Table 3):

Raw Score	Description
5	Clean closure of tunnels. Treatment and immediate disposal at the Hanford Site RCRA/AEA-compliant facility.
4	Clean closure of tunnels. Treatment and interim storage at the Hanford Site RCRA/AEA-compliant facility.
3	Clean closure of tunnels. Treatment, Storage and disposal at an offsite RCRA/AEA-compliant facility.
2	Clean close the tunnels without treatment. Storage/disposal in noncompliant facility.
1	Waste constituents remain in the tunnels without treatment, enhanced disposal technique requiring variances based on solidification/immobilization of waste for a noncompliant facility.
0	Waste constituents remain in the tunnels without treatment. Variances required based on stabilization of disposal structure for disposal in noncompliant RCRA/AEA facility.

Table 3. Regulatory Acceptability Scores.

Alternative	Raw Score	Weighting Factor	Weighted Score
Gravel backfill	0	4	0
Grout Injection	1	4	4
Gravel + Grout	0	4	0
PUREX Plant Disposal	2	4	8
PUREX Plant Process	4	4	16
WRAP Facility	4	4	16
Offsite	3	4	12
New Facility	4	4	16

5.2.2.1 Grout Backfill. The tunnels do not meet minimal criteria for either AEA or RCRA for a disposal facility. Variances from the pertinent regulations will be required for the alternative. A score of 0 is assigned.

5.2.2.2 Grout Injection. This alternative does not treat the MW but provides an additional barrier to reduce the potential for migration of waste constituents. The immobilization may constitute application of a best management practice and allow for obtaining a variance from the regulations for a noncompliant RCRA facility. The alternative will not comply with regulations with the potential for TRU material and greater than Class C (NRC 1989) type waste in a noncompliant AEA disposal facility. A score of 1 is assigned.

5.2.2.3 Grout Backfill and Grout Injection. This alternative will have the same regulatory acceptability as the lowest scored component alternative. A score of 0 is assigned.

5.2.2.4 Retrieval, Disposal in PUREX Plant. This alterative does not treat the EHW but does provides for placement of the wastes in an engineered structure with solidification/immobilization of the waste constituents by grout entombment. The process is nonreversible if future regulatory changes would require retrieval of the wastes. The PUREX canyon building is a massive reinforced concrete structure which will act as an additional barrier to the environment. The alternative provides for clean closure of the tunnels but at the same time uses a noncompliant RCRA/AEA disposal facility. A score of 2 is assigned.

5.2.2.5 Retrieval, Process at PUREX Plant. This alternative will mechanically reduce the size of equipment to allow for segregation of waste by category. The LLW will be sent to the AEA-compliant LLBG. The TRU and MW will be processed and treated at the WRAP facility, with subsequent disposal at AEA- and RCRA-compliant sites, and greater than Class C waste (NRC 1989) will be disposed of at an AEA-compliant site. The tunnels will be clean closed with wastes sent to appropriate disposal/storage facilities. A score of 4 is assigned.

5.2.2.6 Retrieval, Process at WRAP Facility. This alternative will mechanically reduce the size of equipment to meet acceptance requirements for transport to the WRAP facility. The WRAP facility will be a RCRA-compliant, permitted treatment facility. The equipment will be treated and disposed/stored at appropriate compliant and permitted sites. The tunnels will be clean closed. A score of 4 is assigned.

5.2.2.7 Retrieval, Process Offsite. This alternative will necessitate size reduction of the equipment to meet packaging and transportation requirements of RCRA/AEA-compliant offsite treatment and disposal facility(s). A score of 3 is assigned.

5.2.2.8 Retrieval, Process at New Facility. This alternative provides for construction of a new RCRA-compliant facility in close proximity to the storage tunnels and the PUREX Plant. The facility will treat the EHW and dispose/store of all waste at appropriate RCRA/AEA-compliant sites. The tunnels will be clean closed. A score of 4 is assigned.

5.2.3 Cost

The combined cost (capital and operating) for instituting a disposal alternative, when competing for limited resources with other waste management activities, may decide whether an alternative is viable within the scope of activities to be performed at the Hanford Site (Appendix F). The cost should be in line with the amount of materials to be processed to provide a positive cost/benefit for the Hanford Site and the environment. An alternative which provides for a lower unit cost ($ per railcar) will receive a corresponding higher score than an alternative which has a higher unit cost. The raw score was calculated by assigning a score of 0 to the most costly alternative (constructing a new facility--$9.96 million per railcar) and assigning a score of 5 to the least costly alternative (gravel backfill--$0.40 million per railcar). A straight line between these two points produces a slope of (9.96 - 0.40)/5 or 1.91. Accordingly, the raw scores for the alternatives will fall on the line and were calculated as follows (Table 4):

Raw score = (9.96 - alternative cost per unit)/1.91.

Raw Score	Description
5	Lowest capital/operational cost per railcar of waste
0	Highest capital/operational cost per railcar of waste.

Table 4. Cost Scores.

Alternative	Raw Score	Weighting Factor	Weighted Score
Gravel backfill	5.0	3.0	15.0
Grout Injection	4.87	3.0	14.6
Gravel + Grout	4.87	3.0	14.6
PUREX Plant Disposal	4.19	3.0	12.6
PUREX Plant Process	3.5	3.0	10.5
WRAP Facility	2.97	3.0	8.92
Offsite	3.66	3.0	11.0
New Facility	0.0	3.0	0.0

5.2.4 Short-Term Environmental Impact

Each alternative will have some potential for a negative short-term environmental impact on surrounding areas. This type of impact is short-term due to the ability to apply engineering controls and quickly remediate a release of dangerous or radioactive waste constituents. Each alternative was evaluated with respect to potential impact as follows (Table 5):

Raw Score	Description
5	No impact on environmental conditions.
4	Low potential for environmental releases within the work area of dangerous or radioactive contaminants.
3	Moderate potential for environmental releases of dangerous or radioactive contaminants within the work area.
2	High potential for environmental releases of dangerous or radioactive contaminants within the work area.
1	Potential environmental release of dangerous or radioactive contaminants would impact the work area and areas accessible to the general public.
0	Potential for environmental releases which could not be quickly remediated.

Table 5. Short-Term Environmental Impact Scores.

Alternative	Raw Score	Weighting Factor	Weighted Score
Gravel backfill	3	3.5	10.5
Grout Injection	4	3.5	14
Gravel + Grout	3	3.5	10.5
PUREX Plant Disposal	5	3.5	18.5
PUREX Plant Process	4	3.5	14
WRAP Facility	3	3.5	10.5
Offsite	1	3.5	3.5
New Facility	3	3.5	10.5

5.2.4.1 Gravel Backfill. The storage tunnels were originally designed to minimize radiological threats toward the environment and to the contain the stored material. Construction activities related to the alternative will have the potential to release radionuclides to the environment outside the tunnels. Reducing the potential for subsidence will reduce the potential releases of contaminants. The alternative is expected to yield low to moderate potential for a short-term negative environmental impact. A score of 3 is assigned.

5.2.4.2 Grout Injection. In situ stabilization uses existing riser outlets in the tunnels to provide access for injecting grout. The proposed grout injection system can provide exhaust ventilation to control atmospheric releases during operations. The grout will provide additional subsidence protection and immobilization of waste constituents, preventing or reducing the potential for short-term releases. This alternative is expected to yield a low potential for a short-term negative environmental impact. A score of 4 is assigned.

5.2.4.3 Gravel Backfill and Grout Injection. This alternative, being a combination of gravel backfill and grout injection, will have potential short-term impacts similar to those of gravel backfill. This alternative is expected to yield a low to moderate potential for a short-term negative environmental impact. A score of 3 is assigned.

5.2.4.4 Retrieval, Disposal in PUREX Plant. Engineering controls are presently in place to reduce potential atmospheric releases to acceptable limits by disposing in the PUREX Plant. The release of contaminants to the environment in the near future is not expected. Accordingly, the alternative provides for minimal if any changes from the present conditions, and a score of 5 is assigned.

5.2.4.5 Retrieval, Process at PUREX Plant. This alternative uses present engineering controls to reduce atmospheric release to acceptable limits for radionuclides. The potential release of EHW constituents increases with the implementation of size reduction and transportation. Localized engineering controls will contain potential releases within the PUREX Plant. A low potential for an environmental release may occur during a transportation incident. A score of 4 is assigned.

5.2.4.6 Retrieval, Process at WRAP Facility. Development of approved packaging to transport equipment to the WRAP facility for processing and shipment to final disposal site for this alternative is necessary. Approved packaging will provide the necessary barrier to reduce or eliminate a short-term impact during transportation. Engineering control at the WRAP facility will provide protection against short-term negative impact. A low potential for transportation accidents exists and a corresponding low potential for release of contaminants to the environment. A score of 3 is assigned.

5.2.4.7 Retrieval, Process Offsite. Offsite disposal requires transport of the untreated waste to an offsite processor for treatment and disposal. The potential exists for release of EHW and/or radioactive contaminants during a severe transportation accident. This will affect the environment accessible to the general public. A score of 1 is assigned.

5.2.4.8 Retrieval, Process at New Facility. A new facility will use the latest in engineering controls to reduce the potential for environmental releases during processing. The major short-term impact is from the construction of a new facility, which in turn will require decommissioning and increase potential waste volumes for disposal. Thus there is an increased potential for environmental releases. A score of 3 is assigned.

5.2.5 Technology Availability

The LLW and MW treatment/disposal has been practiced by the U.S. nuclear industry for many years. The recent application of RCRA regulations to DOE facilities has changed the management practices for MW to meet both sets of regulations. Treatment technology exists and is currently being used to process MW. Wastes are disposed of using BDAT or placed in safe storage until new treatment/disposal methods are developed. There is a need for developing remote handling technology applications for some of the disposal alternatives.

A proven technology to handle radioactive and MW is highly desirable over unproven technologies. An alternative which presently has or can be adapted to provide for remote applications is also more desirable than the more readily available contact handling applications. The alternatives for the tunnels all require some degree of modification to a current process or design to incorporate remote technology applications. Remote handling methods in an alternative are necessary due to high radiation levels associated with the equipment. Previous D&D work for fuel reprocessing facilities has been contact-oriented and therefore labor and potentially dose intensive.

A higher score is assigned to an alternative which uses proven available technology which requires a minimum of modification to support the alternative; a reduced score is assigned to an alternative which requires increased levels of modification or equipment design (Table 6). Current remote handling and waste processing techniques used in the nuclear industry provide the minimal technological basis for a design.

Raw Score	Description
5	Proven operational technology in use at the Hanford Site. No design modifications needed for equipment.
4	Proven operational Technology in use at the Hanford Site requiring minimal modifications for application to the tunnels.
3	Prototype demonstration developed/tested at the Hanford Site.
2	Prototype technology available at other DOE facilities, requiring technology transfer and development for the Hanford Site.
1	Technology applications available from non-DOE facilities requiring Hanford Site procurement and application design.
0	Technology is only theory and will require conceptual design, prototype testing and modification to Hanford Site specifications.

Table 6. Technology Availability Scores.

Alternative	Raw Score	Weighting Factor	Weighted Score
Gravel backfill	3	2.0	6
Grout Injection	4	2.0	8
Gravel + Grout	3	2.0	6
PUREX Plant Disposal	4	2.0	8
PUREX Plant Process	4	2.0	8
WRAP Facility	3	2.0	6
Offsite	2	2.0	4
New Facility	2	2.0	4

5.2.5.1 Gravel Backfill. The gravel backfill method has been prototype tested on the Hanford Site and has not been placed in full operation. The feasibility of a ground containment and monitoring system technology for materials in the tunnels has not been established. A score of 3 is assigned.

5.2.5.2 Grout Injection. The grout injection system has been developed and used for filling subsurface structures on the Hanford Site. These systems can be modified for direct application to the tunnels. A score of 4 is assigned.

5.2.5.3 Gravel Backfill and Grout Injection. This combination of gravel backfill and grout injection will have a score corresponding to that for gravel backfill. A score of 3 is assigned.

5.2.5.4 Retrieval, Disposal in PUREX Plant. Retrieval and vault equipment and techniques are readily adaptable to performing the requirements of this alternative. Existing equipment in the PUREX Plant and railroad tunnel is used for retrieval and placement of equipment in the canyon. Grouting capabilities can be designed to be incorporated to allow for solidifying the canyon building into a vault structure. A score of 4 is assigned.

5.2.5.5 Retrieval, Process at PUREX Plant. This alternative will use available retrieval and equipment transfer and placement techniques in the PUREX Plant. The addition of remote handling technology to perform size reduction, material segregation, and packaging for transportation for treatment, storage and/or disposal will require modifications. A score of 4 is assigned.

5.2.5.6 Retrieval, Process at WRAP Facility. This alternative will use available retrieval and placement equipment which are presently used in the PUREX Plant. Minimal remote handling technology and techniques will be incorporated for size reduction and packaging for transportation to the proposed WRAP facility. The WRAP facility Module 2 preferred design may not be capable of accepting large highly radioactive equipment from the tunnels without major design changes. The technology may be available in individual components but the availability of the operating facility is needed before the technology can be considered more than a prototype demonstration application. A score of 3 is assigned.

5.2.5.7 Retrieval, Process Offsite. Offsite disposal will use available retrieval and placement equipment techniques presently in use at the PUREX Plant. Size reduction to meet packaging requirements is highly desirable. The technology may be available in individual components but the availability of an operating facility with capabilities similar to the proposed WRAP facility is needed before the technology can be considered more than a prototype demonstration application. A score of 2 is assigned.

5.2.5.8 Retrieval, Process at New Facility. Construction of a new facility that incorporates the latest state of the art technology for processing, treating, and packaging waste for disposal at permitted sites. The technology may be available in individual components but the availability of an operating facility with capabilities similar to the proposed WRAP facility is needed before the application can be considered more than a prototype demonstration application. A score of 2 is assigned.

5.2.6 Packaging/Transportation Feasibility

Due to the efforts required to conform with transportation requirements, a higher score is assigned to an alternative which requires minimal transportation and packaging. Accordingly, scores were assigned as follows (Table 7):

Raw Score	Description
5	No transportation required. No transportation packaging required.
4	Transportation within a radiation zone required. No special packaging required.
2	Transportation on the Hanford Site. Packaging must fulfill site packaging requirements.
0	Transportation offsite requiring development of DOT/NRC certified packaging.

Table 7. Transportation/Packaging Feasibility Scoring.

Alternative	Raw Score	Weighting Factor	Weighted Score
Gravel backfill	5	2.0	10
Grout Injection	5	2.0	10
Gravel + Grout	5	2.0	10
PUREX Plant Disposal	4	2.0	8
PUREX Plant Process	2	2.0	4
WRAP Facility	2	2.0	4
Offsite	0	2.0	0
New Facility	2	2.0	4

5.2.6.1 Gravel Backfill, Grout Injection, and Both. As these three alternatives are in place disposal alternatives, they do not require transportation and have been assigned a score of 5.

5.2.6.2 **Retrieval, Disposal in PUREX Plant.** Disposal in the PUREX Plant requires minimal transportation within a radiation zone, thus a score of 4 has been assigned.

5.2.6.3 **Retrieval, Process at PUREX Plant.** This alternative will require a certain degree of onsite transportation. A score of 2 is assigned.

5.2.6.4 **Retrieval, Process at WRAP Facility.** This alternative will require a certain degree of onsite transportation. A score of 2 is assigned.

5.2.6.5 **Retrieval, Process Offsite.** Transportation offsite is required for offsite disposal. A score of 0 is assigned.

5.2.6.6 **Retrieval, Process at New Facility.** This alternative will require a certain degree of onsite transportation. A score of 2 is assigned.

5.2.7 Industrial Health and Safety

Industrial health and safety considers the potential for personnel exposures to nonradioactive hazards in the working environment. A work area requiring forced ventilation to maintain adequate oxygen levels in the atmosphere, confined work spaces, limited ingress and egress, dusts, noise, tripping hazards, potential exposure to dangerous waste constituents, and other industrial hygiene matters should be considered. An alternative which appears to have a lower potential for exposure to industrial health and safety issues will be evaluated higher than an alternative which presents a greater potential for such exposures (Table 8).

Raw Score	Description
5	Low risk potential for personnel exposure to dangerous waste constituents; nonconfined work areas; or potential for industrial accident expected to be low.
4	Moderate risk potential for personnel exposure to dangerous waste constituents; nonconfined work areas; or potential for industrial accidents low to moderate.
3	Moderate risk potential for personnel to industrial safety hazards; low potential for exposure to dangerous waste constituents.
2	Moderate to high risk potential for personnel to industrial safety hazards in work areas requiring forced ventilation to provide adequate oxygen content, low to moderate potential for exposure to dangerous waste constituents.
1	High risk potential for personnel to industrial safety hazards. High potential for exposure to dangerous waste constituents; or confined work area.

Table 8. Industrial Health and Safety Scores.

Alternative	Raw Score	Weighting Factor	Weighted Score
Gravel backfill	1	1.5	1.5
Grout Injection	4	1.5	6
Gravel + Grout	1	1.5	1.5
PUREX Plant Disposal	4	1.5	6
PUREX Plant Process	3	1.5	4.5
WRAP Facility	3	1.5	4.5
Offsite	2	1.5	3
New Facility	1	1.5	1.5

5.2.7.1 Gravel Backfill. The work area is above ground except for construction/installation of risers in excavations with side walls approximately 8 feet high. Construction of multiple openings in each tunnel roof may provide additional safety concerns for personnel who may be required to enter the confined areas during installation of risers. The potential exposure to dangerous waste constituents is expected to be low. A score of 1 is assigned due to high industrial safety hazards.

5.2.7.2 Grout Injection. The work is on the surface with low to moderate potential exposure for industrial safety hazards. The potential for exposure to dangerous waste constituents is low. A score of 4 is assigned.

5.2.7.3 Gravel Backfill and Grout Injection. As this is a combination of gravel backfill and grout injection, it is ranked with the lowest scored component. A score of 1 is assigned.

5.2.7.4 Retrieval, Disposal in PUREX Plant. Equipment removal and placement will be accomplished through the use of remote handling technology. A minimum if any size reduction will be performed, thus exposure to dangerous waste should be minimal. Industrial accidents may occur during grout placement activities. These occurrences are expected to be minor, assuming equipment is maintained in safe working condition. Storage tunnel decontamination activities require working in a semiconfined area (single ingress/egress) with forced ventilation to maintain acceptable atmospheric conditions. A score of 4 is assigned.

5.2.7.5 Retrieve, Process at PUREX Plant. The alternative has similar concerns as described in Section 5.2.7.4, with the additional potential for inadvertent releases of dangerous waste during size reduction and packaging for transport to the WRAP facility. A score of 3 is assigned.

5.2.7.6 Retrieve, Process at WRAP Facility. The alternative has similar safety concerns as described in Section 5.2.7.4, with additional concerns for inadvertent releases of dangerous waste occurring at the PUREX Plant during size reduction and packaging for transport and at the WRAP facility during receiving and processing of waste. A score of 3 is assigned.

5.2.7.7 Retrieval, Process Offsite. If an offsite location can be located for processing, then remote handling technologies equivalent to the PUREX Plant processing alternatives will prepare the equipment for packaging and transport. Offsite processing will preclude DOE/Westinghouse Hanford from maintaining direct management control over the disposal of the wastes and provides for a major uncertainty with the alternative. A score of 2 is assigned, based on the potential for increased hazards occurring for which DOE/Westinghouse Hanford may ultimately bear responsibility.

5.2.7.8 Retrieval, Process at New Facility. Incorporation of the best available technology (BAT) through design is expected to minimize personnel exposure and provide safe working environments. The use of remote handling technologies to perform retrieval, decontamination, and processing in a facility specifically designed for those activities will provide the greatest potential for reduction in exposure to dangerous waste which may be present. Decontamination activities within the tunnels will still maintain a moderate potential for industrial accidents within a semiconfined space. However, construction projects of this magnitude have the potential for numerous, serious industrial accidents to occur during the initial construction of the facility. A score of 1 is assigned.

6.0 CONCLUSIONS AND RECOMMENDATIONS

In the proposed alternatives evaluation found in section 5.0, each alternative was ranked according to selected criteria. Table 9 summarizes the weighted scores for each alternative.

Three alternative scores are ranked closely. The three highest ranked alternatives are in situ grout injection, retrieval/disposal in the PUREX Plant, and retrieval/process in the PUREX Plant. A comparison of these alternatives, according to the above mentioned criteria, is found below.

Table 9. PUREX Storage Tunnels Alternative Scores Summary

Evaluation Criteria	Weighting Factor	Maximum Rating	Alternatives							
			In Situ Backfill	In Situ Grout	In Situ Backfill and Grout	PUREX Disposal	PUREX	WRAP	Offsite	New Facility
ALARA Evaluation	4.0	20	8	12	8	8	8	8	4	8
Regulatory Acceptability	4.0	20	0	4	0	8	16	16	12	16
Short-Term Environmental Impact	3.5	17.5	10.5	14	10.5	18.5	14	10.5	3.5	10.5
Cost	3.0	15	15	14.6	14.6	12.6	10.5	8.9	11	0
Technology Availability	2.0	10	6	8	6	8	8	6	4	4
Transportation/ Packaging Feasibility	2.0	10	10	10	10	8	4	4	0	4
Industrial Health and Safety	1.5	7.5	1.5	6	1.5	6	4.5	4.5	3	1.5
	Totals:	100.0	51.0	68.6	50.6	69.1	65.0	57.9	37.5	44.0

6.1 PREFERRED ALTERNATIVES COMPARISON

The preferred in situ disposal alternative, grout injection, will fill accessible tunnel/process equipment void spaces. This process will immobilize radioactive and dangerous wastes, thereby reducing the potential for contaminant migration. The grout will greatly reduce the potential for future subsidence of the cover barrier and marker system.

One major disadvantage of the in situ alternative is the lack of treatment of the EHW, allowing it to remain in a land disposal facility. In situ disposal will also require the development of a post-closure plan in accordance with RCRA regulations. A compliant monitoring system to detect migration of mercury, lead, and/or silver will need to be developed. Also, there is a low potential of meteoric waters coming into contact with the wastes and causing leaching of dangerous or radioactive constituents. This will require vadose zone monitoring in addition to the ground water monitoring required by regulations. This would be costly and provide minimal useful information regarding migration of contaminants from the tunnels.

The advantage of in situ grout disposal technology is it has already been developed onsite. Initiation of the alternative will only require procurement of necessary equipment and supplies. Grouting procedures and training for personnel are currently available and will reduce start-up costs.

The two retrieval alternatives ranked high by the evaluation are retrieval/disposal in the PUREX Plant and retrieval/process in the PUREX Plant. Disposal in the PUREX Plant will transfer the waste out of the tunnels into the canyon building, to be grouted in the process cells. The processing of the equipment in the PUREX Plant will separate the waste and dispose of it according to its designation. The EHW and TRU waste will not remain in the facility.

The PUREX Plant disposal alternative also presents disadvantages. As EHW will remain in the canyon, a cover will be required. A cover over the PUREX Plant will be extremely large and will cover a substantial portion of the 200 East Area. The cover over the canyon building has the potential to adversely affect the Tri-Party Agreement 200-PO-1 and 200-PO-2 operable units by creating a high geographic area with potential surface water runoff; this situation will not be compliant with Ecology/EPA regulations. The long-term mission for the PUREX Plant has not been specified. Thus, use of the structure for disposal of untreated EHW and radioactive wastes (LLW, TRU, and MW) may not be feasible, should future plans for the PUREX Plant consider clean closure and alternative future uses.

Good management practices dictate that consolidation of the EHW into the fewest number of manageable sites is preferred over the creation of numerous small sites. The second retrieval alternative, processing in the PUREX Plant, proposes the use of the WRAP facility to treat and process MW. The use of the WRAP facility is not mandatory if a MW drag-off trench is developed under the LLBG final permit. Construction of a MW trench for nondrag-off items is a part of the permit.

The retrieval/processing alternative provides a high degree of regulatory acceptability by using best demonstrated available technology to create an environmentally acceptable solution to the disposal of the equipment. The advantages to this alternative are: clean closure of the PUREX Plant is still feasible; waste will be disposed in appropriate, permitted facilities; and the PUREX Plant will be able to process both tunnel and existing process cell equipment.

Therefore, the preferred retrieval alternative based on the regulatory acceptability is retrieval and processing in the PUREX Plant. This method has been chosen as the appropriate method for disposing of the process equipment from PUREX storage tunnels over the other two highly rank alternatives, due to its compliance will RCRA regulations and its technical feasibility.

6.2 RECOMMENDATION

The issue of a closure alternative for the equipment must be compatible with overall Hanford Site health, safety, and environmental goals. Some of the alternatives are dependent upon being able to use the capabilities of the PUREX Plant to initiate the alternative. Also, it is assumed that the PUREX Plant will continue to use the storage capacity of Tunnel 2 until that capacity is no longer needed. Therefore, these alternatives cannot be initiated until the present and future missions for the PUREX Plant are completed.

Accordingly, the most prudent approach to handling the equipment may be to consider not only the equipment in the tunnels, but also the equipment (failed and/or operational) from the PUREX Plant and other processing facilities located at the Hanford Site. Many of the past and present processes may have used equipment with similar dangerous waste constituents which will require disposal under RCRA and the DOE regulations. Identifying a site-wide strategy to comply with the disposal regulations will greatly assist with the preparation and obtainment of necessary permits and approvals for closure of facilities. This site-wide strategy could contain the proposed alternative from this engineering study, due to the fact that equipment to be used for tunnel waste processing can ultimately be used to process canyon equipment and equipment from other site processing facilities.

Another issue that must be addressed is the closure method for the PUREX Plant. Accordingly, this study recommends that the tunnels be closed in conjunction with the PUREX Plant. Closure should also be consistent with the record of decision for remediation of the 200-PO-1 and 200-PO-2 operable unit closures to maintain an integrated approach to the environmental activities related to the PUREX Plant and support facilities.

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APPENDIX A

PUREX STORAGE TUNNELS 1 AND 2 INVENTORY, EQUIPMENT PHOTOGRAPHS, AND FIGURES

This appendix contains the inventory of Plutonium Uranium Extraction (PUREX) storage tunnels 1 and 2. Figures A-1 to A-11 are drawings and photographs of typical equipment to be found in the tunnels. Figures A-12 and A-13 show PUREX storage tunnels equipment positions.

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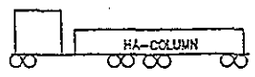
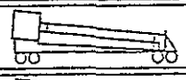
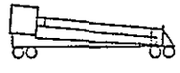
TUNNEL INVENTORY

Listed below are the approximate sizes of the process equipment which has been placed in the PUREX storage tunnels. Also listed are the suspected hazardous constituents, and radiation dose estimates. Some figures of the equipment are attached to provide sizing details.

Sizing of the equipment is based on information provided by PUREX operations. Accurate records were not kept from the start of the tunnel operations. Therefore, a number of assumptions were made about the process equipment sent to the tunnels. It is recommended that prior to attempting removal of the process equipment, remote camera and radiation survey devices be sent into the tunnels to verify the size, position and radiation dose levels of the process equipment.

- Ci = Curies
- NA Indicates No Information Is Available
- O.D. Indicates Outer Diameter
- Volume Estimates Include Only Process Equipment

TUNNEL #1 (218-E-14)

POSITION (Date of Storage)	LAYOUT (Assumed)	CONTENTS	DIMENSIONS	REFERENCE	INITIAL DOSE READING / ESTIMATED Ci CONTENT[1]	SUSPECTED HAZARDOUS CONSTITUENTS	EST. VOLUME (FT.^{3})	NOTES
1 & 2		HA Column	40'11" x 8'2" x 6'	A-1	5 R/hr @ 60' / 400 Ci		4,700	1 Dose Conversion Supplied by PUREX Operations
6/60		Jumper Box	18' X 8'11-1/4" X 8'3/4"	N/A	2000 Ci	Lead ~ 250 lbs[2]	2,190	2 Assumptions: 50 Jumpers/Box, 100 Lb. Lead/Jmp, 5% Jumper Have Lead, ∴ ~ 250 Lb
3 7/29/60		E-F11 Concentrator	29'8" x 6'	A-2	12.5 R/hr @ 100' / 40,000 Ci		1,900	Tower Removable, Could Take 12'6" From Height
4		G-E2 Centrifuge	3' x 5' O.D.	A-3	1.5 R/hr @ 150' / 3,000 Ci		2,465	If G-E2 Centrifuge Was Stored with the Motor, its Dimensions are 7' x 10' x 13'
		Jumper Box	18' x 8'11-1/4" x 8'3/4"	N/A		Lead ~ 250 lbs[2]		
12/24/60		(2) Tube Bundles	Each @ 12'6" x 4'3"	N/A				
5 1/4/61		E-H4 Concentrator	29'6" x 16'6" x 6'	A-4	150 mR/hr @ 50' / 3,000 Ci		2,465	See Position 3
6 4/21/61		E-F6 Concentrator	36'6" x 15' x 6'	A-5	5 R/hr @ 20' / 700 Ci		2,336	Portions Possibly Removed: De-Entrainment Assembly, 7' x 5' O.D., Tower, 12'6" x 5'6" O.D.
7 2/8/62		E-F11 Concentrator	29'6" x 6'	A-2	25 R/hr @ 150' / 40,000 Ci		2,336	
8 1/22/65		E-F6 Concentrator	36'6" x 15' x 6'	A-5	700 Ci		2,400	See Position 6

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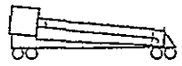
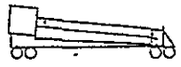
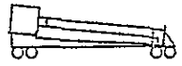
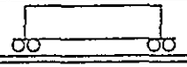
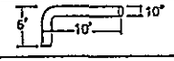
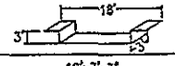
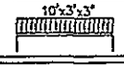
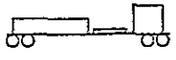
TUNNEL #2 (218-E-15)

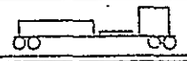
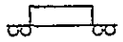
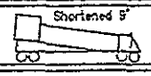
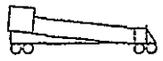
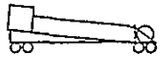
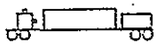
- Ci = Curies
- NA Indicates No Information is Available
- O.D. Indicates Outer Diameter
- Volume Estimates Include Only Process Equipment

POSITION (Date of Storage)	LAYOUT (Assumed)	CONTENTS	DIMENSIONS	REFERENCE	INITIAL DOSE READING / ESTIMATED CI CONTENT	SUSPECTED HAZARDOUS CONSTITUENTS	EST. VOLUME (FT.^{3})	NOTES
1		E-F6 Concentrator	36'6" x 15' x 6'	A-5	1.3 R/hr @ 100' 5 R/hr @ 50' 700 Ci		2,400	See Tunnel #1, Position 6
		Tube Bundle	12'6" x 4'3" O.D.	N/A				
12/12/67		Agitator Motor	NA	N/A				
2		E-F6 Concentrator	36'6" x 15' x 6'	A-5	800 mR/hr @ Coupling 500 Ci		2,400	See Tunnel #1, Position 6 This Car Could Also Contain Tank F15-2. No Information on This Tank is Available.
3/26/69		(2) Tube Bundles	Each @ 12'6" x 4'3" O.D.	N/A				
3		E-F6 Concentrator	36'6" x 15' x 6'	A-5	10 R/hr F 500 R/HR @ 2' 700 Ci		2,400	See Tunnel #1, Position 6
3/19/70		(2) Tube Bundles	Each @ 12'6" x 4'3" O.D.	N/A				
4 12/30/70		L-Cell Package	14'8" x 16'8" x 36'	N/A	10-200 mR/hr	< 500 Gr. PU	2,400	
5		F2 Silver Reactor	13'5" x 4'6" O.D.	A-6	East 300 Mr/hr @ 2"	1,375 Lbs. Silver Salts as Silver Nitrate	2,400	The Silver Salts are a Mixture of Silver Nitrate, Silver Halides, and Silver Fines.
		F6 Demister	NA	N/A				
		Vessel Vent Line		N/A				
		Steel Catwalk		N/A	West 2 R/hr @ 2" 20 Ci			
2/26/71		Guard Rails		N/A				
6		Modified A3-1 Tower	19'7" x 4'4" O.D.	A-6	1 R/hr @ F Max @ Side 10 Ci		2,400	Distributer Ring, 6'6" O.D. See Drawing
12/12/71		Scrubber	12' x 2'6" O.D.	A-6				**

** Figure A-6 is the generalized drawing of the dissolver cell equipment. Actual dimensions of the specific dissolver cells are not available, although these give a good approximation.

TUNNEL #2 (218-E-15)

- Ci = Curies
- N/A Indicates no Information Is Available
- O.D. Indicates Outer Diameter
- Volume Estimates Include Only Process Equipment

POSITION (Date of Storage)	LAYOUT (Assumed)	CONTENTS	DIMENSIONS	FIGURE	INITIAL DOSE READING / ESTIMATED Ci CONTENT	SUSPECTED HAZARDOUS CONSTITUENTS	EST. VOLUME (FT.^{3})	NOTES
6 (Cont.) 12/12/71		Lid & Vapor Line	7' O.D. Disk 6" x 10' O.D.	A-6				
7 12/22/71		A3 Dissolver	15'6" x 9'3" O.D.	A-6	5 R/hr @ 5' / 50 Ci	100 lb Mercury	2,400	
8 8/29/72		Steel Liner Box	18' x 8'11-1/4" x 8'3/4"	N/A	17,500 Ci		800	Fuel Ends and Fuel Handling Equipment are Contained in the Steel Liner Box.
		AIWI Fuel Ends	7" x 7" x 6" 7" x 27" O.D.	N/A				
		NPR Fuel Handling Equipment	(2) 72" x 8" O.D. ~10" x 12' O.D.	N/A				
9 9/30/72		C3 Dissolver	15'6" x 9'3" O.D.	A-6	50 Ci	100 lb Mercury	1,590	
10 8/30/83		E-H4 Concentrator	27'11" x 9'3" O.D.	A-4	500 Ci		2,400	
		Tube Bundle	12'6" x 4'3" O.D.	N/A				
		Cooling Coil	~15' x 5' O.D.	N/A				
		F-F1 Filter Tank	~10' x 10' O.D.	A-7				
11 1/18/86		A3 Dissolver Vessel	15'6" x 9'6" O.D.	A-6	3 mR/hr @ 3' / .81 Ci	84 lb Mercury	3,960	Wt. ~ 40 Tons Tipping Cradle was Welded to Rail Car
		Heater (Vessel #6)	11' x 5'10" x 2'6"	A-6				
12 1/20/86		White Box (8 Tube Bundles)	~12'4" x 26' x 14'6"	N/A	2 R/hr @ Coupling ~3' / 540 Ci		5,438	Wt. ~ 60 Tons
		Pulser #5 Old Heater Dissolver Lid Trunnions	N/A	N/A				These Items Could be in the White Box, or Sitting on the Rail Car Bed.

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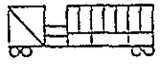
TUNNEL #2 (218-E-15)

- Ci = Curies
- NA Indicates No Information Is Available
- O.D. Indicates Outer Diameter
- Volume Estimates Include Only Process Equipment

POSITION (Date of Storage)	LAYOUT (Assumed)	CONTENTS	DIMENSIONS	REFERENCE	INITIAL DOSE READING / ESTIMATED Ci CONTENT	SUSPECTED HAZARDOUS CONSTITUENTS	EST. VOLUME ($FT.^3$)	NOTES
13		J5 Tank Vessel	~10' x 12' O.D.	N/A	3 R/hr @ 1' / 90 Ci		2,500	Outer Dimensions on the Equipment Account for the Largest Area Needed to Contain the Equipment. Equipment may Have Been Considerably Downsized by Removing Protruding Nozzles, Vent Lines, etc.
		F1 Condenser	~6' x 11' x 7'	N/A				
		F12-B Cell Block	15' x 10' x 3'	N/A				Wt. ~ 75 Tons
		Dissolver 4-Way Dumper	Drawing NA	N/A				
		Dissolver Yoke	~10' x 12'	N/A				Depth of Yoke Not Available
1/21/86		Flange Plate	2" x 2' O.D.	N/A				
14		L-1 Pulser (#53)	~9' x 5' x 5.5'	N/A	5 R/hr @ 15' / 33,750	5,584 Lbs. Lead	3,600	Wt. ~ 50 Tons
		(2) Column Cartridges	~21' x 41" O.D.	N/A				
		Jumper Cutter and Storage Rack	~7' x 3' x 5'	N/A				
		(3) Jumper Alignment Tools	1' x 1', 1'x 2', 1' x 3'	N/A				
		(9) Exterior Dumping Trunnions	~2'3" x 1'4" x 5'5"	N/A				
		(10) Pumps	~2' x 15' each	N/A				
		(3) Agitators	~2' x 15' each	N/A				
		(4) Tube Bundles	12'6" x 4'3"	N/A				
11/18/87		(2) Vent Jumpers	8' x 8' x 2' 10' x 4' x 4'	N/A				

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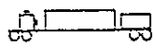
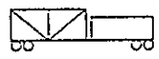
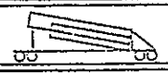
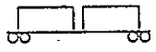
TUNNEL #2 (218-E-15)

- Ci = Curies
- NA Indicates No Information Is Available
- O.D. Indicates Outer Diameter
- Volume Estimates Include Only Process Equipment

POSITION (Date of Storage)	LAYOUT (Assumed)	CONTENTS	DIMENSIONS	REFERENCE	INITIAL DOSE READING / ESTIMATED Ci CONTENT	SUSPECTED HAZARDOUS CONSTITUENTS	EST. VOLUME (FT.^{3})	NOTES
14 (Cont.)		(7) Yokes	See Notes	N/A				Dimensions Vary H(4'-12') x W(6'-10') x D(2'-5')
15		Silver Reactor	13'5" x 4'6"	Figure A-6	20 Mr/HR @ 20' / 240 Ci	250 Lb. Silver Salts as Silver Nitrate 500 Lb. Lead	2,775	The Silver Salts are a Mixture of Silver Nitrate, Silver Halides, and Silver Fines.
		E-F2 Steam Heater (E-A2 #5)	11' x 5'10" x 2'8"	N/A				
		Burial Liner W Jumpers	8'3/4" x 16' x 8'11-1/4"	N/A				Wt. 20 Tons
5/13/88		S/R Cradle SK-GLR-11-2-87		N/A				
16 4/5/89		E-J8-1 Unitized Concentrator Vessel	26' x ~16' x ~17'	N/A	0.5 mR/hr @ 10' / 1.5 Ci		6,000	Wt. 42 Tons Car also Contains Yoke Type 19, Lifting Rod and Hooks.
17		North Burial Liner W Misc. Waste	8'3/4" x 16' x 8'11-1/4"	N/A	80 Mr/HR @ 1' / 3 Ci		2,574	North ~ 14 Tons
8/5/89		South Burial Liner W Misc. Waste	8'3/4" x 16' x 8'11-1/4"	N/A				South ~ 11.5 Tons

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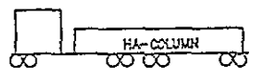
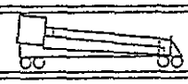
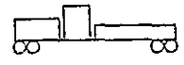
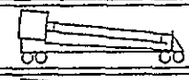
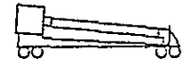
TUNNEL INVENTORY

Listed below are the approximate sizes of the process equipment which has been placed in the PUREX storage tunnels. Also listed are the suspected hazardous constituents, and radiation dose estimates. Some figures of the equipment are attached to provide sizing details.

Sizing of the equipment is based on information provided by PUREX operations. Accurate records were not kept from the start of the tunnel operations. Therefore, a number of assumptions were made about the process equipment sent to the tunnels. It is recommended that prior to attempting removal of the process equipment, remote camera and radiation survey devices be sent into the tunnels to verify the size, position and radiation dose levels of the process equipment.

- Ci = Curies
- NA Indicates No Information Is Available
- O.D. Indicates Outer Diameter
- Volume Estimates Include Only Process Equipment

TUNNEL #1 (218-E-14)

POSITION (Date of Storage)	LAYOUT (Assumed)	CONTENTS	DIMENSIONS	REFERENCE	INITIAL DOSE READING / ESTIMATED Ci CONTENT[1]	SUSPECTED HAZARDOUS CONSTITUENTS	EST. VOLUME (FT.^{3})	NOTES
1 & 2		HA Column	40'11" x 8'2" x 6'	A-1	5 R/hr @ 60' / 400 Ci		4,700	1 Dose Conversion Supplied by PUREX Operations
6/60		Jumper Box	18' X 8'11-1/4" X 8'3/4"	N/A	2000 Ci	Lead ~ 250 lbs[2]	2,190	2 Assumptions: 50 Jumpers/Box, 100 Lb. Lead/Jmp, 5% Jumper Have Lead, ∴ ~ 250 Lb
3 7/29/60		E-F11 Concentrator	29'8" x 6'	A-2	12.5 R/hr @ 100' / 40,000 Ci		1,900	Tower Removable, Could Take 12'6" From Height
4		G-E2 Centrifuge	3' x 5' O.D.	A-3	1.5 R/hr @ 150' / 3,000 Ci		2,465	If G-E2 Centrifuge Was Stored with the Motor, its Dimensions are 7' x 10' x 13'
		Jumper Box	18' x 8'11-1/4" x 8'3/4"	N/A		Lead ~ 250 lbs[2]		
12/24/60		(2) Tube Bundles	Each @ 12'6" x 4'3"	N/A				
5 1/4/61		E-H4 Concentrator	29'8" x 16'6" x 6'	A-4	150 mR/hr @ 50' / 3,000 Ci		2,465	See Position 3
6 4/21/61		E-F6 Concentrator	36'6" x 15' x 6'	A-5	5 R/hr @ 20' / 700 Ci		2,336	Portions Possibly Removed: De-Entrainment Assembly, 7' x 5' O.D., Tower, 12'6" x 5'6" O.D.
7 2/8/62		E-F11 Concentrator	29'6" x 6'	A-2	25 R/hr @ 150' / 40,000 Ci		2,336	
8 1/22/65		E-F6 Concentrator	36'6" x 15' x 6'	A-5	700 Ci		2,400	See Position 6

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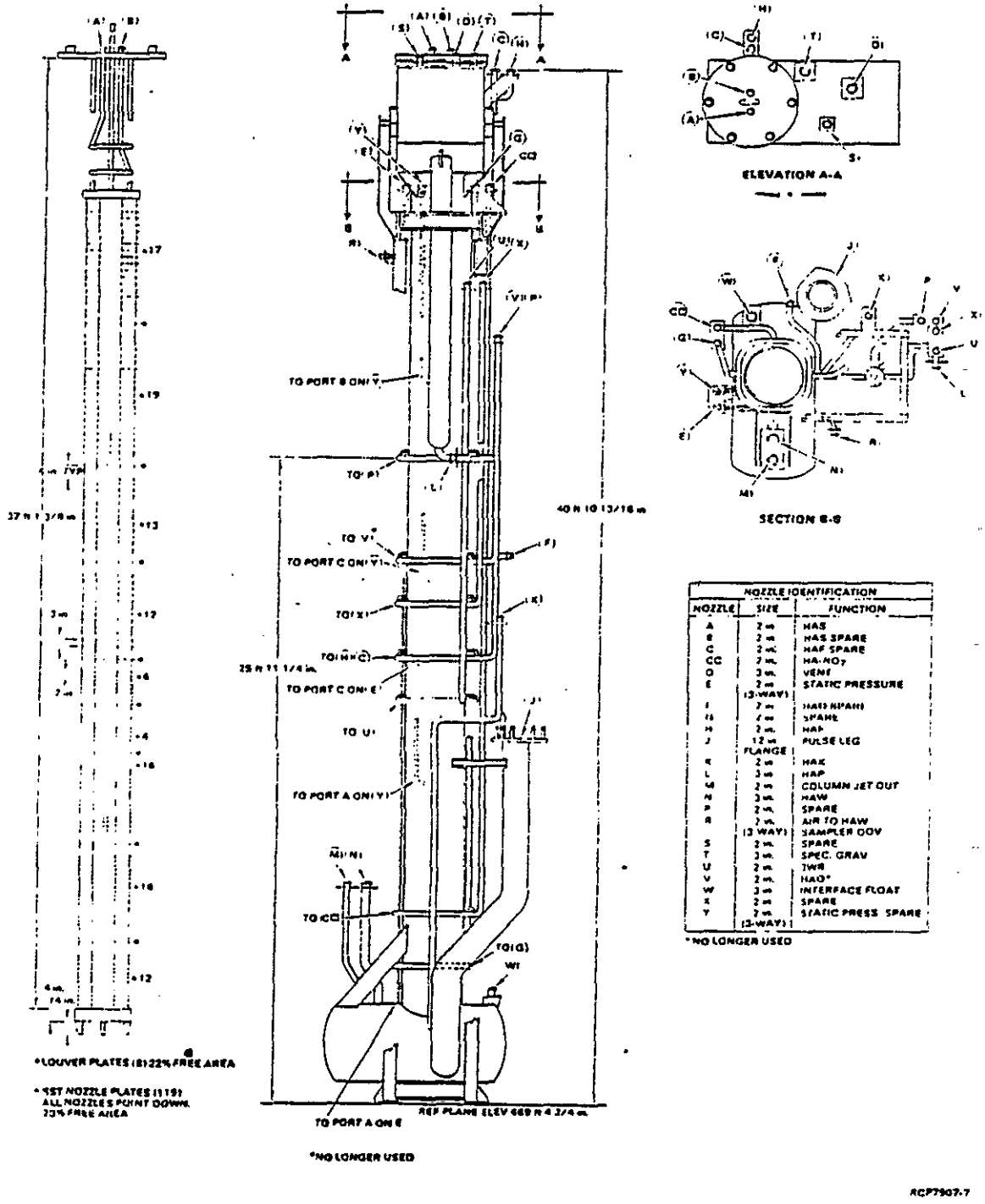
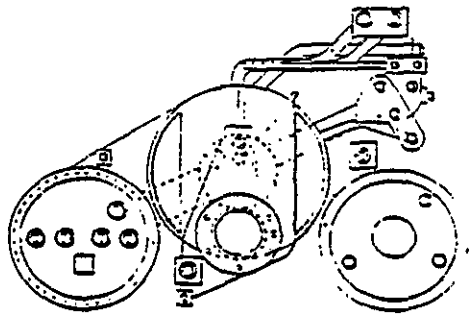


NOZZLE IDENTIFICATION		
NOZZLE	SIZE	FUNCTION
A	2 in	HAS
B	2 in	HAS SPARE
C	2 in	HAF SPARE
CC	2 in	HA-NO_3
D	3 in	VENT
E	2 in (3-WAY)	STATIC PRESSURE
F	2 in	HAS NPAH
G	2 in	SPARE
H	2 in	HAP
J	12 in FLANGE	PULSE LEG
K	2 in	HAK
L	3 in	HAP
M	2 in	COLUMN JET OUT
N	3 in	HAW
P	2 in	SPARE
R	2 in (3 WAY)	AIR TO HAW SAMPLER DOV
S	2 in	SPARE
T	3 in	SPEC. GRAV
U	2 in	TWR
V	2 in	HAO*
W	3 in	INTERFACE FLOAT
X	2 in	SPARE
Y	2 in (3-WAY)	STATIC PRESS SPARE

*NO LONGER USED

Figure A-1. HA Column



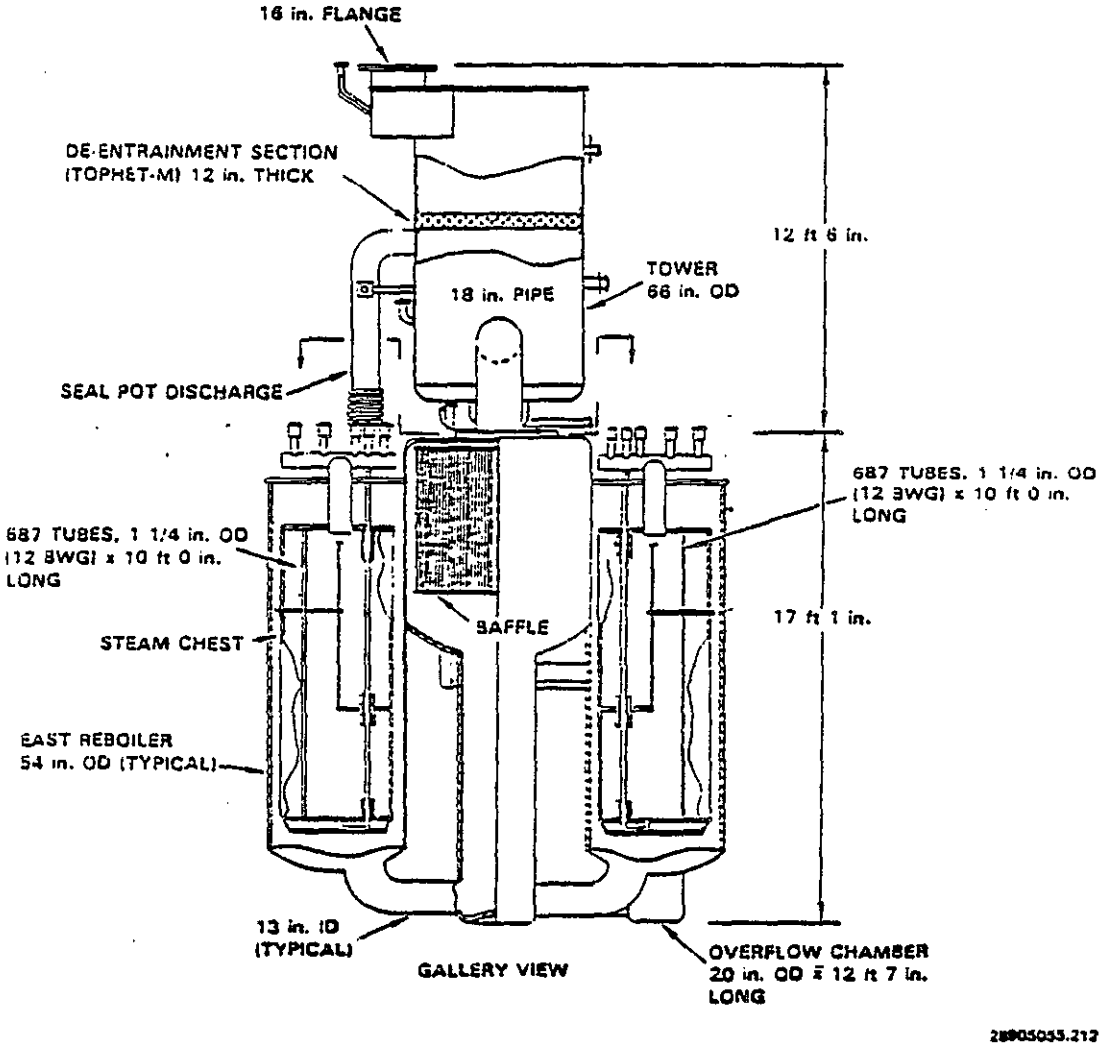


Figure A-2. E-F11 Concentrator

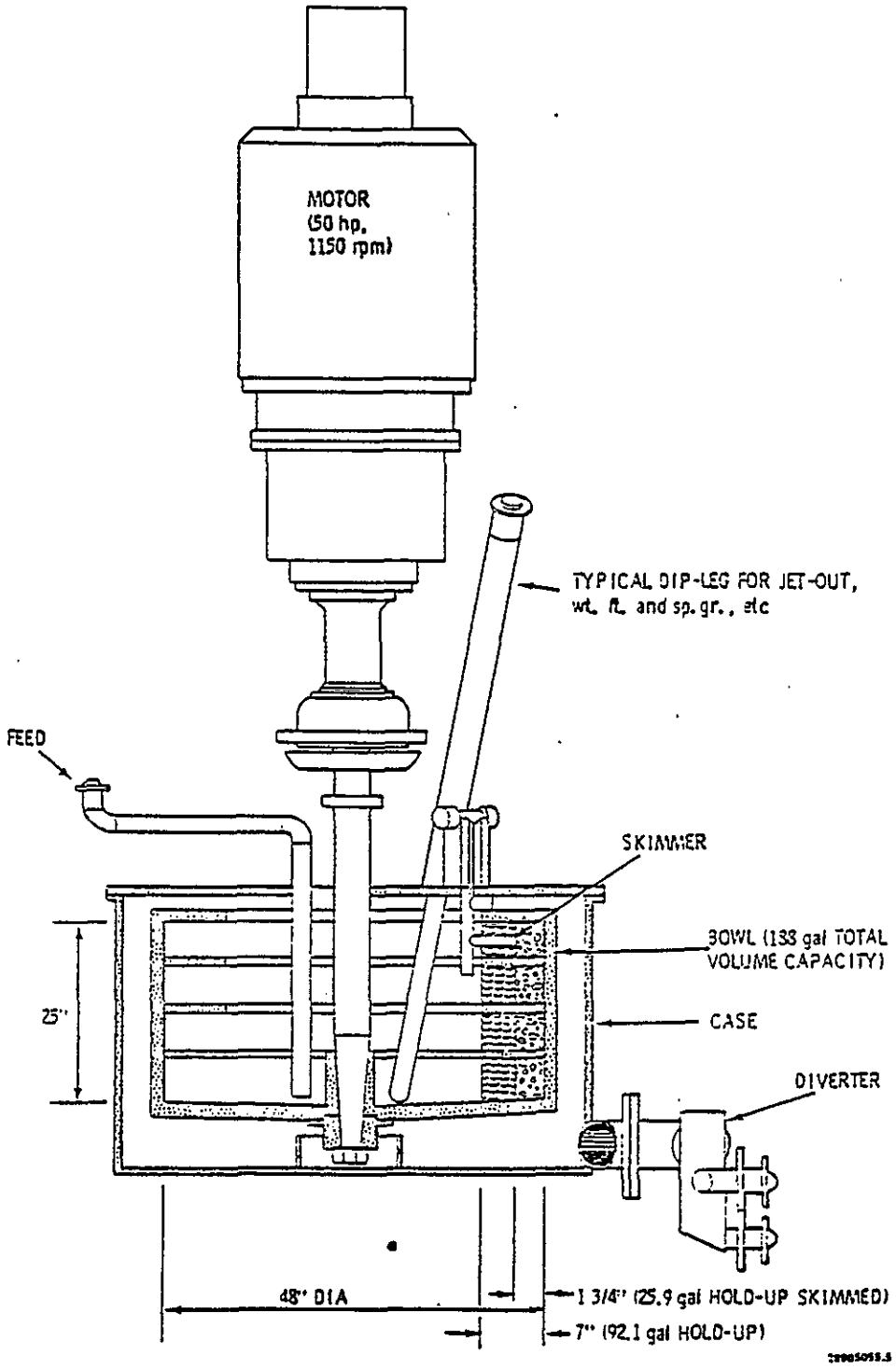


Figure A-3. G-E2 Centrifuge

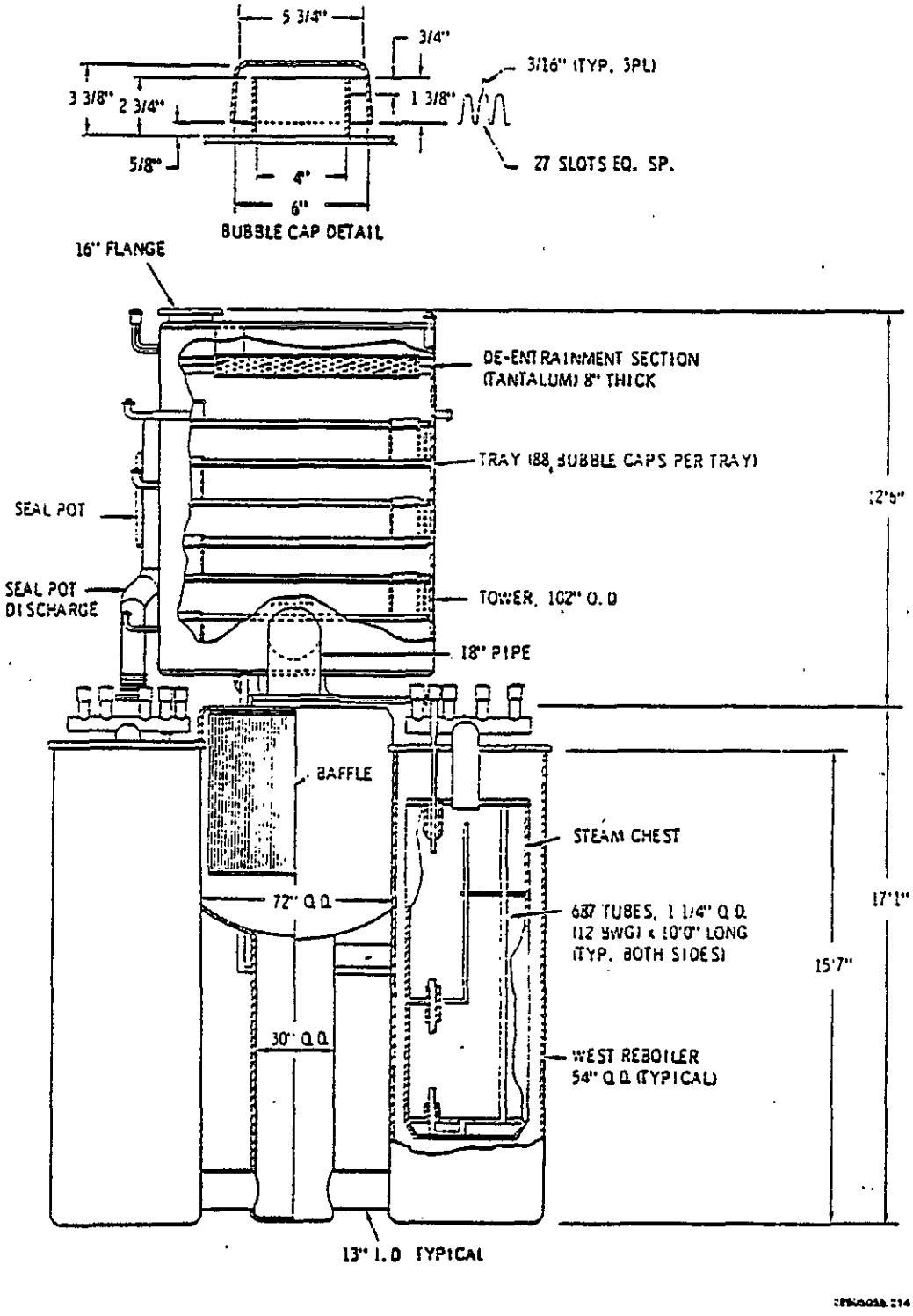


Figure A-4. E-H4 Concentrator

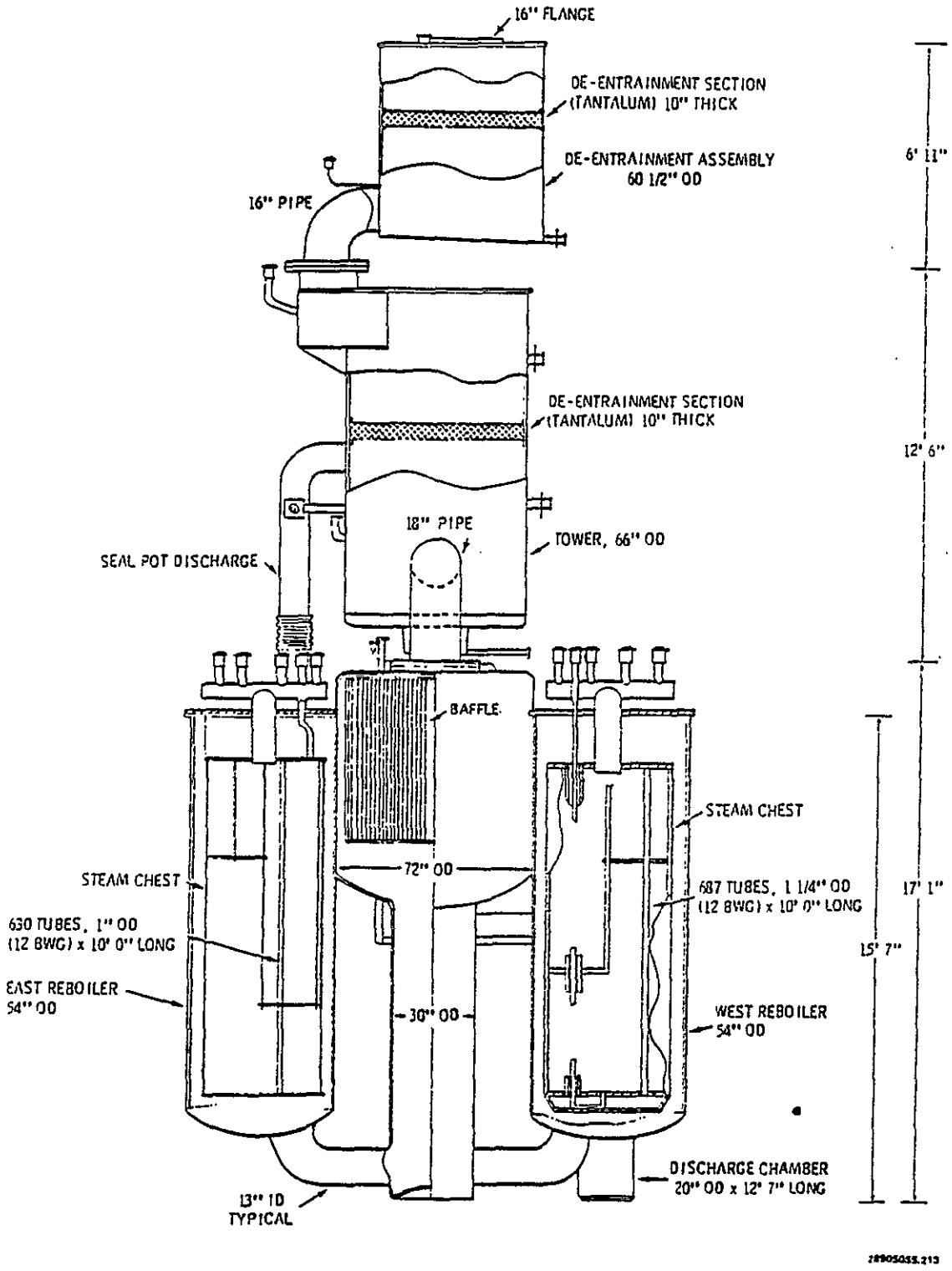


Figure A-5. E-F6 Concentrator

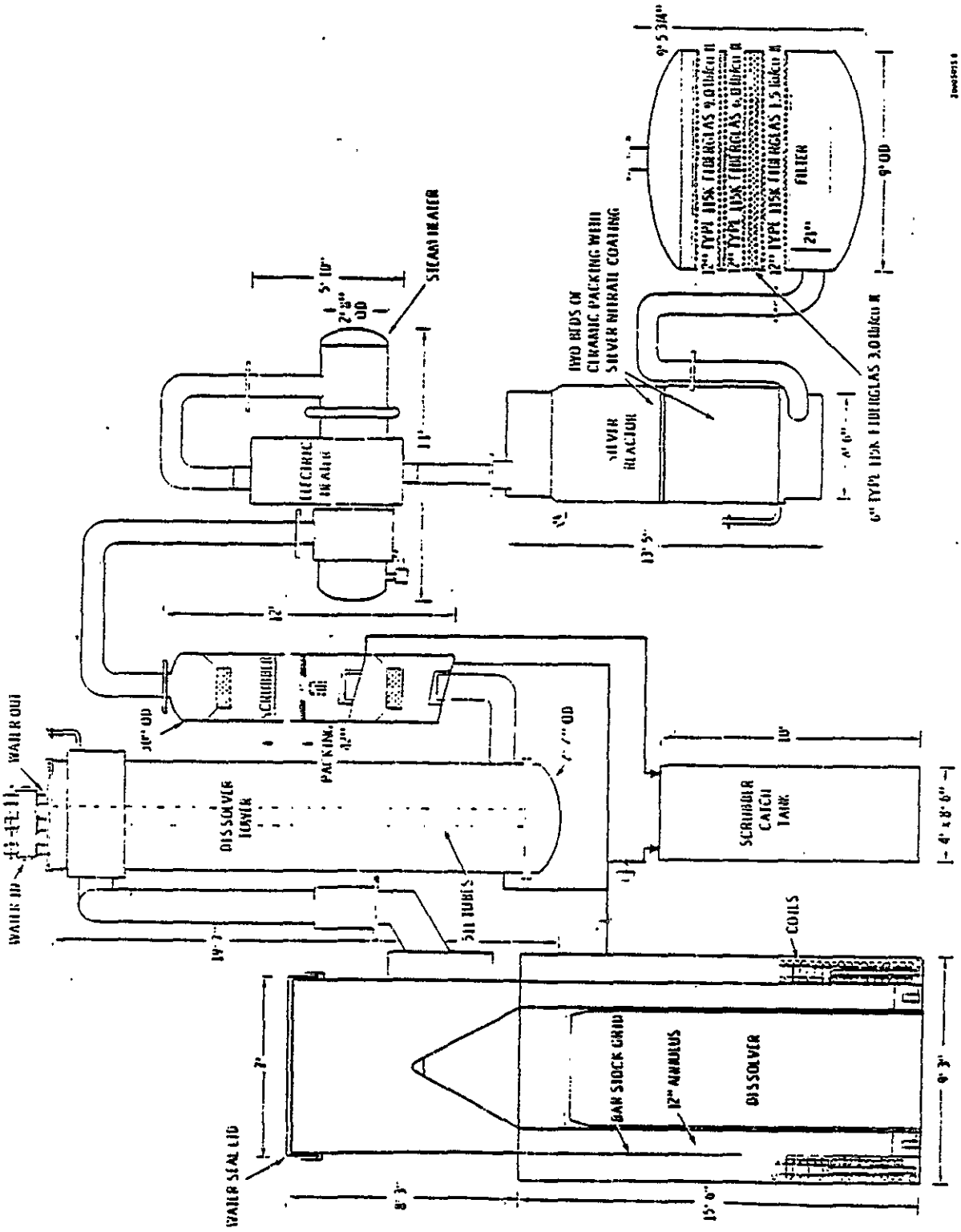
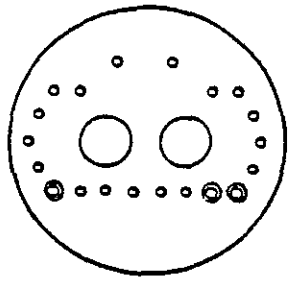


Figure A-6. Dissolver Cell Equipment

NOZZLES	
NUMBER	SIZE
2	27"
3	4"
17	3"



PLAN

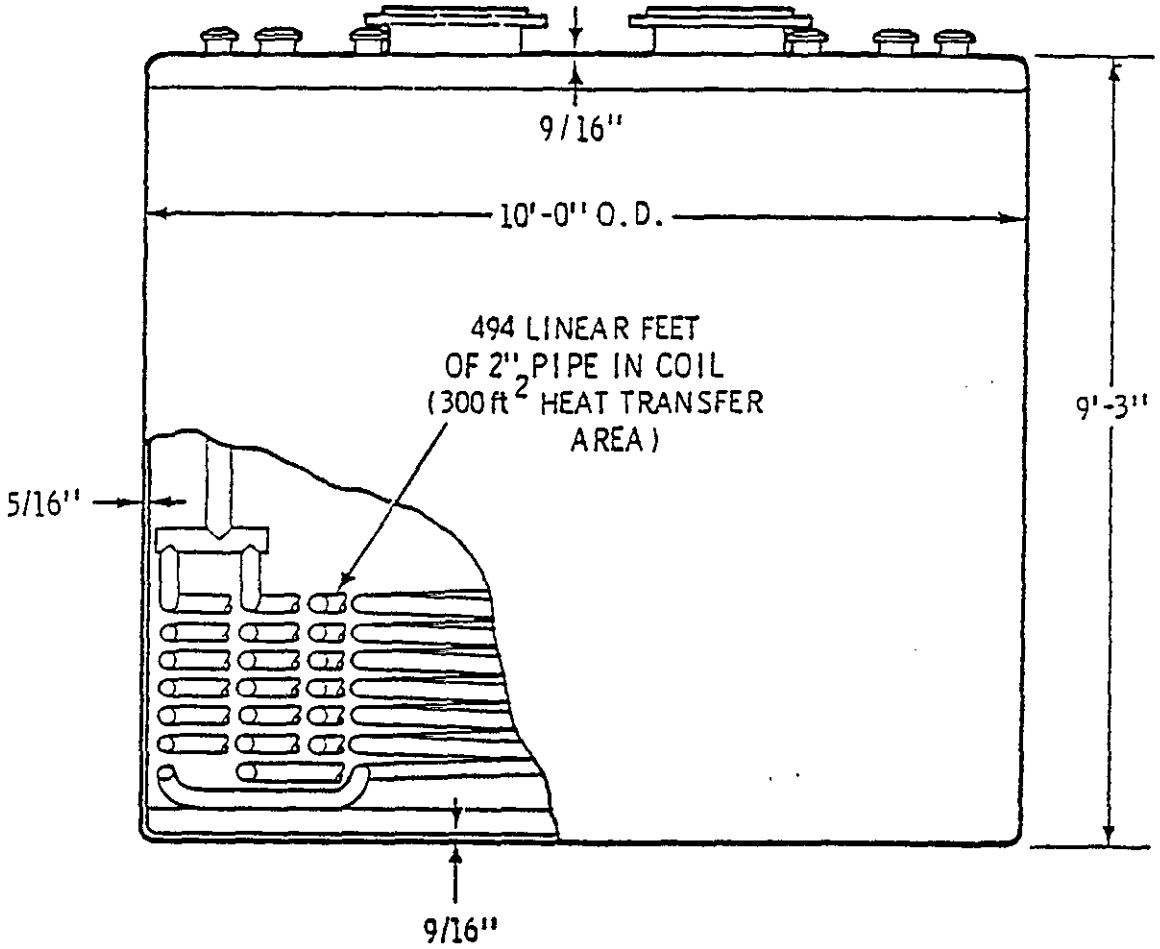


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Figure A-7. F-F1 Filter Tank

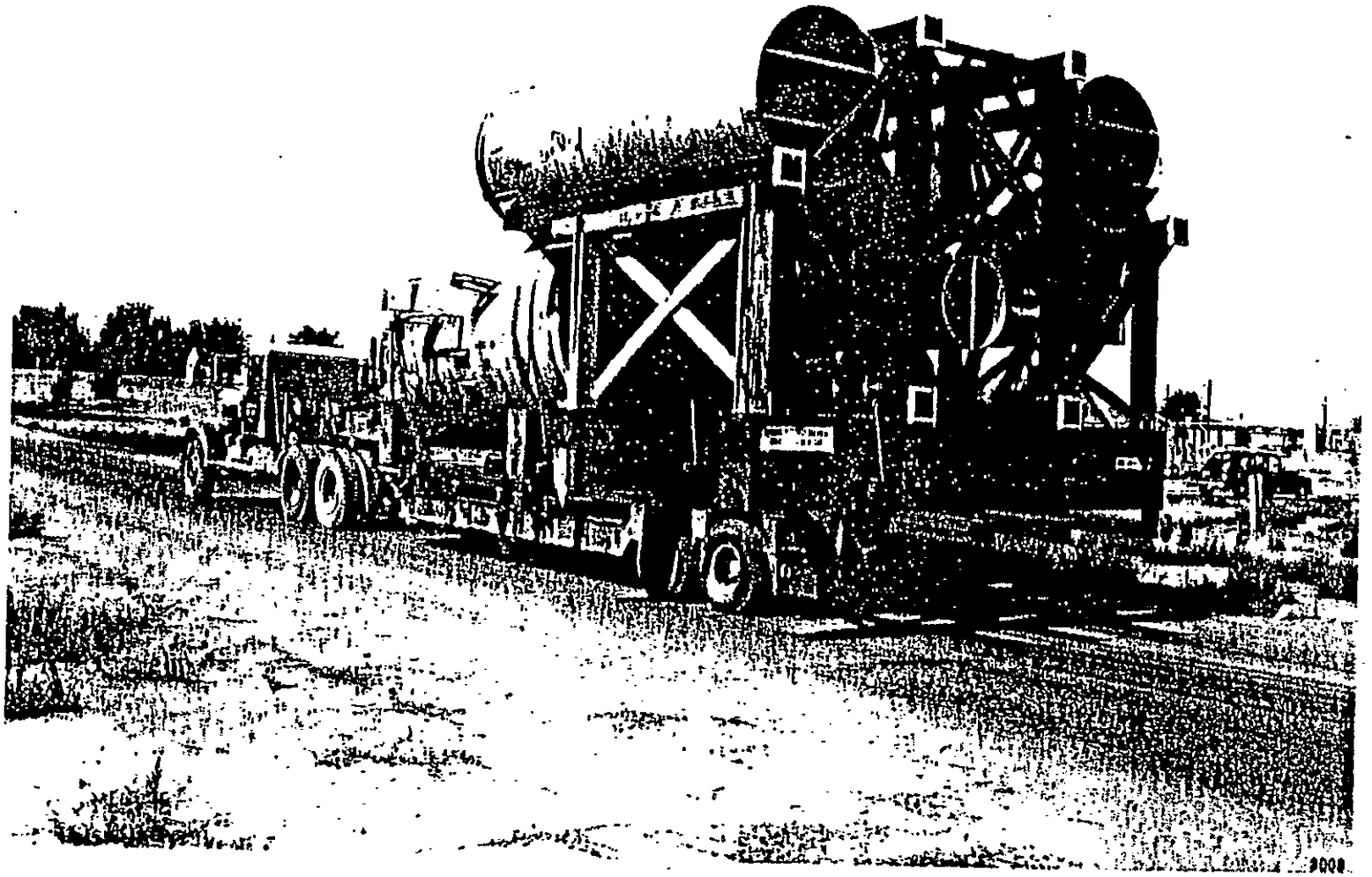

Figure A-8. Concentrator - Bottom View .

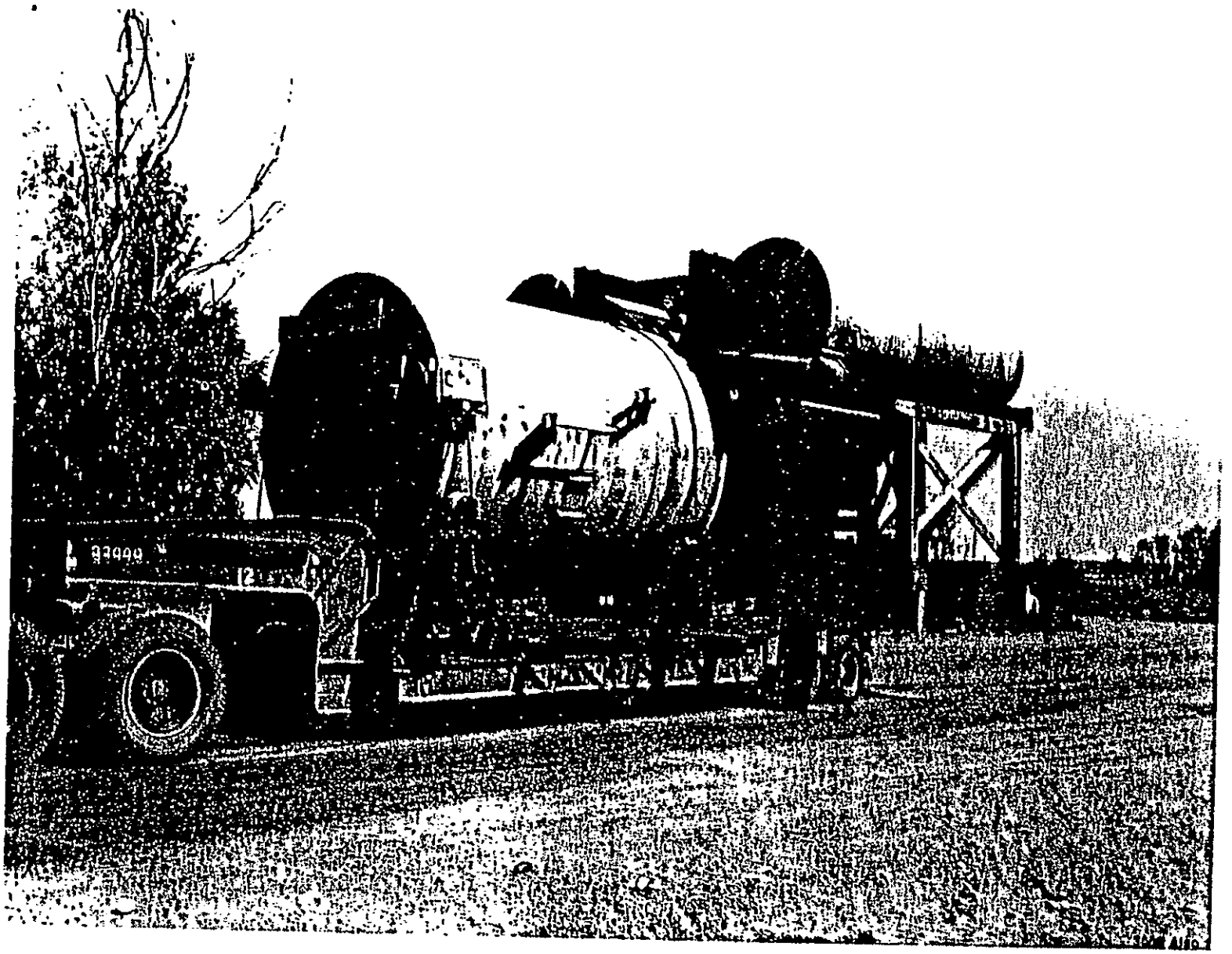

Figure A-9. Concentrator - Top View.

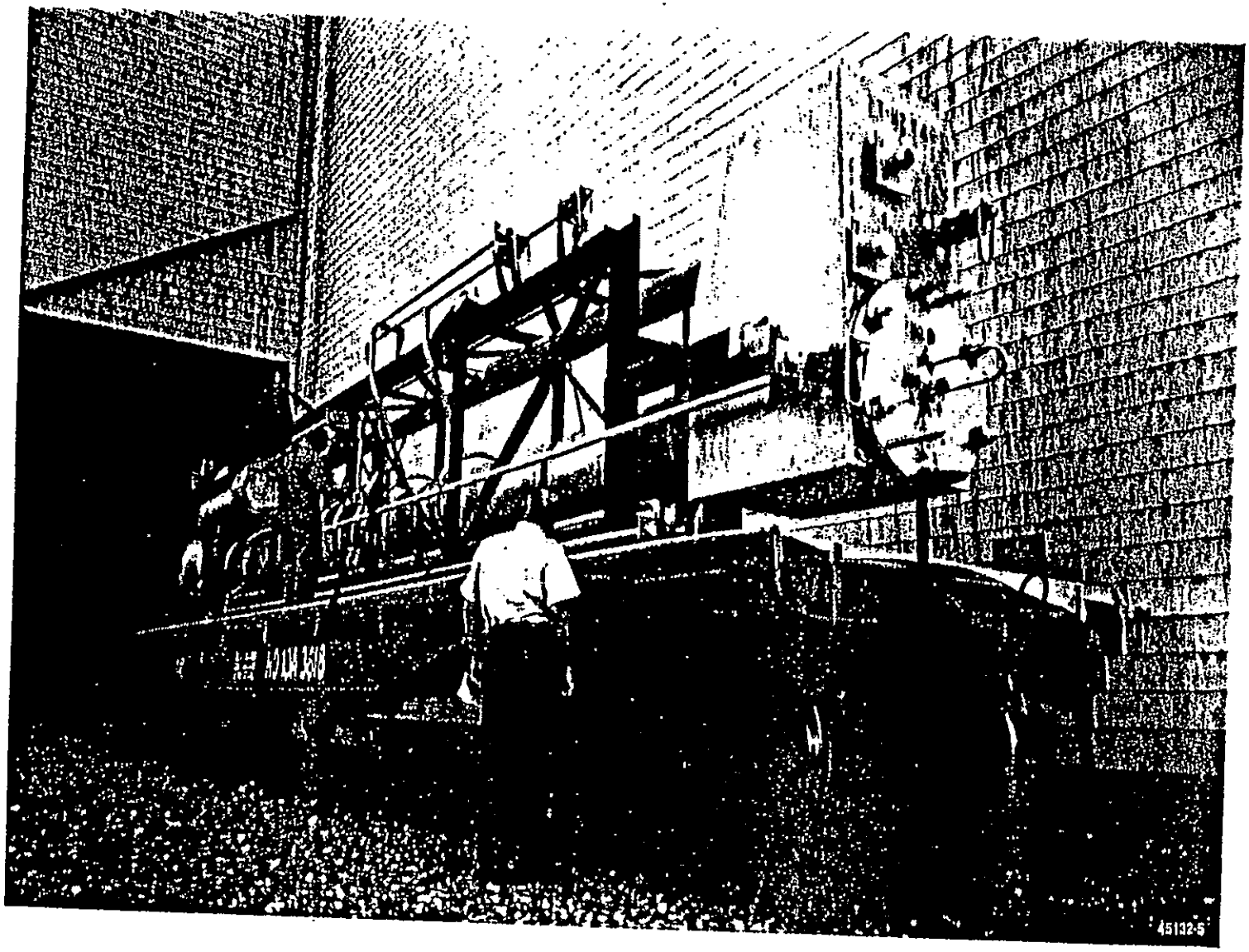

Figure A-10. Typical Column on Railcar.

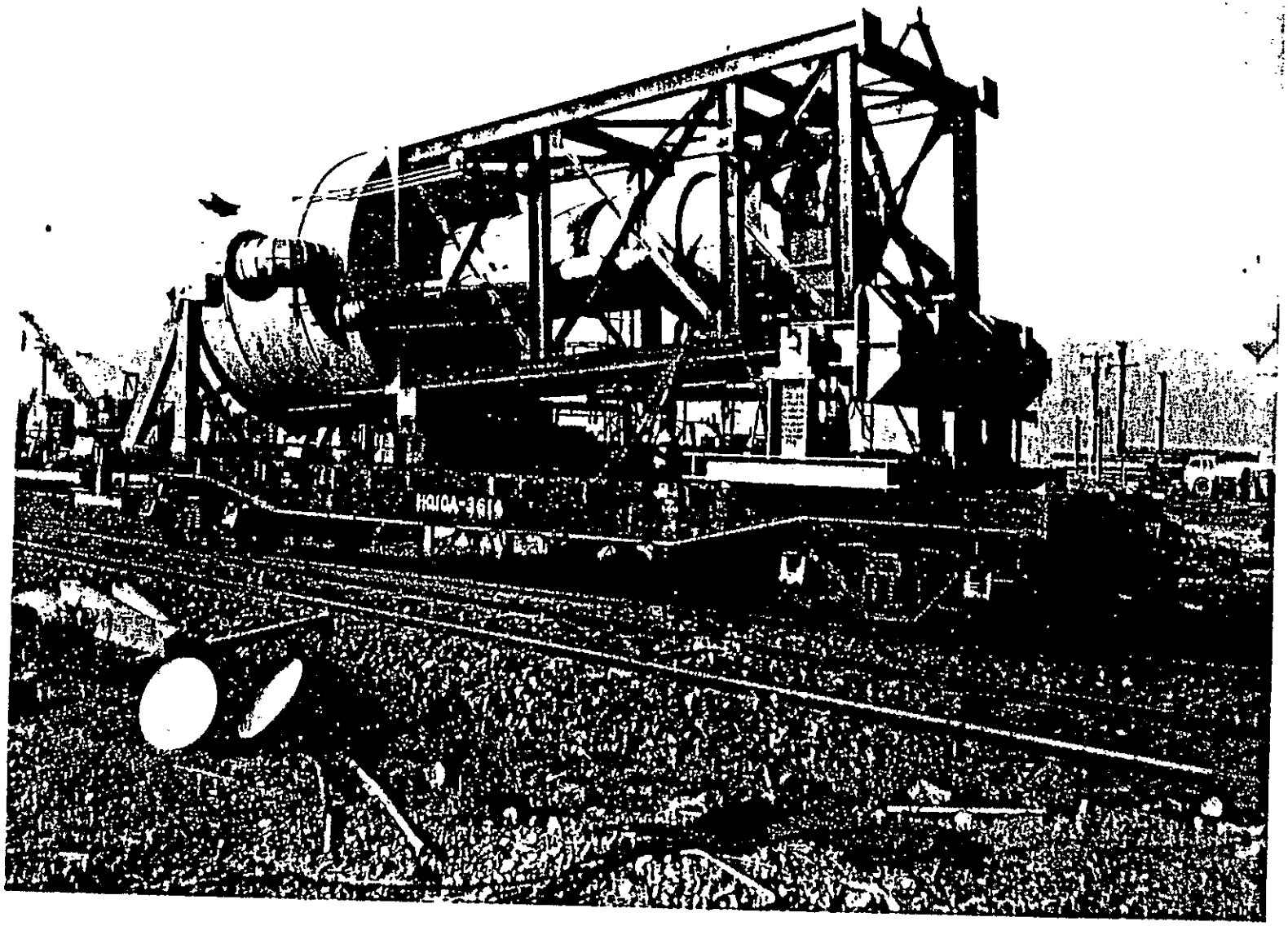

Figure A-11. Equipment on Typical Railcar.

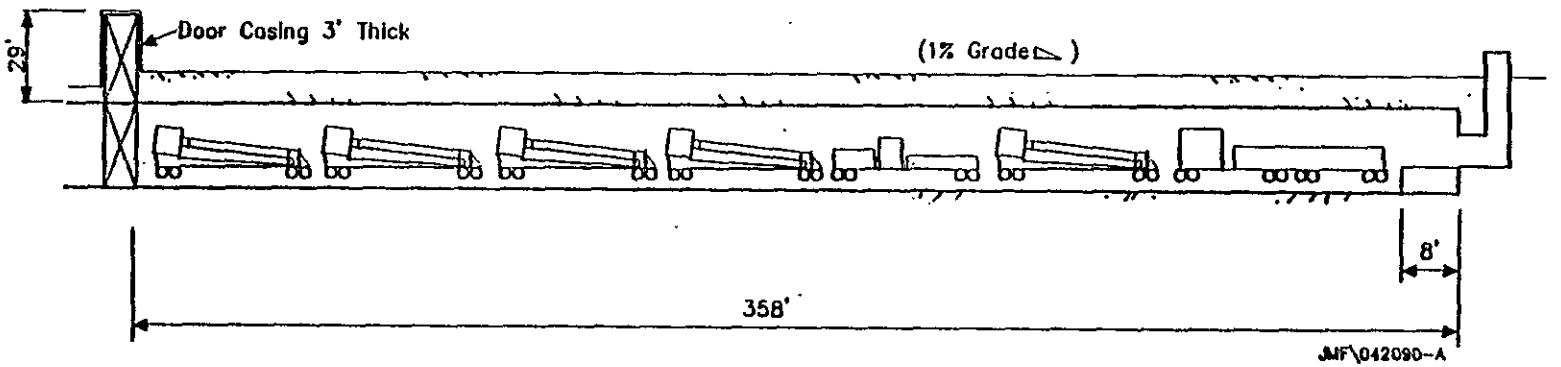

Figure A-12. PUREX Storage Tunnel 1 Equipment Positions.

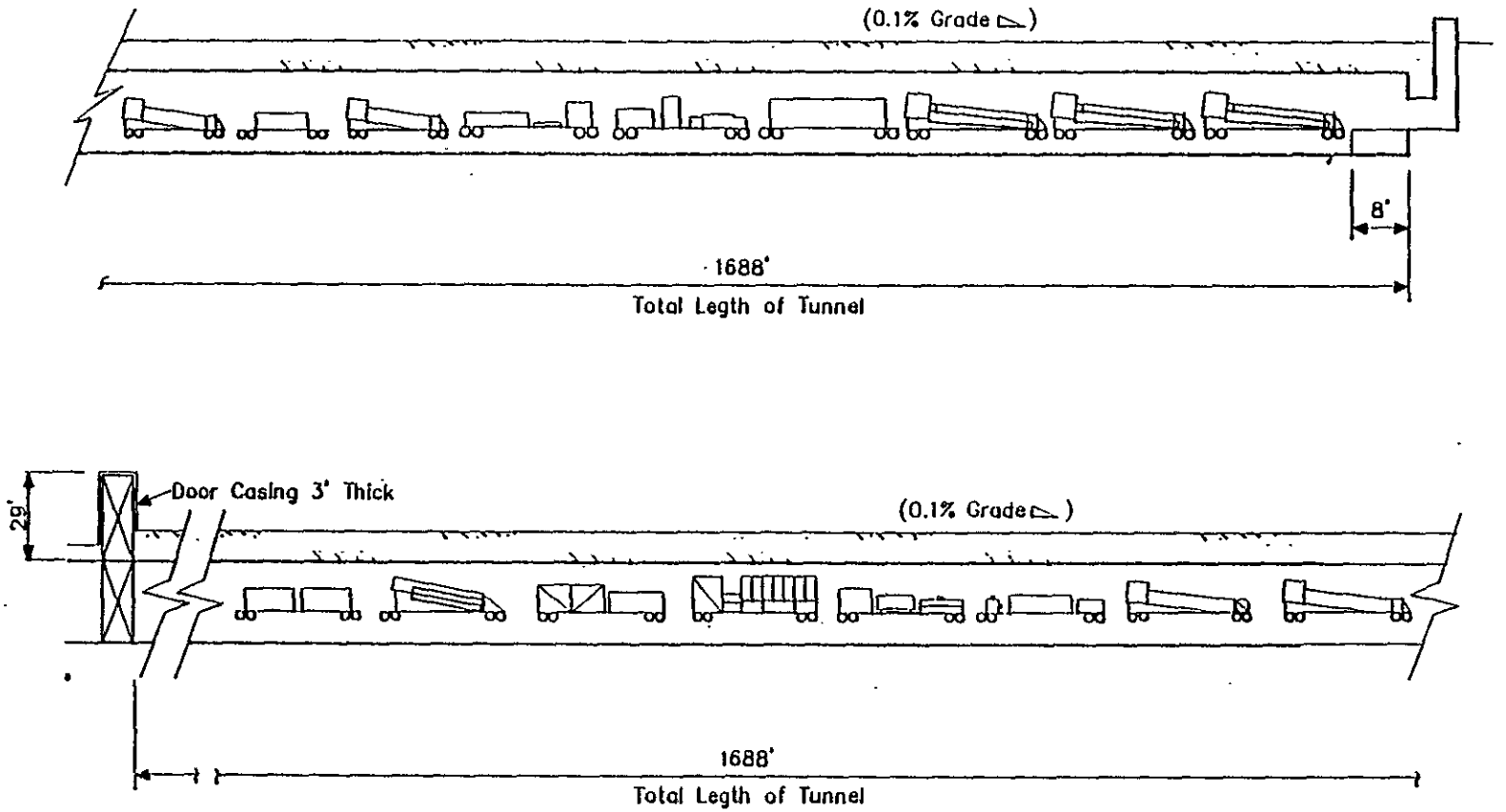

Figure A-13. PUREX Storage Tunnel 2 Equipment Positions.

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APPENDIX B

PUREX STORAGE TUNNEL CONSTRUCTION PHOTOGRAPHS

This appendix contains photographs of Plutonium Uranium Extraction (PUREX) storage tunnel construction (Figures B-1 to B-4).

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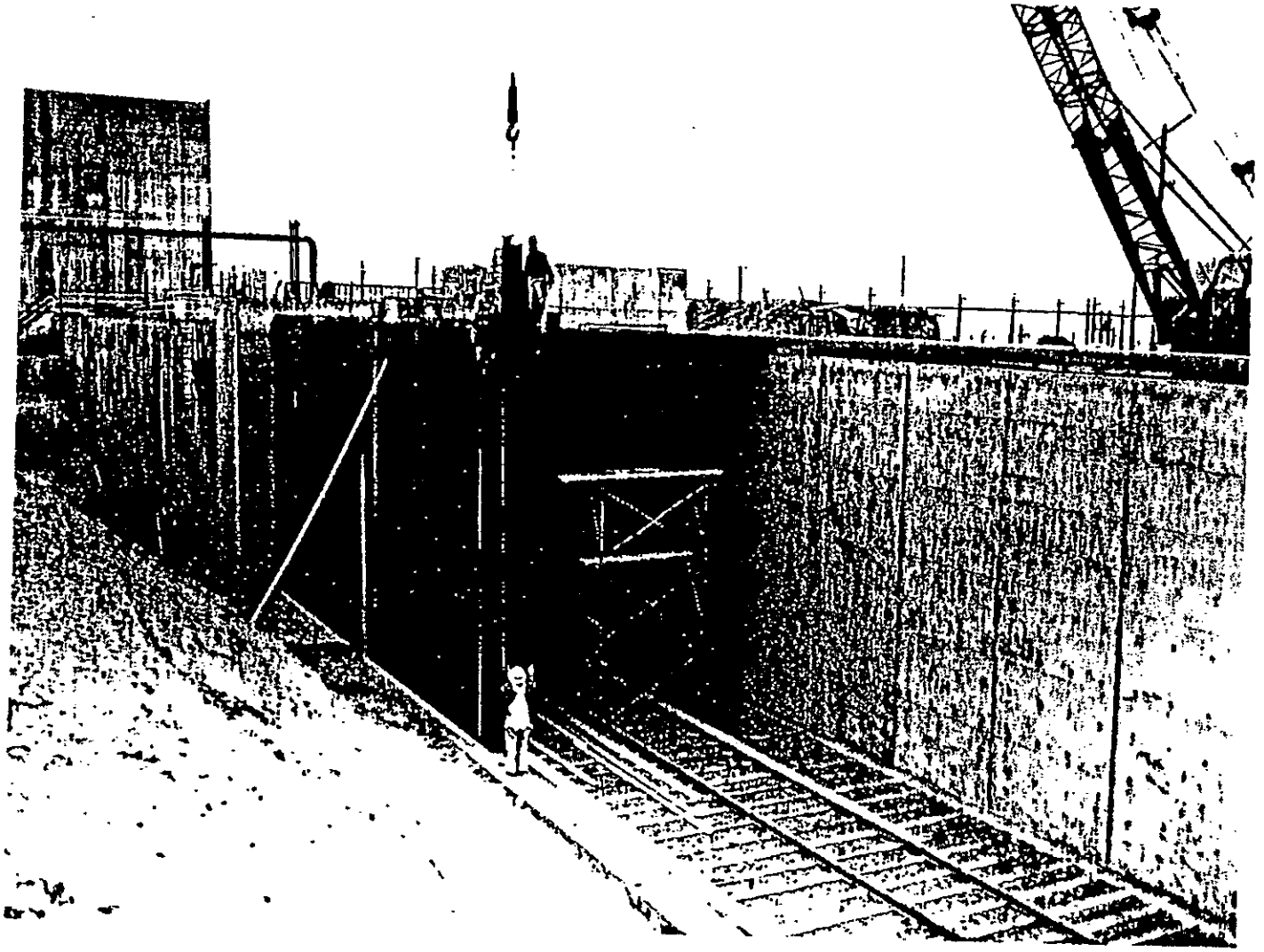

Figure B-1. Tunnel 1 Construction - North End.

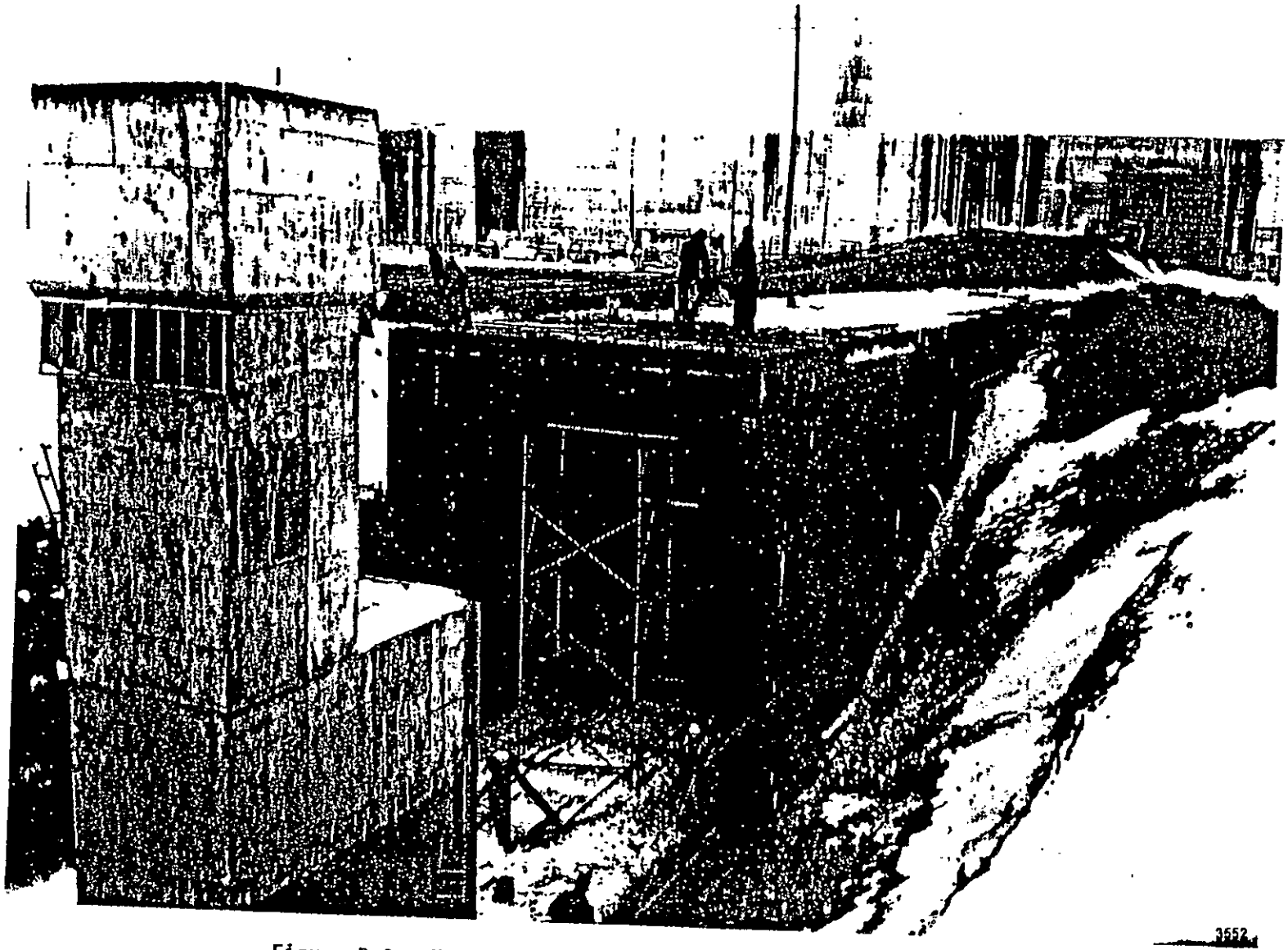

Figure B-2. Tunnel 1 Construction - South End at Vent Shaft.

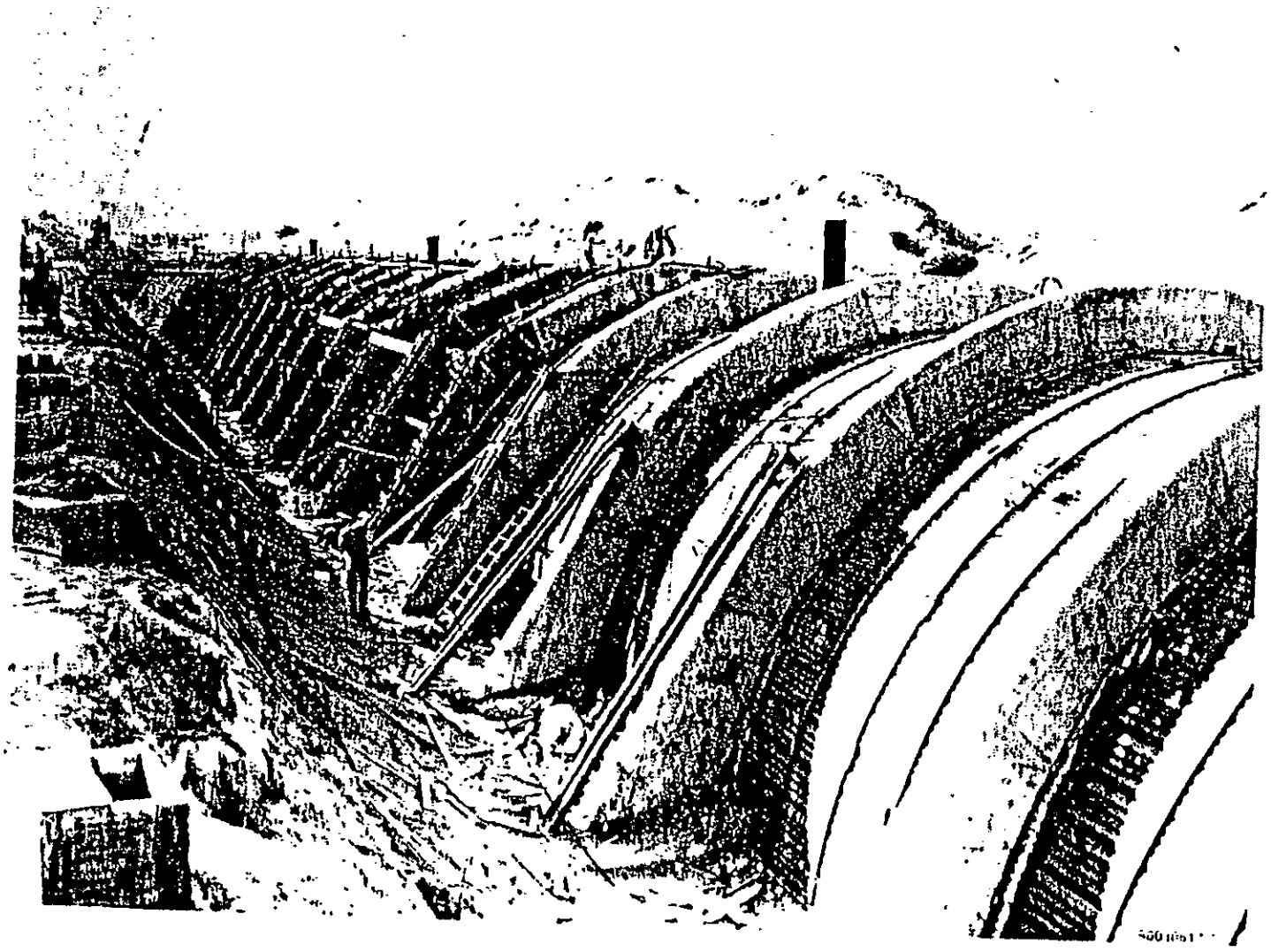

Figure B-3. Tunnel 2 Exterior Construction View - Looking South.

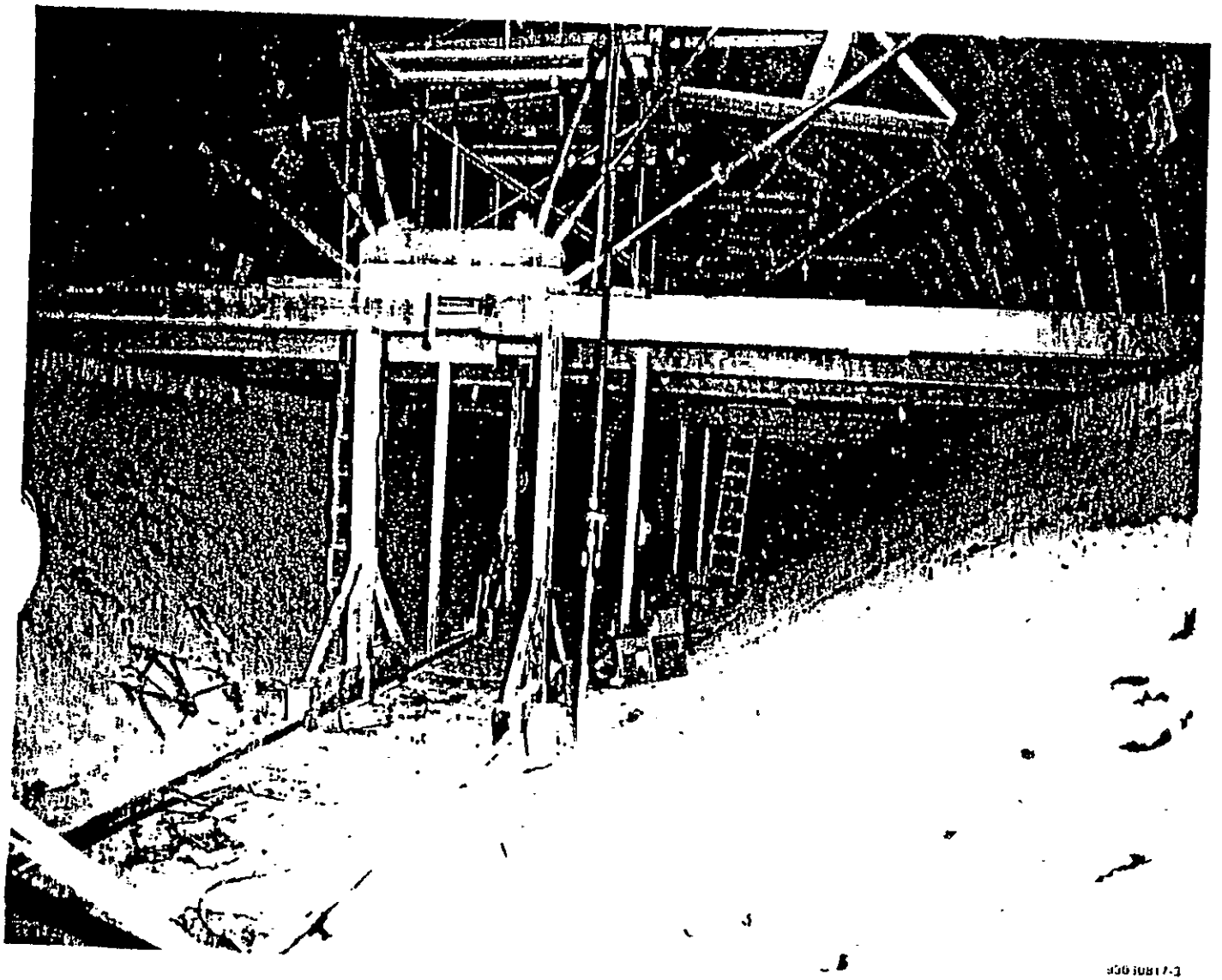

Figure B-4. Tunnel 2 Interior Construction View.

APPENDIX C

PUREX STORAGE TUNNELS REGULATIONS AND GUIDANCE

The following is a list of regulations, U.S. Department of Energy Orders, and Westinghouse Hanford Company policy guidance documents which may pertain directly or indirectly to activities associated with retrieval, storage, processing, treatment, and disposal of the failed equipment presently located in the Plutonium Uranium Extraction (PUREX) storage tunnels:

National Emission Standards for Hazardous Air Pollutants, Title 40, Code of Federal Regulations, Part 61, as amended, U.S. Environmental Protection Agency, Washington, D.C.

National Primary Drinking Water Regulations, Title 40, Code of Federal Regulations, Part 141, as amended.

Hazardous Waste Management System: General, Title 40, Code of Federal Regulations, Part 260, as amended.

Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities, Title 40, Code of Federal Regulations, Part 264, as amended.

Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities, Title 40, Code of Federal Regulations, Part 266, as amended.

Interim Standards for Owners and Operators of New Hazardous Waste Land Disposal Facilities, Title 40, Code of Federal Regulations, Part 267, as amended.

Land Disposal Restrictions, Title 40, Code of Federal Regulations, part 268, as amended.

EPA Administered Permit Programs: The Hazardous Waste Permit Program, Title 40, Code of Federal Regulations, Part 270, as amended.

National Oil and Hazardous Substances Pollution Contingency Plan, Title 40, Code of Federal Regulations, Part 300, as amended.

Designation, Reportable Quantities, and Notification, Title 40, Code of Federal Regulations, Part 302, as amended.

Emergency Planning and Notification, Title 40, Code of Federal Regulations, Part 355, as amended.

Hazardous Chemical Reporting: Community Right-to-Know, Title 40, Code of Federal Regulations, Part 370, as amended.

Toxic Chemical Release Reporting: Community Right-to-Know, Title 40, Code of Federal Regulations, Part 372, as amended.

Records Disposition, DOE Order 1324.2A, U.S. Department of Energy, Washington, D.C.

General Environmental Protection Program, DOE Order 5400.1.

Environment, Safety and Health Program for DOE Operations, DOE Order 5480.1B.

Environmental Protection, Safety and Health Protection Standards, DOE Order 5480.4.

Environment, Safety and Health Appraisal Program, DOE Order 5482.1B.

Environmental Protection-Safety and Health Protection Information Reporting Requirements, DOE Order 5484.1.

Radioactive Waste Management, DOE Order 5820.2A.

General Design Criteria, DOE Order 6430.1A.

Environmental Compliance Manual, Regulatory Compliance, WHC-CM-7-5, Westinghouse Hanford Company, Richland, Washington.

Hazardous Materials Packaging and Shipping, WHC-CM-2-14.

Nonradioactive Dangerous Waste and Packing and Disposal Requirements, WHC-CM-5-16.

Radiation Protection, WHC-CM-4-10.

ALARA Program Manual, WHC-CM-4-11.

Hanford Site Radioactive Solid Waste Acceptance Criteria, WHC-EP-0063-1, Westinghouse Hanford Company, Richland, Washington.

Minimum Standards for Construction and Maintenance of Water Wells, Washington Administrative Code 173-160, as amended, Washington Department of Ecology, Olympia, Washington.

Regulation and Licensing of Well Contractors and Operators, Washington Administrative Code 173-162, as amended.

Water Quality Standards for Water of the State of Washington, Washington Administrative Code 173-201, as amended.

Dangerous Waste Regulations, Washington Administrative Code 173-303, as amended.

Minimum Functional Standards for Solid Waste Handling, Washington Administrative Code 173-304, as amended.

Washington Clean Air Act - General Regulations, Washington Administrative Code 173-400, as amended.

Washington State Department of Social and Health Services Drinking Water Regulations, Washington Administrative Code 248-54, as amended.

Monitoring and Enforcement of Air Quality and Emission Standards for Radionuclides, Washington Administrative Code 402-80, as amended.

The above list is not a complete list of all potentially applicable references, yet provides some indication of the magnitude of the regulatory and procedural considerations to be addressed in disposing of the equipment.

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APPENDIX D

PUREX STORAGE TUNNELS AVAILABLE PACKAGING

This appendix lists approved packaging potentially applicable for use in transporting, storing, or disposing of the failed equipment from the PUREX storage tunnels.

Title: Burial Box (Canyon)

Physical Dimensions: Length: 19 ft Width: 10 ft Height: 8 ft

Gross Weight: 82,000 lb Capacity Volume: 1,500 ft^3

Description: The canyon burial box is constructed of concrete reinforced with embedded carbon steel rebar. The burial box may be shipped with or without box liner and transported by a railcar, or structural modifications may be made which allows the burial box to be lifted by crane and transported by low boy truck. The three box configurations have different allowable gross weights, and administrative controls.

Used for Type A: X Type B: X Highway Route Controlled Quantity (HRCQ): X

Content Limits: Waste shall consist of failed, contaminated process equipment. The contact dose equivalent rate shall not exceed 10 rem/h at 1 m.

Title: Burial Box (General Purpose)

Physical Dimensions: Length: 19 ft Width: 10 ft Height: 7 ft 2 in

Gross Weight: 80,000 lb Cavity Volume: 1,300 ft^3

Description: The general purpose burial box is constructed of steel reinforced concrete mounted on a channel frame that also serves as a skid surface. A burial-box vent with filter is centrally located at the front end, and 1/2-in. thick x 2-in. wide neoprene gasket is bonded all around the surface of the box for sealing purposes. The closure is constructed of steel reinforced concrete within a steel-channel framework. A steel I-beam runs across the center of narrow dimension of the cover. A shaped steel bar forms a cover-lifting bail and is attached to the central beam. This container can be used in conjunction with a steel liner 17 ft 4 in. long, 7 ft 8 in. wide, 6 ft 5 in. high and has a gross weight of 15 tons. Weight of liner must be subtracted from payload weight above.

Used for Type A: X Type B: X HRCQ: X

Content Limits: Used for transport of 55-gal drums of waste and equipment contaminated with mixed fission products. Specifics based on a safety analysis.

Title: Burial Box (Standard with Yoke)

Physical Dimensions: Length: 11 ft Width: 5 ft 4in Height: 6 ft

Gross Weight: 29,700 lb Cavity Volume: 279 ft^3

Description: The Standard burial box with lifting yoke is 6-in. thick reinforced concrete within a carbon steel framework at all outside corners. The overall box dimensions are 5 ft 4 in. wide, 6 ft high, and 11 ft long excluding the cover guides and lifting members. The rear guides extend 19 in., and the front guides extend 13 in. above the top surface of the box. The two lifting members are located on the rear and the front of the box and extend approximately 21 in. above the top surface. The cover lifting bails are provided for lifting the 5,000-lb cover. A lifting yoke is provided for lifting the closed box and its contents. The gross weight of the loaded container is 29,700 lb. The content weight limit is 8,000 lb. A cover-to-box latching mechanism is provided on all corners of the box and cover. The box has a 1/2-in-thick x 3-in-wide neoprene gasket cemented to the box. The box equipped with an air vent with an assault mask canister installed.

Used for Type A: X Type B: X HRCQ: X

Content Limits: Contaminated equipment with a maximum of 150,000 Ci of Strontium or 1,000 Ci of Cesium.

Title: Car (Multipurpose Transfer Box)

Physical Dimensions: Length: 20 ft Width: 11 ft 8 in. Height 17 ft 1 in.

Gross Weight: 38,500 lb Cavity Volume: 3,986 ft^3

Description: The box frame is constructed of carbon and stainless steel pipe. Reinforced concrete is added to the frame, 6-in. thick on the sides and 3-in. thick on the ends. The inside and outside of the box are sheathed with stainless steel. A sump is located in one corner of the bottom plate to allow removal of liquid accumulations collected during decontamination. A filter housing is provided in the same end of the box as the sump but at the opposite side. The filter housing is fitted with a HEPA filter during transport to preclude the release of contamination. There are two lid sections and both sections are hinged on the outer edge of the box with five plain piano hinges. The lids are opened and closed by means of air cylinders located at each end of the box. A neoprene rubber gasket is used to provide a lid seal. The railcar has been modified to accept the Transfer Box.

Used for Type A: X Type B: X HRCQ: X

Content Limits: Non-transuranic (TRU) contaminated process equipment with less than 100 nCi/g TRU contamination. Total fissile contents limited to 15 g. Highway route controlled quantities are authorized.

Title: Metal Box (Low Level - LMB)

Physical Dimensions: Length: Width: Height

Gross Weight: Cavity Volume:

Description: Rectangular metal boxes with various external dimensions. The maximum gross weight is limited to the manufacturer's certified weight for the package. The container meets Department of Transportation (DOT) Type A requirements and have been certified to pass a 30-ft drop without catastrophic failure. All containers have the capability for handling by forklift or sling. Lid handles are for lifting lid only. The LMB is reusable if safety analysis requirements are met.

Used for Type A: X Type B: X HRCQ: X

Content Limits: The contents are limited to low level waste or contaminated equipment. Contents are limited to 3,000 A1/A2 of low level (non-TRU) radioactive material.

Title: Transuranic Metal Box (TMB)

Physical Dimensions: Length: Width: Height:

Gross Weight: 17000 Cavity Volume:

Description: Rectangular metal boxes with various external dimensions. The maximum gross weight is limited to the manufacturer's certified weight for the package not to exceed 17,000 lb. The containers meet DOT Type A requirements and have been certified to pass a 30-ft drop without catastrophic failure. All containers have the capability for handling by forklift or sling. Lid handles are for lifting lid only. The container is equipped with a standard NucFil filter. Contents are individually plastic wrapped or the box is lined with plastic prior to loading. The TMB is reusable if safety analysis requirements are met.

Used for Type A: X Type B: X HRCQ: X

Content Limits: The contents are limited to TRU contaminated equipment or waste not to exceed 1,000 g per TMB. See criticality specification for details. Nonfissile radionuclides are limited to 7,500 A1/A2. A safety analysis may provide for exceptions.

Title: Metal Box (UNI-4476)

Physical Dimensions: Length: 8 ft Width: 4 ft Height: 4 ft

Gross Weight: 9,800 lb Cavity Volume: 120 ft^3

Description: Metal box constructed of 12-ga ASTM A-36 low carbon, hot rolled, sheet metal. The bottom is supported by "H" frame shaped structural channel. A reinforced lid is installed over a 1/4-in. neoprene gasket and closed with 1/4-in. x 1-in. steel self-drilling, self-tapping screws.

Used for Type A: X Type B: X HRCQ: X

Content Limits: Tools, valves, piping, reactor hardware/components, metal containers, concrete, soil, wood, plastic, rags, clothing, paper, and other solid material with less than 100 nCi/g TRU radioactive materials.

Title: Metal Box (447R Reusable)

Physical Dimensions: Length: 7 ft Width: 4 ft Height: 4 ft

Gross Weight: 3,000 lb Cavity Volume: 85 ft^3

Description: The CI 447R shipping container is a corrugated, carbon steel box approximately 4-ft wide, 4-ft high, 7-ft long. The box has been tested and certified to meet requirements for a DOT 7A container. The approved gross weight is 3,000 lb. A paint primer and overcoat (Phynoline - decontamination factor 120) are applied to container surfaces to aid in the decontamination of the box.

Used for Type A: X Type B: X HRCQ:

Content Limits: Intra-area transport of equipment contaminated with Type B quantities of mixed fission products (MFP) radioactive material for decontamination or repair.

Title: Drum (55-gal, Non-TRU waste)

Physical Dimensions: Length: Width: 2 ft Height: 2 ft 11 in.

Gross Weight: 840 lb Cavity Volume: 8 ft^3

Description: The 55-gal waste drum is a metal container in the shape of a right circular cylinder and serves as a primary containment barrier for the waste contents. Additional containment is provided by a polyethylene bag liner. Two types of drums, as defined in DOT regulation, are commonly used for non-TRU waste shipments. Either DOT specification 17C drums (49 CFR 178.115), or DOT specification 17H drums (49 CFR 178.118) may be used.

Used for Type A: X Type B: X HRCQ:

Content Limits: Waste material such as glass, paper, plastic, rags, wood, rock, soil, metal pipe, pump parts, etc. Fissile materials are limited to less than 100 nCi per gram of waste material. The maximum MFP content is 20 Ci per drum.

Title: Drum (55-gal, Non-TRU, reusable)

Physical Dimensions: Length: Width: 2 ft Height: 2 ft 11 in.

Gross Weight: 840 lb Cavity Volume: 8 ft^3

Description: 55-gallon drums with specifications of DOT-17C, DOT-17H, and DOT-17C/17H (DOT-17E drums converted to DOT-17H drums) are used for transport and burial of non-TRU waste. The drums are now specified as a single trip containers and are capable of being requalified under 49 CFR 173.28(m). A nonreusable

polyethylene bag liner should be used to provide an extra containment barrier. The contents should be double wrapped in plastic. The drums have removable heads secured with a bolt lock ring.

Used for Type A: X Type B: X HRCQ:

Content Limits: Non-TRU contamination on small tools and equipment. Waste material such as glass, paper, plastic, rags, wood, rock, soil, metal pipe, pump parts, etc. The TRU materials are limited to less than 10 nCi/g. Maximum MFP content is 20 Ci per drum (Type B quantity). Surface dose equivalent rate limited to 500 rem/h. No free liquids or absorbed organic liquid allowed.

Title: Drum (55-gal, TRU waste)

Physical Dimensions: Length: Width: 2 ft Height: 2 ft 11 in.

Gross Weight: 900 lb Cavity Volume: 7 ft^3

Description: DOT 55-gal open head drum with bolt ring closure. The bolt ring closure bolt must be torqued to 40 ft-lbs.

Used for Type A: X Type B: X HRCQ: X

Content Limits: Waste may include absorbed inorganic liquids, glass, paper, plastic, rags, wood, metal pipe, and pump parts which are contaminated with plutonium, other TRU radionuclides, and small amounts of associated fission and activation products. Contents approved for highway route controlled quantity, but not more than 400 g of fissile material. Amount of activity is limited by dose equivalent rate of the load.

Title: Drum (55-gal, shielded)

Physical Dimensions: Length: Width: 2 ft Height: 2 ft 11 in.

Gross Weight: 1,450 lb Cavity Volume: 2 ft^3

Description: A fiber reinforced concrete lined 55-gal drum with three cavity configurations. Internal cavity dimensions are 11.5 in. ID x 31.4 in., 15.1 in. ID x 32.4 in., and 18.1 in. x 32 in. with payload capacities of 460, 730, and 990 pounds respectively. The cavity is lined with a nominal 4 mil plastic bag, horsetailed and taped for secondary containment.

Used for Type A: X Type B: X HRCQ:

Content Limits: For nonfissile material (fissile exempt), non-TRU materials limited to less than 20 Ci. Contaminated materials include glass, paper, rags, wood, plastic, rock, soil, metal pipe, tools, etc.

Title: Self Container

Physical Dimensions: Variable

Gross Weight: Variable Volume: Variable

Description: Self Container consist of any piece of equipment that has all of its external openings sealed, has been decontaminated, and can be safely shipped without further packaging. Typical Self Containers would be gloveboxes, pressure vessels, tanks, or heat exchangers.

Used for Type A: X Type B: X HRCQ: X

Content Limits: The amount of radioactive material on the inside surface of the container may be up to and including large quantity (HRCQ), non-TRU material. A safety analysis provides for specific content restrictions.

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APPENDIX E

FIELD STABILIZATION OF WASTE PACKAGES

BURIAL STABILIZATION AND SOLIDIFICATION

Stabilization and solidification of materials originating from the PUREX tunnels may be accomplished by treatment after burial. After waste is retrieved, processed, packaged, and transported to the burial grounds, the packages will require treatment to reduce the void volume (Stickney 1988). The void volume reduction is necessary for maintaining the integrity of the burial ground.

Westinghouse Hanford Company (Westinghouse Hanford) has developed a technology (Phillips and Hinschberger 1989 and Phillips and Gilbert 1987) and modified existing engineering practices for treatment of drag-off burial boxes containing high radiation level contaminants. This technology is directly applicable to in-place treatment of burial boxes originating from the PUREX facility as part of PUREX tunnel decommissioning or dismantlement.

LARGE WASTE PACKAGE SLURRY INJECTION

As failed process equipment and contaminated materials originating from PUREX process facilities are treated within the facility, a significant quantity of materials will be of sufficient activity to mandate disposal in drag-off burial trenches. Materials and equipment placed in burial boxes often have a large internal and large interstitial void volume. This void volume must be reduced by introduction of a physically stable material such that the waste form is structurally stable. Due to mass limitations of burial boxes during transport from PUREX to their selected burial locations, void volume reduction is conducted immediately after burial. An example of treatment of burial boxes containing high specific activity materials is provided as follows:

- Burials boxes--Large, i.e., greater than 50 m^3, concrete or equivalent material burial boxes are typically used to dispose of highly contaminated materials requiring remote disposal operations. These boxes and their contents may not maintain structural integrity

for required time and as such result in loss of confinement of radionuclides and hazardous materials. Boxes are injected with particulate slurry.

- Injector Placement--Injector prot are constructed with the ends or top of the burial box during fabrication. These consist of anchored steel flanges, connectors, and quick-connect camlock fittings. These provide access into the box for slurry through flexible injection tubing.

- Displacement Gas Filtration--As slurry materials are fed into the burial box, air is displaced. If airborne contaminated particulate are present, they may be contained within the box by filtration of the displaced air. Filters located on burial box ends or top consists of carbon-carbon composite materials and are sized to accommodate slurry throughput volumes. Filter connectors are fitted with filters or blanked off dependant on individual waste form conditions.

- Drag-Off--Large burial boxes originating from PUREX are transported by train on flatcars. Boxes are tethered with cables extending over the length of several railcars. The cables are attached to existing cables extending the length of a given burial trench. These are attached to bulldozers at the far end of the trench. The railcar and cables are configured such that when the burial box is located at the working end of the trench adjacent to an inclined ramp, the bulldozers drag the box from the railcar to the far end of the trench. The burial box has been previously fitted with flexible slurry injector hoses that are trailed following the burial box as it travels down the longitudinal axis of the trench to provide shielding. The slurry injection tubing is left exposed and is next connected to the dynamic consolidation slurry injection system.

- Injection--Particulate based slurry is injected into the burial box from the dynamic consolidation slurry injection system discussed in the previous alternative. The general formulation of the slurry consisting of cement, fly ash, smectite clays, retarders, and water injected into the burial boxes is also equivalent to that discussed in the previous alternative. The problem of buoyant waste forms is elevated where needed by staging injection volumes. Pressurization of the burial box is controlled by the volume of slurry pumped, the capacity of the carbon filters, and the lithostatic pressure. Overfilling of the burial box is controlled by pressure monitoring and calculation of accessible void volume within the box and cessation of injection at 90% of fill volume. At completion of injection, slurry injection tubing is cut off and capped below grade.

Attached are conceptual drawings of drag-off trench disposal (Figures E-1 to E-8).

REFERENCES

Phillips, S. J. and S. T. Hinschberger, 1989, "Concurrent In Situ Treatment and Disposal of Low-Level Radioactive Waste: Technology Development," in Proceedings of the International Radioactive Waste Management Conference, Brighton, England, May 1989, British Nuclear Society.

Phillips, S. J. and T. W. Gilbert, 1987, "Stabilization and Isolation of Low-Level Liquid Waste Disposal Sites," Waste Management '87, Volume 3, Tucson, Arizona.

Stickney, R. G., 1988, Hanford Radioactive Solid Waste Packaging, Storage, and Disposal Requirements, WHC-EP-0063-1, Westinghouse Hanford Company, Richland, Washington.

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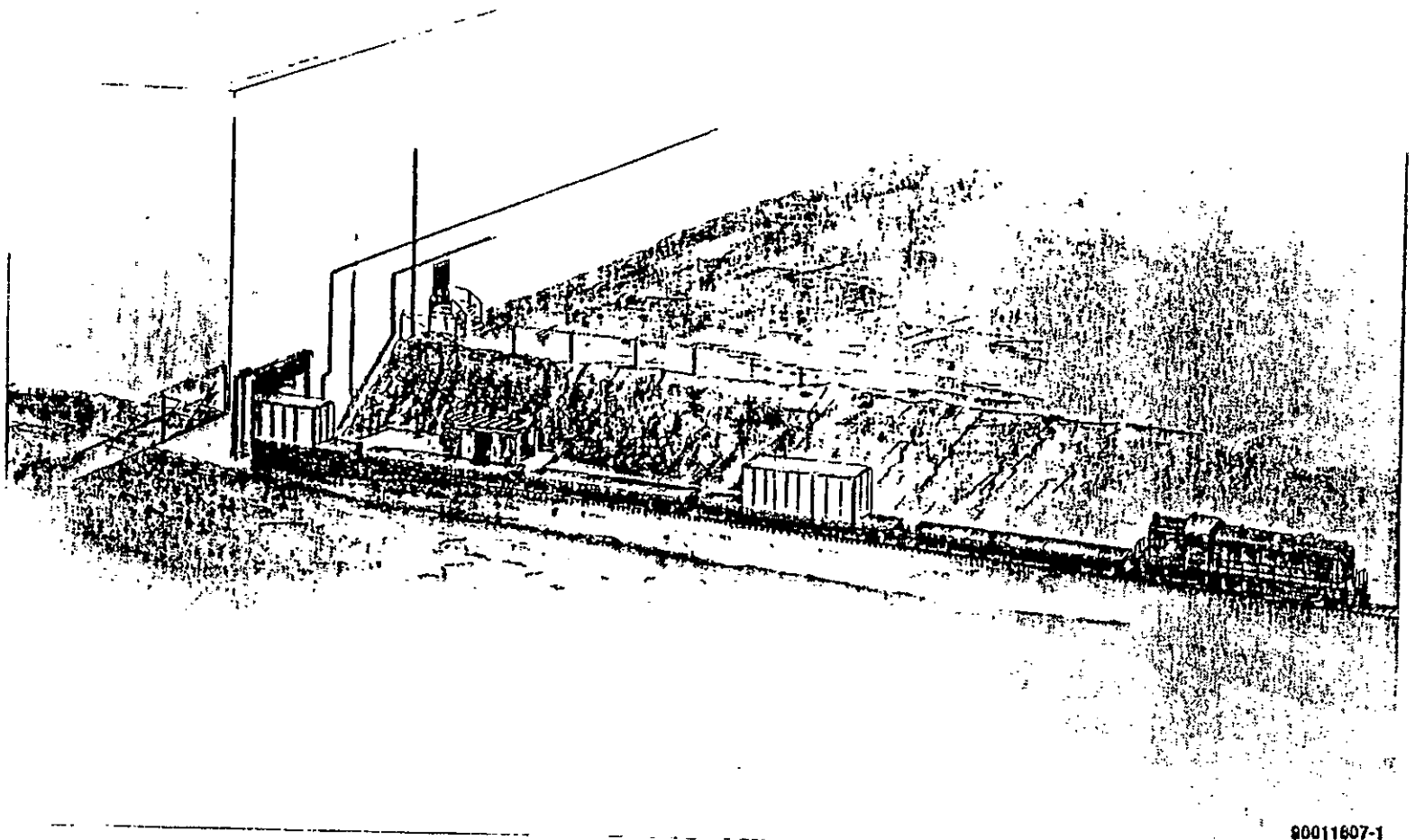

Figure E-1. Waste Package Egress from Purex Plant.

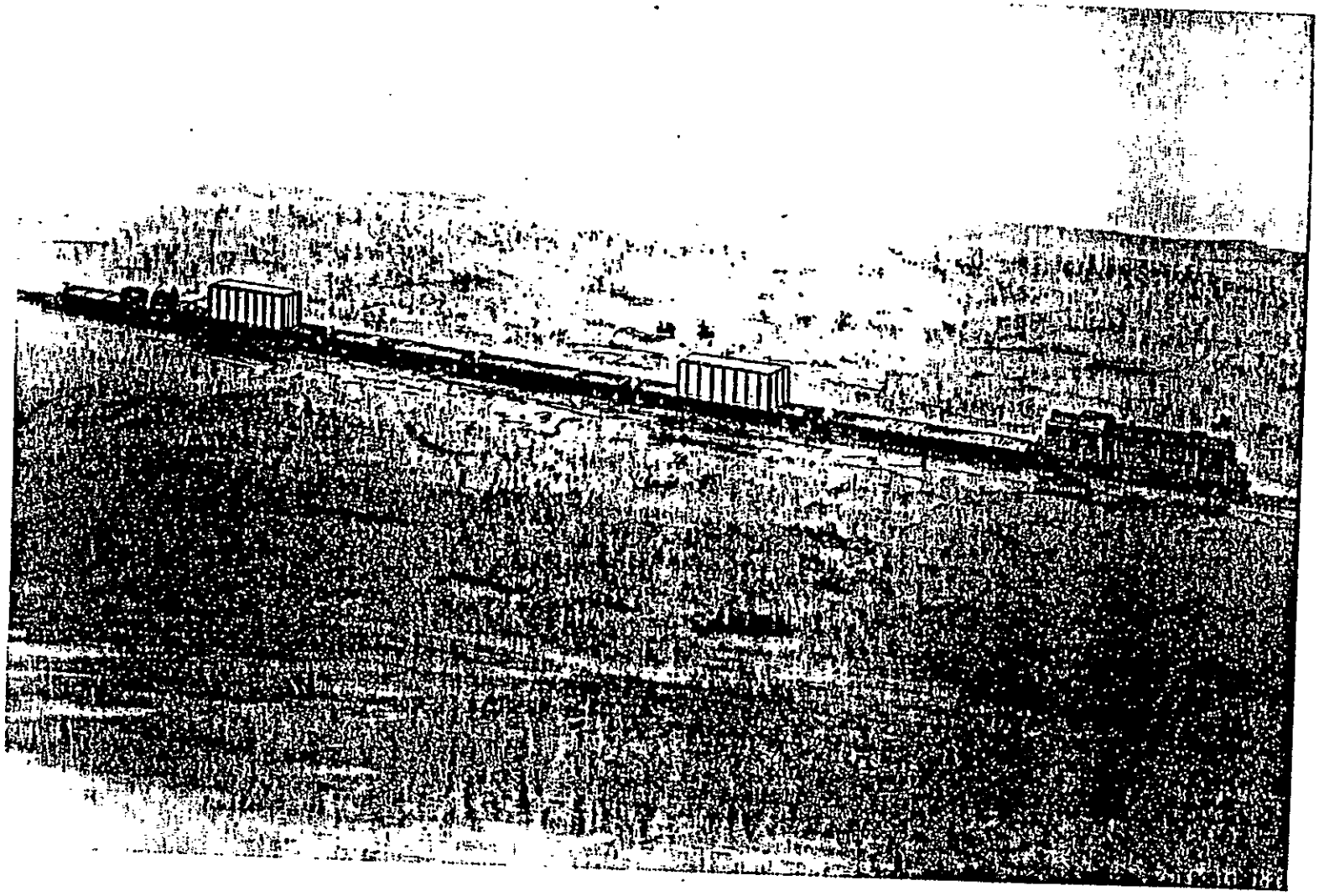

Figure E-2. Transport to Drag-Off Disposal Trench.

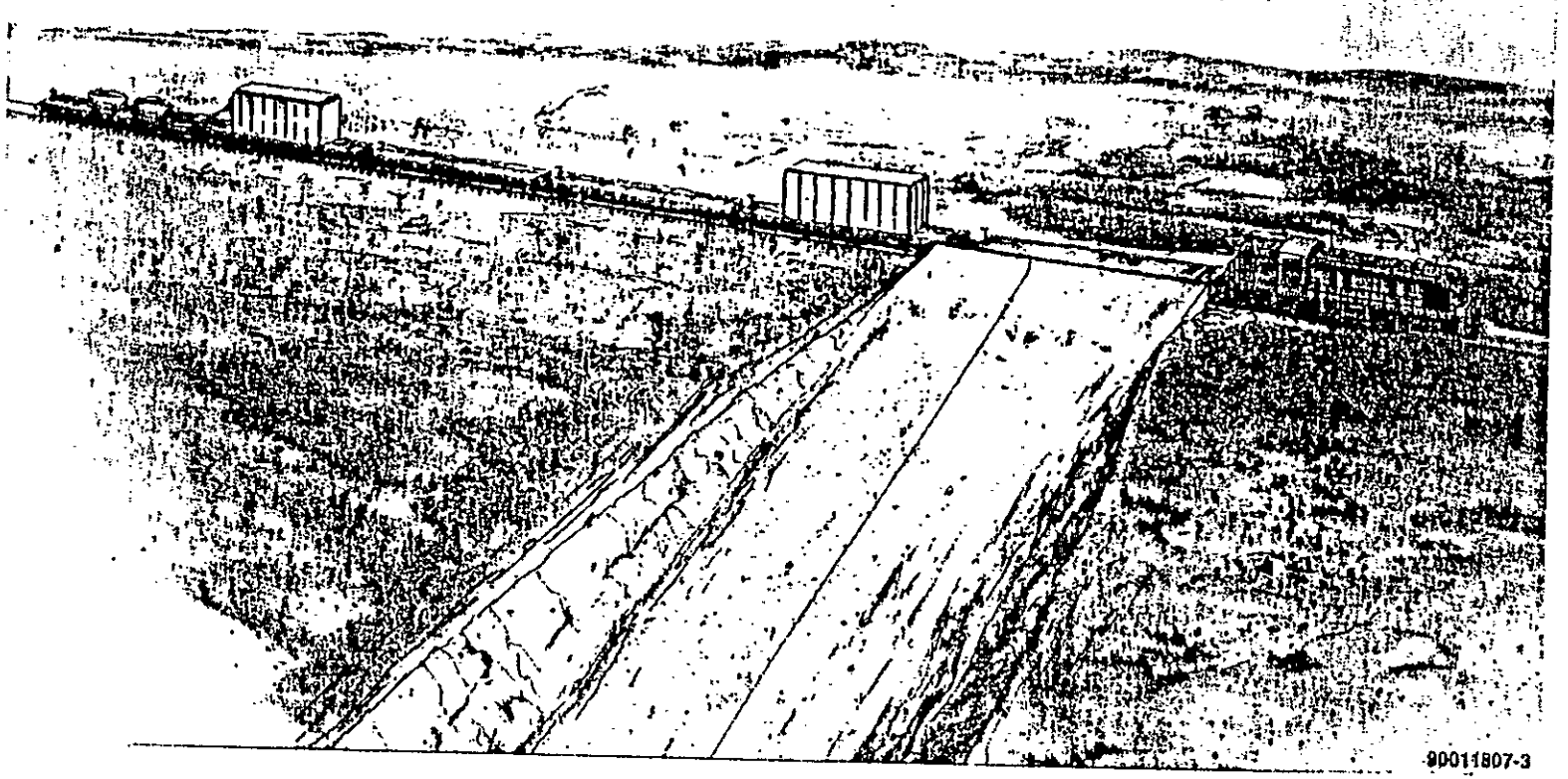

Figure E-3. Waste Package Cable Attachment at Disposal Trench.

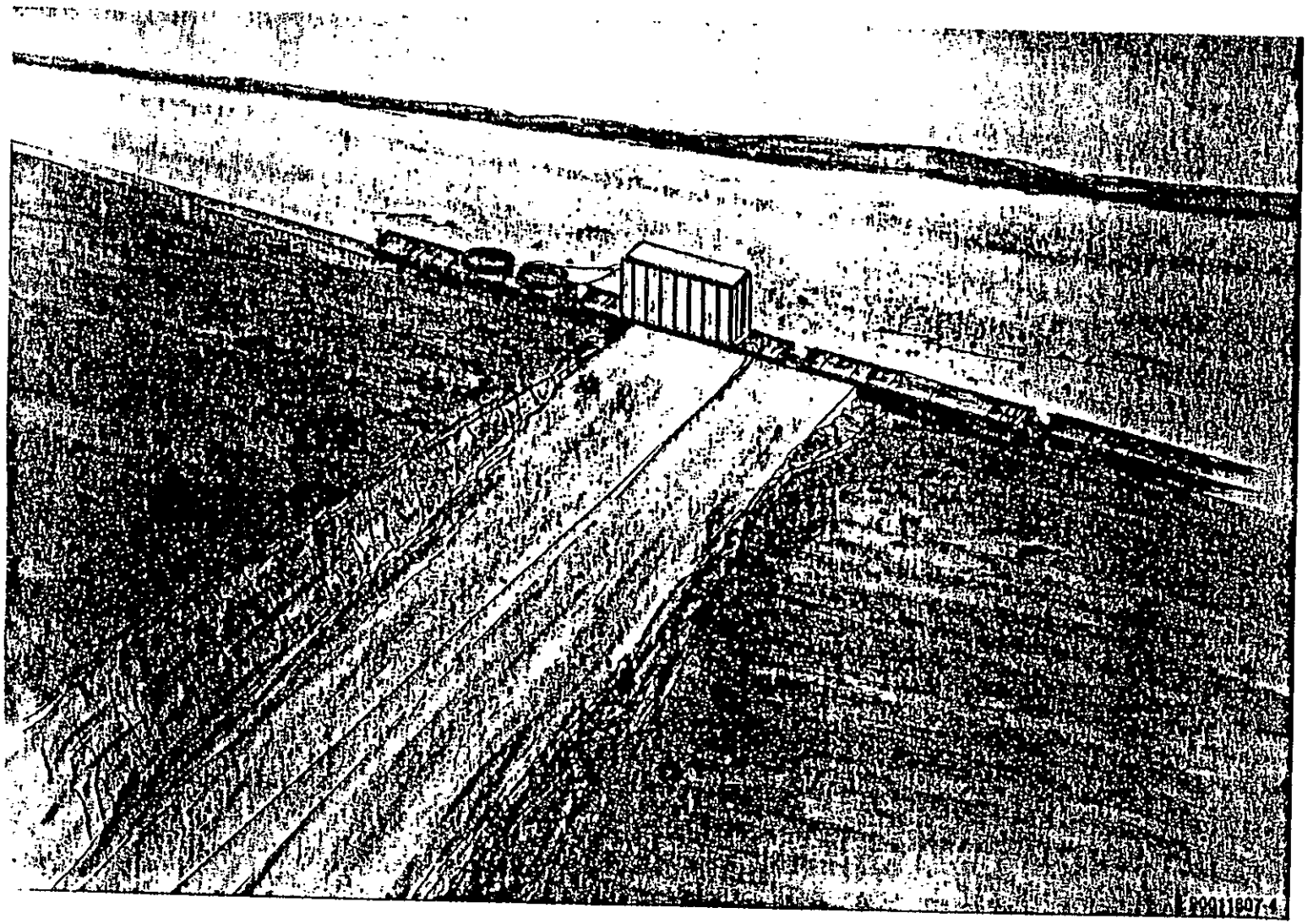

Figure E-4. Waste Package and Slurry Hoses on Railcars.

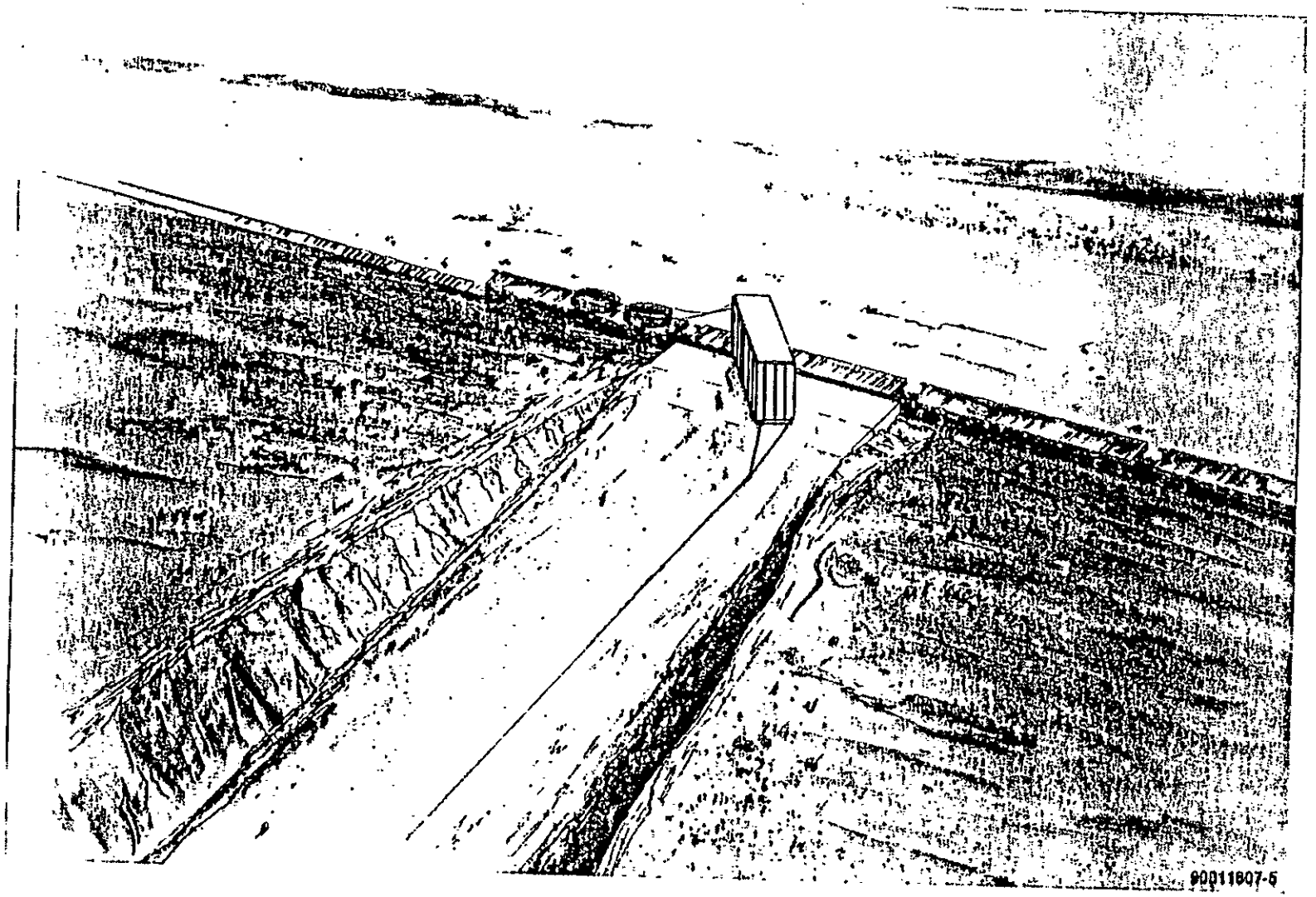

Figure E-5. Rotation of Waste Package from Railcar.

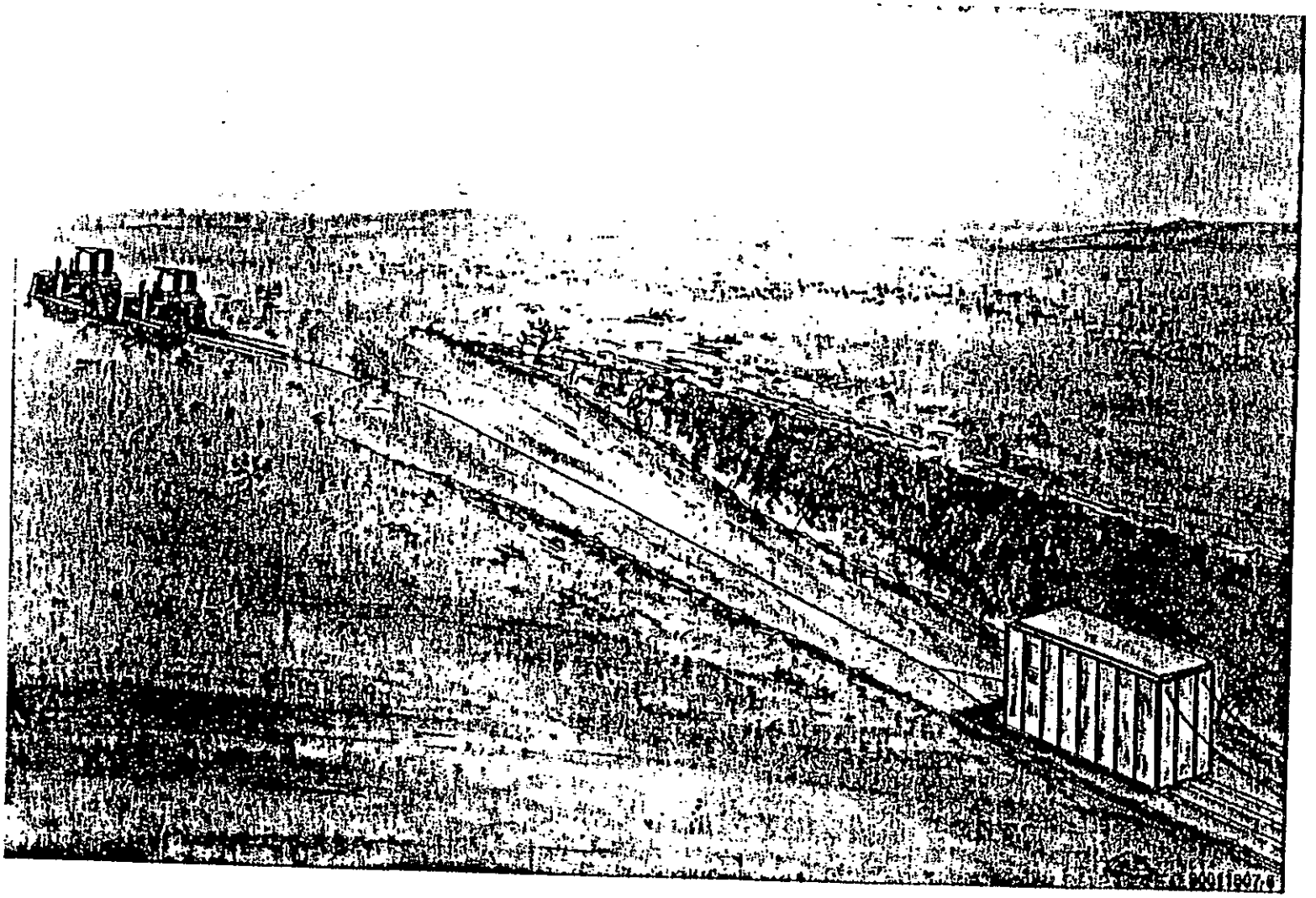

Figure E-6. Waste Package Skid Using Bulldozers.

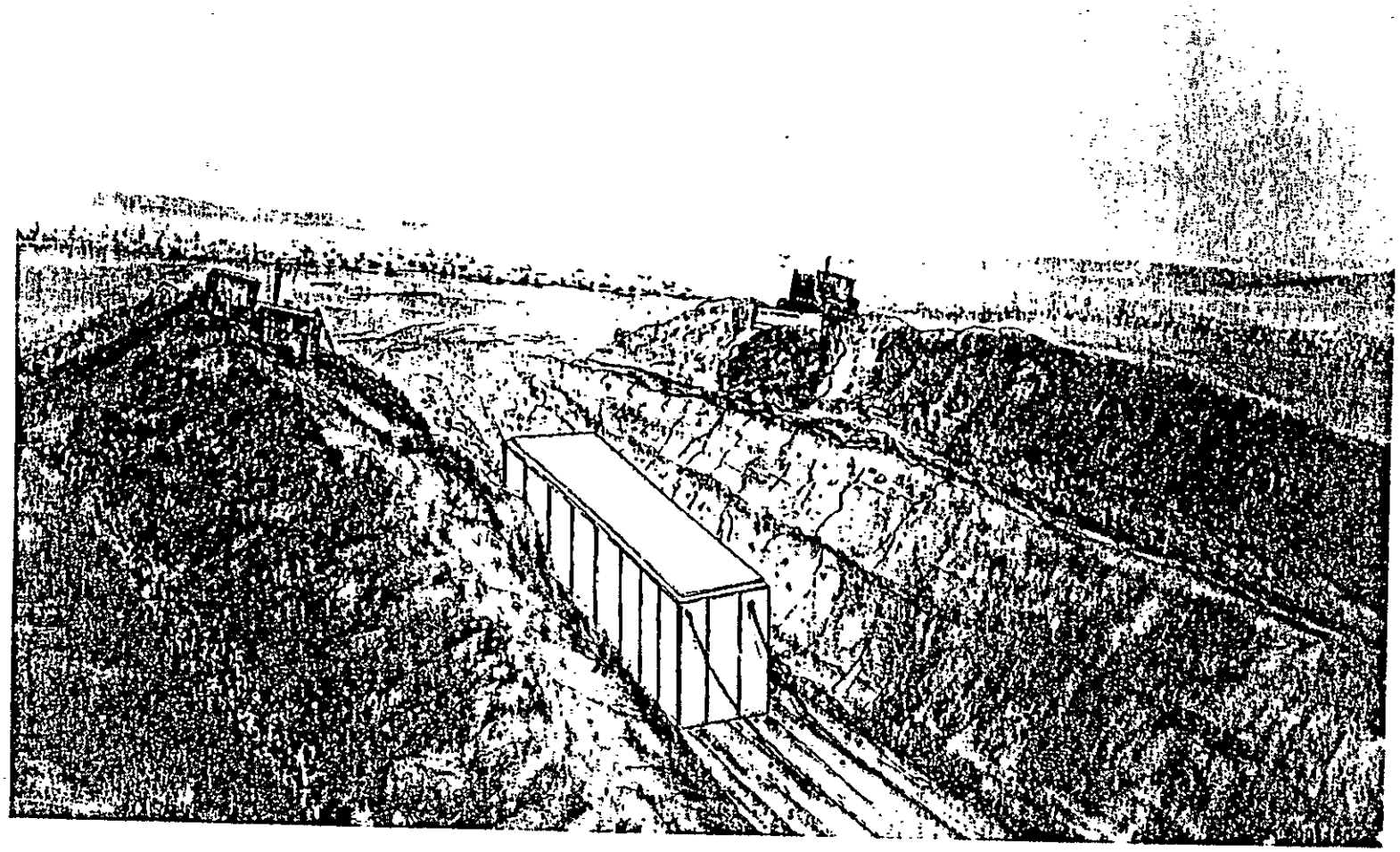

Figure E-7. Backfill of Trench by Bulldozers.

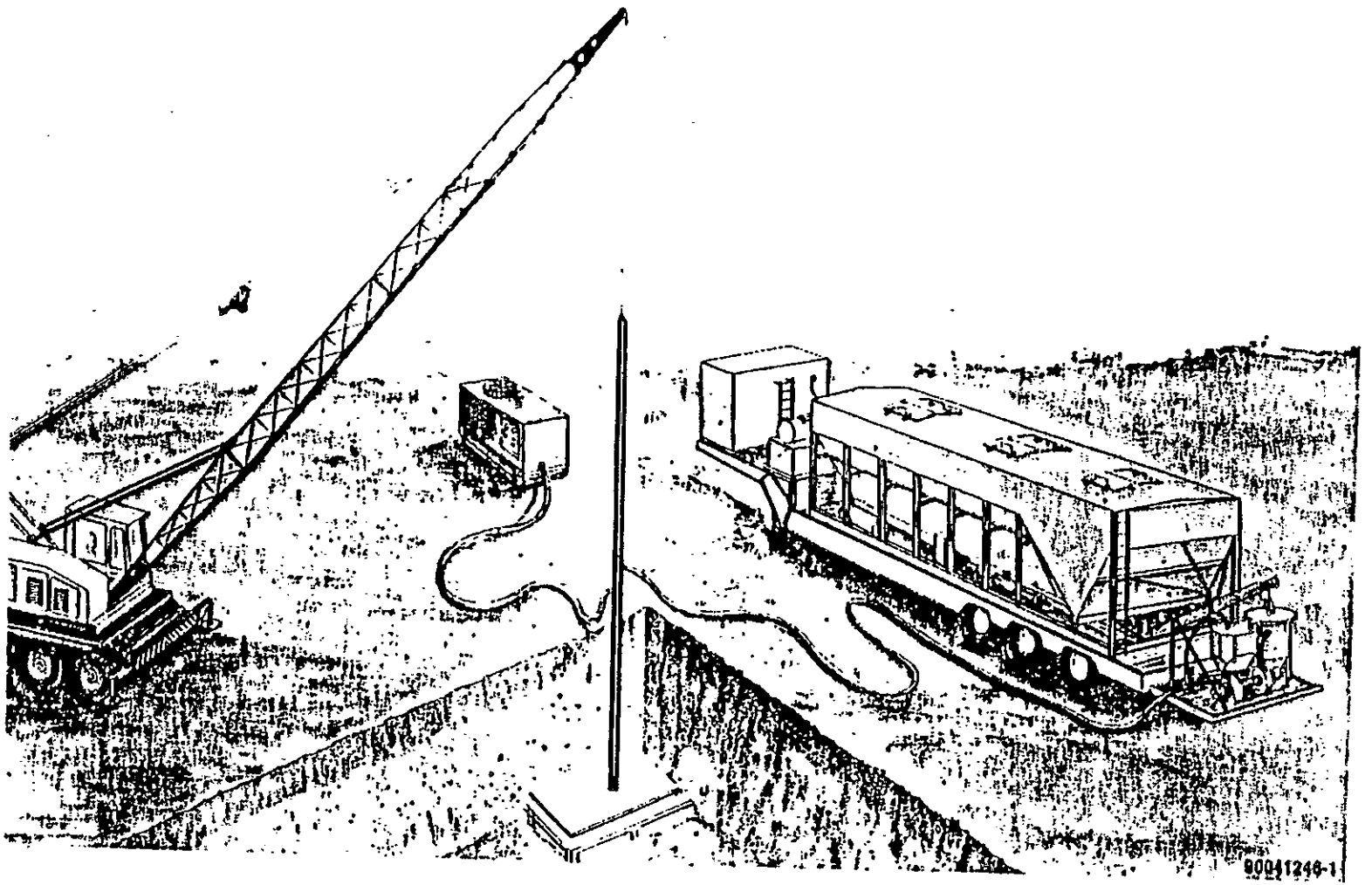

Figure E-8. Stabilization of Drag-Off Package.

APPENDIX F

DISPOSAL ALTERNATIVES COST ESTIMATES

This appendix contains the summary information for the estimated cost to implement each alternative. (The grout injection/gravel backfill alternative was assigned the same estimated cost as the grout injection alternative.) The costs are rough order of magnitude estimates.

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TPCN	Building No.	Project Title	ACTIVITY SUMMARY SHEET
Customer: Gravel Backfill	Description: Purex Tunnels Decommissioning		TYPE ESTIMATE: ☐ Study ☐ Conceptual ☐ Preliminary ☐ Final ☒ Other ROM
			WORK BY: ☐ FP ☒ Oper. Contr. ☐ CPAF
			Prepared By: E.S.
			Checked By: -
			Sheet No. 1 of 3
			Date 02/01/90

Reference Sheet No.	Description	Labor/ Benefits	Materials	Procurement Sub Contr.	Services	Equip. Usage	Total Direct Costs
	1.0 Remote Monitoring						
1.1	Engineer: Remote Monitoring Equipment	20,500	-	-	-	-	20,500
1.2	Development & Procure. of Remote Equip.	12,000	-	42,000	-	-	54,000
1.3	Fabricate and Modify Remote Equipment	24,000	-	20,000	-	-	44,000
	2.0 Install Remote Equipment						
2.1	Equipment Installation	36,640	-	-	-	960	37,600
2.2	Training	7,840	-	-	-	-	7,840
2.3	Aquisition Both Tunnels	111,360	-	-	-	5,000	116,360
2.4	Analyze Data From Both Tunnels	12,000	-	-	-	-	12,000
	3.0 Surface Preparation						
3.1	Engineering Procurement	4,000	-	10,000	-	-	14,000
3.2	Repair the Ventilation System	21,560	-	2,000	-	3,000	26,560
3.3	Restart and Adjust Ventilation System	11,600	-	-	-	3,200	14,800
3.4	Excavate to Expose the Tunnel Porthole	6,160	-	-	-	960	7,120
3.5	Penetrate Roof Tunnels/Install Risers	47,560	-	20,000	-	3,840	66,400
3.6	Backfill Around the Risers	7,600	-	-	-	960	8,560
		317,820		94,000		17,920	429,740

TPCN	Building No.	Project Title	ACTIVITY SUMMARY SHEET
Customer: Gravel Backfill	Description: Purex Tunnels Decommissioning		TYPE ESTIMATE: ☐ Study ☐ Conceptual ☐ Preliminary ☐ Final ☒ Other ROM
			WORK BY: ☐ FP ☒ Oper. Contr. ☐ CPAF
			Prepared By: ES; Checked By: -; Sheet No. 2 of 3; Date 02/01/90

Reference Sheet No.	Description	Labor/ Benefits	Materials	Sub Contr.	Services	Equip. Usage	Total Direct Costs
	Sub-Total from Sheet 1 of 3	317,820	-	94,000	-	17,920	429,740
	3.0 Surface Preparation						
3.7	Procure tower - Transfer belt, fill material - Construct tower.	-	-	1,091,000	-	-	1,091,000
3.8	Fabricate modifications for tower and rock stinger.	42,000	8,000	-	-	-	50,000
	4.0						
4.1	Isolate doors	9,808	1,000	-	-	1,000	11,808
4.2	Grout fill tunnel doors	5,024	18,920	1,440	-	1,000	26,384
4.3	Penetrate tunnel door towers/provide access	8,880	200	-	-	2,000	11,080
4.4	Decom. & demol. rail tunnel extention sump	198,448	6,000	-	32,000	120,000	356,448
	5.0 Backfill the tunnel						
5.1	Tunnel backfilling	-	-	488,930	-	-	488,930
5.2	Provide remote viewing	304,000	-	-	-	-	304,000
5.3	Grout injection	27,552	-	936,320	-	-	963,872
5.4	Grout fill ventilating system	32,896	8,320	-	16,400	-	57,616
	Sub-Total	946,428	42,440	2,611,690	48,400	141,920	3,790,878

TPCN	Building No.	Project Title	ACTIVITY SUMMARY SHEET
Customer: Gravel Backfill	Description: Purex Tunnels Decommissioning		TYPE ESTIMATE: ☐ Study ☐ Final ☐ Conceptual ☒ Other ☐ Preliminary ROM; WORK BY: ☐ FP ☒ Oper. Contr. ☐ CPAF; Prepared By: ES; Checked By: -; Sheet No. 3 of 3; Date 02/01/90

Reference Sheet No.	Description	Labor/ Benefits	Materials	Sub Contr.	Services	Equip. Usage	Total Direct Costs
	Sub-Total from sheet 2 of 3	946,428	42,440	2,616,690	48,400	141,920	3,790,879
	6.0 Preliminary Barrier Construction						
6.1	Cut & fill, assume 3' over tunnel area	28,000	-	-	-	24,000	52,000
	7.1 Ground Water Maintenance						
7.1	Design Engineering	10,000	-	-	-	-	10,000
7.2	6 Wells Drill wells - Sub-contract	-	-	900,000	-	-	900,000
7.3	Monitor Wells - 6 ea. yearly cost	-	-	-	60,000	-	60,000
	8.0 Move Equip. from tunnel 1 to tunnel II						
8.1	Reactivate tunnel doors	Zone - Mask Work 46,543	-	-	-	-	46,543
8.2	Engineer Fab., Procure grappler/remote camera	4,000	-	205,000	-	-	209,000
8.3	Install Retreivable Equipment & Test	24,160	-	-	-	2,000	26,160
8.4	Retrieve 6 Rail Cars Mask Work	61,378	-	-	-	-	61,378
8.5	Decom. tunnel & decon. Some mask work & burial	998,222	-	-	-	-	998,220
	Sub-Total	2,118,729	42,440	3,716,690	108,400	167,920	6,154,180

TPCN	Building No.	Project Title

Customer	Description
Gravel Backfill	Purex Tunnels Decommissioning

ACTIVITY SUMMARY SHEET

TYPE ESTIMATE		WORK BY		Sheet No.
☐ Study	☐ Final	☐ FP	☒ Oper. Contr.	1 of 1
☐ Conceptual	☒ Other		☐ CPAF	
☐ Preliminary	ROM	Prepared By: E.S.	Checked By: -	Date: 02/01/90

Reference Sheet No.	Description	Labor/ Benefits	Materials	Sub Contr.	Services	Equip. Usage	Total Direct Costs
	Sub-Total - Program Dollars	2,118,729	42,440	3,716,690	108,400	167,920	6,154,180
	Engineering 25% of Total	-	-	-	-	-	1,538,545
	Subtotal	-	-	-	-	-	7,692,725
	Contingency 35% of All Costs	-	-	-	-	-	2,692,454
	Total						0,395,179
			$10,000,000				

TPCN	Building No.	Project Title	ACTIVITY SUMMARY SHEET
Customer: Grout Injection	Description: Purex Tunnels Decommissioning		TYPE ESTIMATE: ☐ Study ☐ Conceptual ☐ Preliminary ☐ Final ☒ Other ROM WORK BY: ☐ FP ☒ Oper. Contr. ☐ CPAF Prepared By: ES Checked By: - Sheet No. 1 of 3 Date 02/02/90

Reference Sheet No.	Description	Labor/ Benefits	Materials	Sub Contr.	Services	Equip. Usage	Total Direct Costs
	1.0 Remote Monitoring						
1.1	Engineering Remote Equipment	-	-	-	-	-	20,500
1.2	Procure Remote Equipment	-	-	-	-	-	54,000
1.3	Fab. and Modify Remote Equipment	-	-	-	-	-	44,000
1.4	Remote Equipment Installation	-	-	-	-	-	37,600
1.5	Training	-	-	-	-	-	7,840
1.6	Acquisition Both Tunnels	-	-	-	-	-	116,360
1.7	Analyze Data	-	-	-	-	-	12,000
	2.0 Surface Work	-	-	-	-	-	
2.1	Prepare surface Area for Grouting						11,680
2.2	Decon. Ventilating System	-	-	-	-	-	64,360
2.3	Isolate Tunnel Doors and Grout Fill	-	-	-	-	-	38,192
2.4	Cut access doors in above & grade towers	-	-	-	-	-	11,080
~~2.5~~	~~Decon. Towers~~	-	-	-	-	-	66,000
2.6	Decommission Door Towers	-	-	-	-	-	15,920
2.7	Decon - Rail Tunnel (Extention)						
2.8	Demolish the Rail Tunnel Extension	-	-	-	-	-	358,448
							857,980

TPCN	Building No.	Project Title

Customer	Description
Grout Injection	Purex Tunnels Decommissioning

ACTIVITY SUMMARY SHEET

TYPE ESTIMATE: ☐ Study ☐ Conceptual ☐ Preliminary ☒ Final ☐ Other ROM

WORK BY: ☐ FP ☒ Oper. Contr. ☐ CPAF

Prepared By: ES | Checked By: - | Sheet No. 2 of 3 | Date 02/02/90

Reference Sheet No.	Description	Labor/ Benefits	Materials	Sub Contr.	Services	Equip. Usage	Total Direct Costs
	Sub-Total from Page 1 of 3	-	-	-	-	-	857,980
	3.0						
3.1	Procure grouting material	-	-	-	-	-	5,888,000
3.2	Cut & Grade Roadway & Laydown Area	-	-	-	-	-	14,640,000
3.3	Set up portable generator & support equ	p. -	-	-	-	-	129,920
3.4	Build and set up greenhouse	-	-	-	-	-	28,000
	4.0 Tunnel Grout Injection						
4.1	Proceed with Grout Injection	-	-	-	-	-	516,400
4.2	Plug grout injection penetrations	-	-	-	-	-	92,000
4.3	Demobilize	-	-	-	-	-	3,872
	5.0 Barrier Construction						
5.1	Place one meter fill over tunnels						
5.2	Grade for drainage		-	-	-	-	52,000
	Sub-Total						7,438,956

TPCN	Building No.	Project Title	ACTIVITY SUMMARY SHEET			
Customer: Grout Injection	Description: Purex Tunnels Decommissioning		TYPE ESTIMATE: ☐ Study ☐ Conceptual ☐ Preliminary ☐ Final ☒ Other ROM	WORK BY: ☐ FP ☒ Oper. Contr. ☐ CPAF	Prepared By: ES	Checked By: -	Sheet No. 3 of 3	Date 02/02/90

Reference Sheet No.	Description	Labor/ Benefits	Materials	Sub Contr.	Services	Equip. Usage	Total Direct Costs
	Sub-Total from sheet 2 of 3	-	-	-	-	-	7,438,956
	6.0 Ground Water Monitoring						
6.1	Design Wells	-	-	-	-	-	10,000
6.2	Drill 6 wells	-	-	-	-	-	900,000
6.3	Well monitoring 6 wells/yearly cost						60,000
	7.0 Move Equipment from Tunnel 1 to Tunnel 2						
7.1	Reactivate Tunnel Doors Ventilation System-Design Grappler						46,543
7.2	Procure Camera and Grappler	-	-	-	-	-	207,000
7.3	Install Retrieval Equipment	-	-	-	-	-	26,110
7.4	Retrieve Rail Cars from Tunnel 1 and Place in Tunnel 2						61,378
7.5	Decon. and Decommission Tunnel 1	-	-	-	-	-	898,220
							9,650,203

TPCN	Building No.	Project Title

Customer	Description
Grout Injection	Purex Tunnels Decommissioning

ACTIVITY SUMMARY SHEET

TYPE ESTIMATE	WORK BY	Sheet No.
☐ Study ☐ Final ☐ Conceptual ☒ Other ☐ Preliminary ROM	☐ FP ☒ Oper. Contr. ☐ CPAF	1 of 1
Prepared By: ES	Checked By: -	Date: 02/02/90

Reference Sheet No.	Description	Labor/ Benefits	Materials	Sub Contr.	Services	Equip. Usage	Total Direct Costs
	Sub-Total · Program Dollar	-	-	-	-	-	9,680,203
	Engineering 25%	-	-	-	-	-	2,412,551
	Contingency 35%	-	-	-	-	-	2,067,574
							4,221,964
							16,784,538
			$16,000,000				

TPCN	Building No.	Project Title

Customer	Description
PUREX Plant Disposal	Purex Tunnels Decommissioning

ACTIVITY SUMMARY SHEET

TYPE ESTIMATE		WORK BY		Sheet No.
☐ Study	☐ Final	☐ FP	☒ Oper. Contr.	1 of 2
☐ Conceptual	☒ Other		☐ CPAF	
☐ Preliminary	ROM	Prepared By: ES	Checked By: -	Date: 02/10/90

Reference Sheet No.	Description	Labor/ Benefits	Materials	Sub Contr.	Services	Equip. Usage	Total Direct Costs
1.1	Engineer Remote Equipment	20,500	-	-	-	-	20,500
1.2	Procure Remote Equipment	12,000	42,000	-	-	-	54,000
1.3	Fabricate-Modify Remote Application	24,000	20,000	-	-	-	44,000
1.4	Personnel Training	7,480	-	-	-	-	7,480
1.5	Install Remote Equipment	36,640	-	-	-	960	37,600
1.6	Acquisition Tunnels	111,360	-	-	-	5,000	116,360
1.7	Analyze Data	12,000	-	-	-	-	12,000
2.1	Remote Monitoring	34,320	-	-	181,966	3,000	219,286
2.2	Remove Failed Equipment	718,080	-	-	150,000	50,000	918,080
2.3	Grout the Process Cells	8,560	10,000	-	37,368	200	56,128
2.4	Grout Failed Equip. in Canyon Area	56,128				-	56,128
2.5	Fill the Canyon with Grout	499,200	-	-	19,662,960	10,240	20,172,400
2.6	Decon. Tunnel	679,488	-	-	163,424	9,600	852,512
2.7	Remove 6" of Soil/Grout Tunnels Surface	902,720	360,000	-	2,450,000	133,000	3,845,840
2.8	Decon. 25 Rail Cars	234,000	6,400	-	41,460	40,000	321,860
	Sub-Total	3,356,476	438,400	-	22,681,178	252,120	26,734,174

TPCN	Building No.	Project Title

Customer	Description
PUREX Plant Disposal	Purex Tunnels Decommissioning

ACTIVITY SUMMARY SHEET

TYPE ESTIMATE	WORK BY	Sheet No.
☐ Study ☐ Final ☐ Conceptual ☒ Other ☐ Preliminary ROM	☐ FP ☒ Oper. Contr. ☐ CPAF	2 of 2
	Prepared By: ES	Checked By: -
		Date: 02/10/90

Reference Sheet No.	Description	Labor/ Benefits	Materials	Sub Contr.	Services	Equip. Usage	Total Direct Costs
	Brought Forward from Sheet 1 of 2	3,356,476	438,400	-	22,687,178	252,120	26,738,174
3.1	Well Design Engineering	10,000	-	-	-	-	10,000
3.2	Drill Wells - 6 each	-	-	900,000	-	-	900,000
3.3	Monitor 6 wells - Yearly Cost	-	-	-	60,000	-	60,000
4.1	Reactivate Tunnel doors-Grappler/Camera	-	-	-	46,543	-	46,543
4.2	Procure Remote Camera & Grappler	209,000	-	-	-	-	209,000
4.3	Install Retreivable Equipment	26,160	-	-	-	-	26,160
4.4	Retrieve 6 Rail Cars from Tunnel 1 Place in Tunnel 2	61,378	-	-	-	-	61,378
4.5	Decon. Tunnel 1 and Decommission Tunnel 1 by Collapsing Tunnel in place	998,220	-	-	-	-	998,220
		4,661,234	438,400	900,000	22,793,721	252,120	29,049,475

TPCN	Building No.	Project Title

Customer	Description
PUREX Plant Disposal	Purex Tunnels Decommissioning

ACTIVITY SUMMARY SHEET

TYPE ESTIMATE		WORK BY		Sheet No.
☐ Study	☐ Final	☐ FP	☒ Oper. Contr.	1 of 1
☐ Conceptual	☒ Other		☐ CPAF	
☐ Preliminary	ROM	Prepared By: ES	Checked By: -	Date: 02/10/90

Reference Sheet No.	Description	Labor/ Benefits	Materials	Sub Contr.	Services	Equip. Usage	Total Direct Costs
	Sub-Total	-	-	-	-	-	29,049,475
	Engineering 25%	-	-	-	-	-	7,267,369
	Sub-Total	-	-	-	-	-	36,311,844
	Contingency 35%	-	-	-	-	-	12,709,145

TPCN	Building No.	Project Title

Customer	Description
PUREX Plant Process	Purex Tunnels Decommissioning

ACTIVITY SUMMARY SHEET

TYPE ESTIMATE: ☐ Study ☐ Conceptual ☐ Preliminary ☐ Final ☒ Other ROM

WORK BY: ☐ FP ☒ Oper. Contr. ☐ CPAF

Prepared By: ES | Checked By: - | Date: 02/12/90 | Sheet No. 1 of 2

Reference Sheet No.	Description	Labor/ Benefits	Materials	Sub Contr.	Services	Equip. Usage	Total Direct Costs
1.1	Engineer Remote Equipment	20,500	-	-	-	-	20,500
1.2	Procure Remote Equipment	12,000	42,000	-	-	-	54,000
1.3	Fabricate & Modify Remote Equipment	24,000	20,000	-	-	-	44,000
2.1	Engineering and Design	104,000	10,000	-	-	-	144,000
2.2	Procure Remote Handling Equipment	-	-	-	50,000	250,000	300,000
2.3	Modify Canyon Cell	-	-	-	-	-	1,004,000
2.4	Personnel Training & Equip. Testing	30,880	-	-	-	-	30,880
2.5	Modify Testing Results	32,320	20,000	15,000	-	-	67,320
3.1	Decon. Tunnel	756,288	19,200	-	163,424	9,600	948,512
3.2	Remove 6" of Tunnel surface soil	902,720	360,000	-	2,450,000	133,120	3,989,090
3.3	Decon. 25 Rail Cars	234,000	6,400	-	41,460	40,000	321,860
4.1	Decon. Equipment	919,360	-	-	132,000	350,000	1,401,360
4.2	Dismantle and Size Reduction	919,360	-	-	132,000	350,000	3,402,720
4.3	Analyse Waste	1,000,000	-	-	-	-	1,000,000
4.4	Waste Classification	35,200	-	-	-	-	35,000
4.5 & 4.6	Waste Segregation/Waste Packaging	1,177,280	114,000	-	3,614,400	120,000	5,029,408
	Sub-Total	6,167,908	595,600	15,000	6,583,284	1,252,720	14,614,512

TPCN	Building No.	Project Title	ACTIVITY SUMMARY SHEET
Customer: PUREX Plant Process	Description: Purex Tunnels Decommissioning		TYPE ESTIMATE: ☐ Study ☐ Conceptual ☐ Preliminary ☐ Final ☒ Other ROM
			WORK BY: ☐ FP ☒ Oper. Contr. ☐ CPAF
			Prepared By: ES; Checked By: -; Sheet No. 2 of 2; Date 02/12/90

Reference Sheet No.	Description	Labor/ Benefits	Materials	Sub Contr.	Services	Equip. Usage	Total Direct Costs
	Sub-Total From Page 1 of 2	6,167,908	595,600	15,000	6,583,284	1,252,720	14,614,512
4.7	Transport Tru Waste Wrap/Ship to WIPP	71,105	5,000	-	8,990,000	30,000	9,592,310
4.8	Transport Mixed Waste to WRAP						
4.9	WRAP Treatment Disposal/Storage	161,920	10,000	-	17,001,852	60,000	17,233,772
4.10	LLW High Activity	73,600	5,000	-	1,601,000	30,000	1,714,600
4.11	Potential Special Waste Greater than Class C	161,720	20,000	-	5,607,500	60,000	5,949,470
	Sub-Total	6,636,453	635,600	15,000	39,783,736	1,432,720	49,004,661

TPCN	Building No.	Project Title

Customer	Description
PUREX Plant Process	Purex Tunnels Decommissioning

ACTIVITY SUMMARY SHEET

TYPE ESTIMATE: [ ] Study [ ] Final [ ] Conceptual [ ] Other [X] Preliminary

WORK BY: [ ] FP [X] Oper. Contr. [ ] CPAF

Prepared By: ES | Checked By: - | Date: 02/14/90 | Sheet No. 1 of 1

Reference Sheet No.	Description	Labor/ Benefits	Materials	Sub Contr.	Services	Equip. Usage	Total Direct Costs
	Sub-Total						49,000,000
	Engineering 25%	-	-	-	-	-	12,250,000
	Sub-Total	-	-	-	-	-	61,250,000
	Contingencies 35%	-	-	-	-	-	21,437,500
							82,687,500
		82,000,000					

TPCN	Building No.	Project Title: Purex Tunnels	ACTIVITY SUMMARY SHEET		
Customer: WRAP Facility		Description: Decommissioning	TYPE ESTIMATE: ☐ Study ☐ Conceptual ☐ Preliminary ☐ Final ☒ Other ROM	WORK BY: ☐ FP ☒ Oper. Contr. ☐ CPAF; Prepared By / Checked By	Sheet No. 1 of 2; Date 02/08/90

Reference Sheet No.	Description	Labor/ Benefits	Materials	Sub Contr.	Services	Equip. Usage	Total Direct Costs
	1.0 Monitoring						
1.1	Engineering	20,500					20,500
1.2	Develop & Procure Remote Equipment	17,000				42,000	54,000
1.3	Fab & Modify Remote Equipment	24,000	20,000				44,000
	2.0 Modify Canyon Area						
2.1	Engineering & Design	104,000	10,000				114,000
2.2	Procure Remote Handling Equipment	300,000					300,000
2.3	Construction Modify Canyon Area						1,004,000
2.4	Personnel Training						30,800
2.5	Modify Testing Results	32,320	20,000			15,000	67,320
	3.0 Retrieve Failed Equipment from Tunnels						
3.1	Reactivate Tunnel Doors						46,543
3.2	Procure Remote Camera & Grappler	209,000					209,000
3.3	Install Retrieval Equipment						26,110
3.4	Remote Monitor Rad levels						116,360
3.5	Decon both Tunnels						948,512
	SUBTOTAL						2,981,145

TPCN	Building No.	Project Title: Purex Tunnels	ACTIVITY SUMMARY SHEET
Customer: WRAP Facility	Description: Decommissioning		TYPE ESTIMATE: ☐ Study ☐ Final ☐ Conceptual ☒ Other ☐ Preliminary ROM
			WORK BY: ☐ FP ☒ Oper. Contr. ☐ CPAF
			Prepared By / Checked By
			Sheet No. 2 of 2
			Date 02/13/90

Reference Sheet No.	Description	Labor/ Benefits	Materials	Sub Contr.	Services	Equip. Usage	Total Direct Costs
	Subtotal from Page 1 of 2						2,981,145
	3.0 Retrieve Failed Equipment						
3.6	Remove 6" of Tunnel Surface						3,989,009
3.7	Decon 25 Railcars						320,000
3.8	Transport cars to Safe Storage	83,600				25,000	108,600
	4.0 Equipment Size Reduction						
4.1	Decon Equipment	919,360			132,000	350,000	1,401,360
4.2	Dismantle Equipment	919,360			132,000	650,000	1,701,360
4.3	Package Waste	1,177,280	118,000		3,614,400	120,000	5,029,680
4.4	Transport to WRAP & ship to WIPP	71,105	5,000		8,990,050	30,000	9,096,155
4.5	Transport Mixed Waste to WRAP						
4.6	WRAP Treatment & Disposal Storage	161,920	10,000		26,207,102	60,000	26,439,022
4.7	LLW Activity						
4.8	LLW High Activity	32,000 cubic feet					12,800,000
							63,866,412

TPCN	Building No.	Project Title: Purex Tunnels	ACTIVITY SUMMARY SHEET		
Customer: WRAP Facility		Description: Decommissioning	TYPE ESTIMATE: ☐ Study ☐ Conceptual ☐ Preliminary ☐ Final ☒ Other ROM	WORK BY: ☐ FP ☒ Oper. Contr. ☐ CPAF	Sheet No. 1 of 1
				Prepared By	Checked By	Date 02/13/90

Reference Sheet No.	Description	Labor/ Benefits	Materials	Sub Contr.	Services	Equip. Usage	Total Direct Costs
	Subtotal						63,866,412
	Engineering 25%						15,966,603
	Subtotal						79,833,015
	Contingency 35%						27,941,555
							107,774,570

TPCN	Building No.	Project Title: Purex Tunnels	ACTIVITY SUMMARY SHEET		
Customer: Offsite Processing		Description: Decommissioning	TYPE ESTIMATE: ☐ Study ☐ Final ☐ Conceptual ☐ Other ☐ Preliminary ROM	WORK BY: ☐ FP ☐ Oper. Contr. ☐ CPAF	Sheet No. 1 of 2
				Prepared By / Checked By	Date 02/13/90

Reference Sheet No.	Description	Labor/ Benefits	Materials	Sub Contr.	Services	Equip. Usage	Total Direct Costs
	1.0 Remote Monitoring						
1.1	Engineering	20,500					20,500
1.2	Develop & Procure Remote Equipment	12,000	42,000				54,000
1.3	Fab & Modify Remote Equipment	24,000	20,000				44,000
	2.0 Install Remote Equipment						
2.1	Training	7,840					7,840
2.2	Equipment Installation	36,640				960	37,600
2.3	Acquisition Tunnels	111,360				5,000	116,360
2.4	Analyze Data	12,000					12,000
	3.0 Retrieve Failed Equipment						
3.1	Reactivate Tunnel Doors						46,543
3.2	Procure Remote Camera & Grappler						209,000
3.3	Install Retrieval Equipment						26,110
3.4	Remote Monitor Rad Levels						116,360
3.5	Remove Failed Equipment						918,080
	SUBTOTAL						1,608,393

TPCN	Building No.	Project Title: Purex Tunnels	ACTIVITY SUMMARY SHEET		
Customer: Offsite Processing	Description: Decommissioning		TYPE ESTIMATE: ☐ Study ☐ Final ☐ Conceptual ☐ Other ☐ Preliminary ROM	WORK BY: ☐ FP ☐ Oper. Contr. ☐ CPAF	Sheet No. 2 of 2
				Prepared By / Checked By	Date 02/13/90

Reference Sheet No.	Description	Labor/ Benefits	Materials	Sub Contr.	Services	Equip. Usage	Total Direct Costs
	Subtotal from Page 1 of 2						1,608,393
	3.0 Retrieve Failed Equipment						
3.6	Remove Rail cars and Decon						321,860
3.7	Transport Rail Cars to Safe Storage						108,600
	4.0 Equipment Size Reduction						
4.1	Decon Equipment						1,401,360
4.2	Size Reduction, Dismantle equipment						3,402,720
4.3	Analyze Waste						1,000,000
4.4	Package waste						5,029,408
4.5	Transport Waste to WRAP; ship to WIPP	Class C Waste	7,000	cubic feet			5,847,470
4.6	Transport Waste offsite for disposal	Mixed Waste	18,000	cubic feet			17,233,772
		TRU Waste	7,000	cubic feet			9,592,310
		LLW	32,000	cubic feet			1,714,600
							47,260,493

TPCN	Building No.	Project Title
		Purex Tunnel

Customer	Description
Offsite Processing	Decommissioning

ACTIVITY SUMMARY SHEET

TYPE ESTIMATE	WORK BY	Sheet No.
☐ Study ☐ Final ☐ Conceptual ☒ Other ROM ☐ Preliminary	☐ FP ☒ Oper. Contr. ☐ CPAF	1 of 1
Prepared By	Checked By	Date 02/14/90

Reference Sheet No.	Description	Labor/ Benefits	Materials	Sub Contr.	Services	Equip. Usage	Total Direct Costs
	Subtotal						47,260,493
	Engineering 25%						11,815,123
	Subtotal						59,075,616
	Contingency 35%						20,676,465
							79,752,081

TPCN	Building No.	Project Title: Purex Tunnels	ACTIVITY SUMMARY SHEET		
Customer: New Facility		Description: Decommissioning	TYPE ESTIMATE: ☐ Study ☐ Conceptual ☐ Preliminary ☐ Final ☐ Other ROM	WORK BY: ☐ FP ☐ Oper. Contr. ☐ CPAF; Prepared By / Checked By	Sheet No. 1 of 2; Date 02/14/90

Reference Sheet No.	Description	Labor/ Benefits	Materials	Sub Contr.	Services	Equip. Usage	Total Direct Costs
	1.0 Remote Monitoring						
1.1	Engineering	20,500					20,500
1.2	Procure & Develop	12,000	42,000				54,000
1.3	Fab & Modify Remote Application	24,000	20,000				44,000
1.4	Install Remote Equipment	36,640				960	37,600
1.5	Personnel Training	7,480					7,480
1.6	Acquisition both Tunnels	111,360				5,000	116,360
1.7	Analyze Data for both Tunnels	12,000					12,000
	2.0 Design & Build a New Processing Facility						100,000,000
	3.0 Retrieve Tunnel Equipment and Rail Cars & Place in new Facility for Processing						
3.1	Eng. & Design Remote Retrieval Equip.						156,000
3.2	Procure, Fab, & Test						313,120
3.3	Personnel Training	9,440					9,440
3.4	Retrieve Equip. & Rail Cars	852,800	100,000		128,000	244,000	1,324,800
	SUBTOTAL						102,095,300

TPCN	Building No.	Project Title: Purex Tunnels	ACTIVITY SUMMARY SHEET			
Customer: New Facility		Description: Decommissioning	TYPE ESTIMATE: ☐ Study ☐ Conceptual ☐ Preliminary ☐ Final ☑ Other ROM	WORK BY: ☐ FP ☑ Oper. Contr. ☐ CPAF	Prepared By	Checked By	Sheet No. 2 of 2	Date 02/14/90

Reference Sheet No.	Description	Labor/ Benefits	Materials	Sub Contr.	Services	Equip. Usage	Total Direct Costs
	Subtotal from Page 1 of 2						102,095,300
	4.0 Equipment Processing & Disposal						
4.1	Decon Tunnel Equipment & Rail Cars						1,722,360
4.2	Size Reduction Dismantling						3,402,720
4.3	Analyze Waste						1,000,000
4.4	Waste Classification						35,200
4.5	Waste Segregation						
4.6	TRU Packaging						5,029,408
4.7	Process at WRAP and Ship to WIPP	7,000 cubic	feet				9,592,310
4.8	Package Mixed and Transport to WRAP						
4.9	Treatment and Disposal	18,000 cubic	feet				17,233,772
4.10	LLW High Activity						
4.11	LLW Low Activity	42,000 cubic	feet				1,716,600
4.12	Potential Greater than Class (C)	7,000 cubic	feet				5,849,470
							147,677,140

TPCN	Building No.	Project Title: Purex Tunnels	ACTIVITY SUMMARY SHEET		
Customer: New Facility		Description: Decommissioning	TYPE ESTIMATE: ☐ Study ☐ Conceptual ☐ Preliminary ☐ Final ☒ Other ROM	WORK BY: ☐ FP ☒ Oper. Contr. ☐ CPAF	Sheet No. 1 of 1
				Prepared By / Checked By	Date 02/14/90

Reference Sheet No.	Description	Labor/ Benefits	Materials	Sub Contr.	Services	Equip. Usage	Total Direct Costs
	Subtotal						147,677,140
	Engineering 25%						36,919,285
	Subtotal						184,596,425
	Contingency 35%						64,608,749
							249,205,174

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