1221039

Final

Meeting Minutes Transmittal/Approval
Unit Managers Meeting: Grout Treatment Facility

Meeting Held June 26, 1991
Richland, Washington

Appvl. Not Present Date:
Clifford E. Clark, Environmental Policy and Permitting, DOE-RL

Appvl. Daniel L. Duncan Date: 8/09/91
Daniel L. Duncan, EPA Region X Unit Manager

Appvl. Date: 8/9/91
Ralph Wood, Unit Manager, Contractor Representative, WHC

Appvl. Susan M. Price Date: 8/9/91
Susan M. Price, RCRA Permitting, Contractor Representative, WHC

Appvl. Date: 8/9/91
Joseph Witczak, Unit Manager, Washington State Department of Ecology

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PURPOSE:
Meeting Minutes are attached. These minutes are from the April Unit Managers Meeting held ~~5-30-91.~~ 6-26-91 J.S. Minutes are comprised of the following:

Attachment 1 - Summary of Discussion and Commitments
Attachment 2 - Attendance List
Attachment 3 - Agenda
Attachment 4 - Action Items List with Status
Attachment 5 - Drawing of Proposed Vault Cutaway Model
Attachment 6 - Engineering Change Notices
Attachment 7 - Drawing Package for Closure of Vault Piping
Attachment 8 - Grout Monthly Status Report
Attachment 9 - Current NOD Table

TD-2-1

Distribution:

R.M. Carosino	DOE-RL (A4-52)
C.E. Clark	DOE-RL (A6-95)
M.W. Cline	WHC (R1-48)
M. Dev	DOE-RL (A6-80)
L.P. Diediker	WHC (T1-30)
D.L. Duncan	EPA (HW-074)
C.J. Geier	WHC(H4-57)
D.W. Hendrickson	WHC (R1-48)
J.S. Hill	WHC (H4-57)
R.D. Izatt	DOE-RL (A6-95)
G.W. Jackson	WHC (R4-01)
D.A. Jones	WHC (H4-16)
K.S. McCullough	WHC (N1-83)
T.M. Michelena	Ecology
L.L. Powers	WHC (B2-35)
S.M. Price	WHC (H4-57)
M. Jaraysi	Ecology
J.E. Van Beek	WHC (R3-27)
T.B. Veneziano	WHC (B2-35)
J.A. Voogd	WHC (R4-03)
J.L. Waite	WHC (B2-35)
G.F. Williamson	WHC (R4-01)
J.J. Witczak	Ecology
G.D. Wright	WHC. (R3-09)

ADMINISTRATIVE RECORD (Grout Treatment Facility, TD-2-1)
[Care of Susan Wray, WHC (H4-22C)]

Washington State Department of Ecology, Nuclear And Mixed Waste Library, Mail Stop PV-11

Attachment #1

Grout Treatment Facility
Unit Managers Meeting

EPA Office
Seattle, Washington
June 26, 1991

Summary of Discussion and Commitments

Agenda Items

1. A drawing of the proposed vault cutaway model (Attachment 5) was provided to all the attendees of the meeting and discussed. It was suggested by Joe Witczak (Ecology) that samples of the different materials accompany the model when it completed and used for public review.

2. Discussion of Engineering Change Notices (ECN)

   A package of Engineering Change Notices (Attachment 6) was handed out and discussed. The package included ECN numbers B-714-84 and B-714-86.

   ECN B-714-84 extends the length of the riser out of the cover panel to ensure proper clearance above the diffusion barrier. This ECN also modifies the thermocouple pull box to one suitable for above grade installation and accessibility. The previous design change to the diffusion barrier making it an asphalt concrete (AC) material required the thermocouple pull box to be raised above grade, as the box would not have been accessible buried within the AC.

   ECN B-714-86 modifies the call out for the pipeline encasement leak detection sensing cable "Trace-Tek" to reflect a new "low profile" cable which is suitable for making field; versus factory connection, of the spool pieces. This will greatly ease the installation process. This design change reflects the same cable type in which Ecology was informally provided manufacturers data on a few months ago.

   In addition to the ECNs above, three other ECNs were provided at the meeting. These were ECN numbers: 129080, 130602, and 130604.

3. Vault Piping Closure Plan

   A package of drawings depicting the plans for closure of vault piping was handed out (Attachment 7) and a discussion on the subject was led by Dean Powell (WHC).

4. Core Sampling

Procurement of a core sampling rig has been initiated by WHC. It will be similiar to the double shell tank core drilling rig that was built in California. Specifications for the truck, drilling rig, and turntable have been written. A special equipment request has been signed by DOE.

5. Grout Monthly Status Report

A monthly status report (Attachment 8) was provided at the meeting.

6. Discuss NOD Comments/Responses

Current NOD tables (Attachment #9) were provided and discussed at the meeting.

During the meeting, it was clarified that the grout facility will be fenced and access will be limited to access through security gates only.

If the fences are properly marked to establish that there is radiation in the area, as is done with tank farms, Joe Witczak (Ecology) indicated that the NOD #8 requirement for labeling distribution piping would be dropped. He stated that the permit application should indicate that a security fence will be set up, it (the facility) won't be a common area, and only grout facility personel will have access. Therefore, piping within the area will not have to be marked. If words to this effect are in the permit, Joe Witcak (Ecology) stated he would agree.

The labeling of transfer piping still needs to be determined to close NOD #6. This issue may be handled as a sitewide issue or on a case by case basis.

Rewording for NOD #9 was discussed and concurrence should be reached when the wording is changed.

Concurrence on NOD #17 was reached during the meeting.

For NOD #20, Joe Witczak (Ecology) sent a document out for external review and expects to have feedback by the next unit managers meeting.

Comments on NOD #25 were incorporated as suggested by Joe Witczak (Ecology).

For NOD #26, Joe Witczak (Ecology) did not want 60 day deadlines that resulted in approval by lack of response by Ecology. He agreed that when Ecology approval is in the critical path, some responsibility should be taken by Ecology to respond. A possible compromise was discussed. This compromise would be that the permit would acknowledge that Ecology's approval to proceed is required to meet TPA milestones and planning of grout construction recognizes a 60 day turnaround under normal circumstances. In the event that Ecology anticipates more than 60 days will be required, Ecology will notify DOE/WHC that more time will be needed. Proposed wording will be forwarded to Ecology for review. A similar approach will be used for NOD #27.

WHC will supply a report to Ecology in response to NOD #29.

Concurrence was reached on NOD #32 in that the limit was changed to 200 psi.

Concurrence was reached on NOD #36.

NOD #56 is being reviewed by Joe Witczak (Ecology).

NOD's #142 and #143 are being worked on by WHC.

With regards to NOD #175, Joe Witczak (Ecology) indicated that QA/QC procedures need to be developed for non-standard operations specific to the grout project that are not covered by the sitewide QA/QC plan.

Joe Witczak (Ecology) stated that he would be satisfied for the time being if a maximum volume was supplied with regards to NOD #191.

NOD #227 requires further review by Joe Witczak (Ecology).

Concurrence was reached on NOD #233 with regards to the timing of notification.

Concurrence was reached on NOD #246 in that 10 gallons per day will be used since 5 gallons per day cannot be detected by the equipment.

Concurrence was reached on NOD #247.

NOD #250 is being reviewed by Joe Witczak (Ecology).

Concurrence was reached on NOD's #251 and NOD #263.

Information needs to be supplied to Joe Witczak (Ecology) to close NOD #268.

NOD's #273 and #274 were briefly discussed, but no conclusions were made.

NOD #287 requires further review by Joe Witczak (Ecology).

NOD #288 is deffered to sitewide issues.

Concurrence was reached on NOD's #291, #295, #298, and #301.

In summary, approximately 20 NODs require further resolution of issues. There were 13 out of 33 NOD's closed at this meeting.

The next meeting will take place on July 26, 1991 in Richland, Washington.

Attachment 2

Grout Treatment Facility
Unit Managers Meeting
June 26, 1991

Attendance List

NAME	ORGANIZATION	PHONE #
R. Bowman	WHC	(509) 376-4876
S. Briggs	WHC	(509) 373-2991
M. Cline	WHC	(509) 376-9739
S. Hill	WHC	(509) 376-1674
M. Jaraysi	Ecology	(206) 546-2995
J. King	SWEC	(509) 376-4726
D. Powell	WHC	(509) 373-5713
J. Schmitz	DOE	(509) 376-2186
J. Steude	SWEC	(509) 376-8205
J. Witczak	Ecology	(206) 438-7557
R. Wood	WHC	(509) 373-4731
T. Woebkenberg	SWEC	(509) 376-1177

Attachment 3

AGENDA - GROUT TREATMENT FACILITY UNIT MANAGER'S MEETING

DATE: June 26, 1991
TIME: 14:30 - 16:00
PLACE: EPA Office - Richland, Washington

1. Sign-off Outstanding Meeting Minutes
2. Engineering Change Notices
3. Piping Closure Plan
4. Core Sampling
5. Discuss NOD comments and/or responses
6. Assign/Discuss Action Items

Attachment 4

Grout Treatment Facility Unit Managers Meeting

Commitments/Agreements Status (Status date: 6/26/91)

ACTION ITEM	COMMITMENTS/AGREEMENTS STATUS LIST
4-29-91:1	Determine the status of the December, January, and February minutes. Action: John Steude and Joe King (SWEC) CLOSED (6-26-91) Missing minutes were sent to DOE for distribution.
4-29-91:2	Determine the procedure for referencing dates for Dangerous Waste Regulations in the permit. Action: Joe Witczak (Ecology) CLOSED (6-26-91)
4-29-91:3	Provide vendor information for the leak detection cable in ECN B-714-74 to Ecology. Action: Steve Briggs (WHC) CLOSED (5-30-91) See Attachment 8.
3-22-91:1	The final report on the radiation test results will be given to Joe Witczak (Ecology) and Dan Duncan (EPA) as soon as it is available. Action: WHC CLOSED (6-26-91)
1-29-91:1	WHC and DOE will provide greater detail on the practical quantitation limits and the relationship with the contract laboratory procedures by the next Unit Managers Meeting. Action: Jeff Voogd. CLOSED (3-22-91) Information provided at meeting.
1-29-91:2	EPA Region X will inquire of EPA-HQ where in the waste stream the designation and regulations apply. Action: Dan Duncan. CLOSED (4-29-91)

1-29-91:3	WHC will prepare a letter for DOE-RL through Kenneth Bracken to EPA Region X addressing the following items: 1) a statement of the nature of the wastes coming out of the candidate tanks; 2) a statement that in treating the effluent an apparent nonwaste water is created, whereas heretofore the tank effluent may have been a non-waste water; 3) Does the reduced concentration of TOC in the treated waters mandate their designation as waste water? Action: Jeff Voogd. CLOSED (4-29-91)
1-4-91:1	WHC to provide information on the rate of hydrogen build up within the vault and the rate of diffusion of hydrogen out of the vault. Action: Jeff Voogd. CLOSED (4-29-91)
9-18-90:3	WHC will provide updated Bluelines at the January 1991 UMM. Action: Steve Briggs. CLOSED (4-29-91)
7-23-90:3	A copy of the TPA change request will be sent to Dan Duncan (EPA). Action: Cliff Clark. CLOSED (4-29-91)

Attachment 5

Grout Treatment Facility
Unit Managers Meeting
June 26, 1991

Drawing of Proposed Vault Cutaway Model

Attachment 6

Grout Treatment Facility
Unit Managers Meeting
June 26, 1991

Engineering Change Notices

ENGINEERING CHANGE NOTICE

Page 1 of 11

1. ECN ~~142704~~ Proj. ECN B-714-84

2. ECN Category (mark one)
- Supplemental ■
- Direct Revision ☐
- Change ECN ☐
- Temporary ☐
- Supersedure ☐
- Discovery ☐
- Cancel/Void ☐

3. Originator's Name, Organization, MSIN, and Telephone No.
H. J. Steffens, KEH, E6-33, 6-6912

4. Date
03-27-91

5. Project Title/No./Work Order No.
See Block 12

6. Bldg./Sys./Fac. No.
218-E-16

7. Impact Level
3

8. Document Number Affected (include rev. and sheet no.)
See Block 12

9. Related ECN No(s).
None

10. Related PO No.
N/A

11a. Modification Work
- ☐ Yes (fill out Blk. 11b)
- ☐ No (NA Blks. 11b, 11c, 11d)

UNKNOWN

11b. Work Package Doc. No.
UNKNOWN

11c. Complete Installation Work
Cog. Engineer Signature & Date

11d. Complete Restoration (Temp. ECN only)
Cog. Engineer Signature & Date

12. Description of Change

Block 5: B-714, Grout Vault Pair (218-E-16-102 & 103)(218-E-16-104 & 105)/ER8007

Block 8: Drawings -
- H-2-77619, Sh 1, Rev 1
- H-2-77620, Sh 1, Rev 0
- H-2-77620, Sh 2, Rev 1
- H-2-77641, Sh 1, Rev 1
- H-2-78491, Sh 1, Rev 1
- H-2-78492, Sh 1, Rev 0
- H-2-78492, Sh 2, Rev 1
- H-2-78507, Sh 1, Rev 1
- Specification B-714-C2, Rev 1 (V-B714C2-003, Rev 1)

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SEE SUCCEEDING PAGES FOR DESCRIPTION OF CHANGES

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13a. Justification (mark one)
- Criteria Change ☐
- Design Improvement ■
- Environmental ☐
- As-Found ☐
- Facilitate Const. ☐
- Const. Error/Omission ☐
- Design Error/Omission ☐

13b. Justification Details

(DI): The NEC prohibits placing a junction box underground in an area that is inaccessible. Since the design was completed, a diffusion material was put in place. This is a design improvement in that it eliminates a cable connection that would cause future problems.

THIS CHANGE DOES NOT IMPACT THE INTEGRITY OF THE ORIGINAL FACILITY DESIGN.

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

KEH DISTRIBUTION
- Const Doc Cntl E2-50
- Engrg Doc Cntl E6-52

WHC DISTRIBUTION
- Project Files R1-28
- S. R. Briggs(PE) R3-27
- T. K. Cordray S1-54
- ~~Stan Hill H4-57~~
- LUPE GARZA A3-80

EDC
- ~~J. K. Epperley 50-05~~
- O. A. Halverson R3-09
- J. S. Hill [2] ~~H4-57~~
- K. S. McCullough N1-83
- D. B. Powell [4] R4-03
- J. E. Vanbeek R3-27
- STATION 10 ~~R3-87~~

DOE
- A. G. Lassila A5-18

RELEASE STAMP

OFFICIAL RELEASE BY WHC (13)
DATE APR 11 1991
STATION 12

A-7900-013 (11/88)

~~DOE~~ **ENGINEERING CHANGE NOTICE** Page 2 of 11

1. ECN (use no. from pg. 1): B-714-84

15. Design Verification Required	16. Cost Impact		17. Schedule Impact (days)
	ENGINEERING	CONSTRUCTION	
☐ Yes	Additional ☒ $ 2405	Additional ☒ $ 1500	Improvement ☐ NA
■ 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	☐	_____	☐

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

20. Approvals

OPERATIONS AND ENGINEERING	Signature	Date
Cog./Project Engineer	L R Bray	4/11/91
Cog./Project Engr. Mgr.	LRB for J E Van Dyke	4/11/91
QA	J. K. Goodwin	4-11-91
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		

ARCHITECT-ENGINEER	Signature	Date
PE	K C Bergard	4/10/91 4-11-91
QA	T D Haupt	4-10-91
Safety	C. D. Eggers	4/8/91
Design	INSTM: H. Stoffers	4/5/91
Other	ELEC: R. R. Frankel	4/5/91
	SPECS: J. E. Breed	4/5/91
	ENVIR: R. Hollenbach	4-5-91
	PLE: [illegible]	4/10/91
DEPARTMENT OF ENERGY		
ADDITIONAL		

Block 12: Description of Changes

INSTRUMENTATION CHANGES TO DRAWINGS

1) H-2-77619, Sh 1, Rev 1

A) **DETAIL 3 (Z E4):** Extend riser as shown on page 8 of this ECN.
B) **SECTION A (Z C6):** Modify probe assy as shown on page 9 of this ECN.
C) **NOTE 6:** Change to read as follows -
RISER #42 AND #45 MEASURED FROM BOTTOM OF CORBEL. LENGTH = 2'-11" WITH 3" EXTENSION ABOVE ROOF PANEL. RISER #43 AND #44 LENGTH = 2'-5" WITH 3" EXTENSION.

2) H-2-77620, Sh 1, Rev 0

A) **ASSEMBLY (Z E4-F5, C4):**
1. Change junction box to pull box as shown on page 10 of this ECN.
2. Change PROBE INSERTION LENGTH to read 43'-6".

B) **Change Note 3** to read THERMOCOUPLE ASSEMBLIES AS SUPPLIED BY VENDOR SHALL HAVE PROTECTION TUBE. THERMOCOUPLE PULL BOX SHALL BE SUITABLE FOR BURIAL.

C) **DELETE** Note 6 in its entirety.

3) H-2-77620, Sh 2, Rev 1

A) **ASSEMBLY (Z E4-F5, C4):**
1. Change junction box to pull box as shown on page 11 of this ECN.
2. Change PROBE INSERTION LENGTH to read 43'-6".

4) H-2-78491, Sh 1, Rev 1

A) **DETAIL 3 (Z E4):** Extend riser as shown on page 8 of this ECN.
B) **SECTION A (Z C6):** Modify probe assy as shown on page 9 of this ECN.
C) **NOTE 6:** Change to read as follows -
RISER #42 AND #45 MEASURED FROM BOTTOM OF CORBEL. LENGTH = 2'-11" WITH 3" EXTENSION ABOVE ROOF PANEL. RISER #43 AND #44 LENGTH = 2'-5" WITH 3" EXTENSION.

5) H-2-78492, Sh 1, Rev 0

A) **ASSEMBLY (Z E4-F5, C4):**
1. Change junction box to pull box as shown on page 10 of this ECN.
2. Change PROBE INSERTION LENGTH to read 43'-6".

B) **Change Note 3** to read THERMOCOUPLE ASSEMBLIES AS SUPPLIED BY VENDOR SHALL HAVE PROTECTION TUBE. THERMOCOUPLE PULL BOX SHALL BE SUITABLE FOR BURIAL.

C) **DELETE** Note 6 in its entirety.

6) H-2-78492, Sh 2, Rev 1

A) **ASSEMBLY (Z E4-F5, C4):**
1. Change junction box to pull box as shown on page 11 of this ECN.
2. Change PROBE INSERTION LENGTH to read 43'-6".

ELECTRICAL CHANGES TO DRAWINGS

7) H-2-77641, Sh 1, Rev 1

A) WIRE RUN LIST (Z F6-7, E6-7):

1. FROM column, GWD 57, 58, 59, 60, 73, 74, 75, & 76: Delete "JB".

2. VIA column, GWD 57, 58, 59, & 60: In descending order add the following:
   TE-102-1 PB, I24...
   TE-102-2 PB, I25...
   TE-102-3 PB, I26...
   TE-102-4 PB, I27...

3. VIA column, GWD 73, 74, 75, & 76: In descending order add the following:
   TE-103-1 PB, I28...
   TE-103-2 PB, I29...
   TE-103-3 PB, I30...
   TE-103-4 PB, I40...

B) Change "TYPE OF WIRE" Note 4 to read:
THERMOCOUPLE EXTENSION CABLE PROVIDED BY THERMOCOUPLE MANUFACTURER.

8) H-2-78507, Sh 1, Rev 1

A) WIRE RUN LIST (Z F6-7, E6-7):

1. FROM column, GWD 128, 129, 130, 131, 138, 139, 140, & 141: Delete "JB"

2. VIA column, GWD 128, 129, 130, & 131: In descending order add the following:
   TE-104-1 PB, I66...
   TE-104-2 PB, I65...
   TE-104-3 PB, I64...
   TE-104-4 PB, I63...

3. VIA column, GWD 138, 139, 140, & 141: In descending order add the following:
   TE-105-1 PB, I69...
   TE-105-2 PB, I70...
   TE-105-3 PB, I71...
   TE-105-4 PB, I72...

B) Change "TYPE OF WIRE" Note 4 to read:
THERMOCOUPLE EXTENSION CABLE PROVIDED BY THERMOCOUPLE MANUFACTURER.

9) SPECIFICATION B-714-C2

A) SECTION 13440

1. Add the following reference paragraph:

1.1.1.3 American Society for Testing and Materials (ASTM)

E 235-82	Standard Specification for Thermocouples, Sheathed, Type K, for Nuclear or for Other High-Reliability Applications

2. Delete Data Sheet Y-102 and replace with new Data Sheet Y-102 as shown on page 6 & 7 of this ECN.

THERMOCOUPLE PROBE ASSEMBLY

THERMOCOUPLE

1.	Tag Numbers	See Note 1
2.	Thermocouple Conductor	Chromel-alumel (Type K), 24 AWG wire diameter
3.	Sheath	300 Series Stainless Steel
4.	Junction End	Undergrounded as shown in ASTM E 235, Figure 2, for Class 2
5.	Sheath Configuration	Enclosed
6.	Sheath Outside Diameter	0.125 inches
7.	Sheath Wall Thickness	0.015 inches (nominal)
8.	Sheath Length	See Note 2
9.	Thermocouple Tolerance	ASTM 235
10.	Thermocouple Insulation	Electrically fused, compatible magnesium oxide
11.	Limits of Error	Special limits of error shall be in accordance with ANSI MC-96.1, Paragraph 2.5 and Table 8 for thermocouples Type K
12.	Transition Joint and Cable	The thermocouple sheath shall terminate into a heavy-duty transition joint of any grade stainless steel (same as sheath). Coming out of the transition joint shall be a type KX leadwire cable with a 20 AWG yellow KPX positive insulated lead and a 20 AWG red KNX negative insulated lead. The cable length shall be as specified in NOTE 1. The cable and leadwire insulation shall have a temperature range of minus 40° F to +392° F. The overall cable and insulated leads shall be teflon or neoflon type insulation.

ECN No. B-714-84		Page 6/ 11	
Ref. Dwg. SPEC B-714-C2		Sh.	Rev. 1
Prep. By H.J. STEFFENS	Ckd. By PC BARROWS		

13.	Transition Joint Connection	Within the transition joint, the thermocouple wire shall be connected to the leadwire cable by a silver braze. The transition joint shall be silver brazed to the thermocouple sheath and be filled with epoxy at the leadwire end. The epoxy shall be a 450° F potting compound. The epoxy within the transition joint shall be free of bubbles.

PROTECTION TUBE

14.	Protection Tube	A 1 inch schedule 40S 304 grade stainless steel pipe with a closed end.
15.	Protection Tube Length	See Note 2

PULL BOX

16.	Pull Box	Mount a NEMA 4 pull box of sufficient capacity to coil the 16 leadwire cables specified in Item 12.
17.	Special Features	Protection tube to be factory sealed and attached rigidly to pull box, see Note 2.

MANUFACTURER

18.	Thermocouple Probe Assembly consisting of a Protection Tube, Thermocouple and Pull Box	Similar to a product manufactured by: Thermo-Couple Products Co., Inc. Sales Aid S-126 27W 230 Beecher St. P. O. Box 457-T Winfield, IL 60190 Ph. (708) 653-1400 Attn: Kevin Hansen

NOTES:

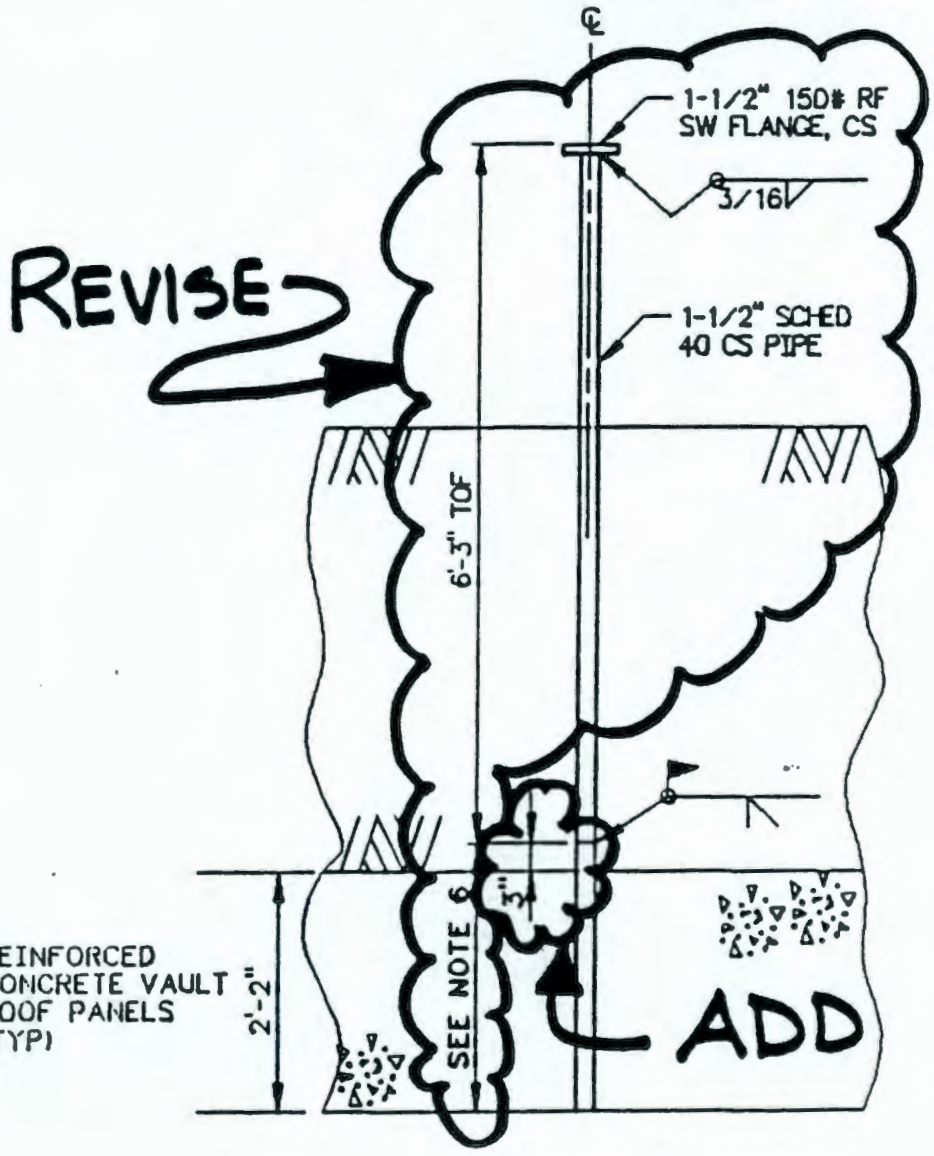
1. Tag Numbers and Cable Length
Cable Length + 12 inches, -0 inches

TE-102-1-150FT	TE-103-1-200FT
TE-102-2-150FT	TE-103-2-150FT
TE-102-3-130FT	TE-103-3-130FT
TE-102-4-130FT	TE-103-4-80FT
TE-104-1-150FT	TE-105-1-200FT
TE-104-2-150FT	TE-105-2-150FT
TE-104-3-130FT	TE-105-3-130FT
TE-104-4-130FT	TE-105-4-80FT

2. See Drawings

3. Thermocouple Probe Assembly shall have a minimum service life of 30 years under normal use.

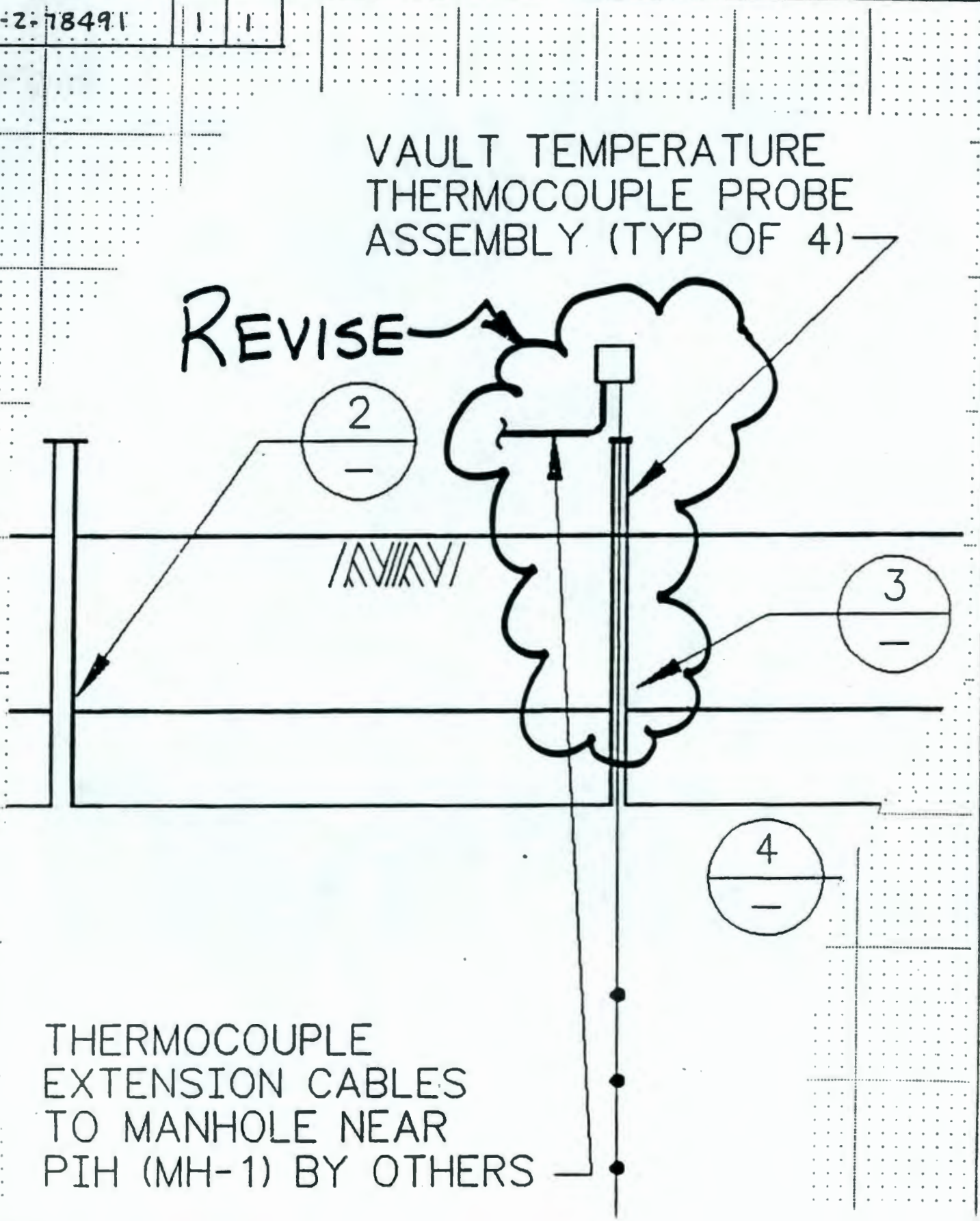
KAISER ENGINEERS HANFORD	ENGINEERING CHANGE NOTICE SKETCH					
Ref. Dwg. H-2-77619	Sh. 1	Rev. 1	Prepared By TK EHRHARD	Checked By PC BARROWS	ECN No. B-714-84	Page 8/11
H-2-78491	1	1				



DETAIL 3/—

SCALE: 3/4"=1'-0"
THERMOCOUPLE PROBE PENETRATION RISER
SEE NOTE 2 & 3

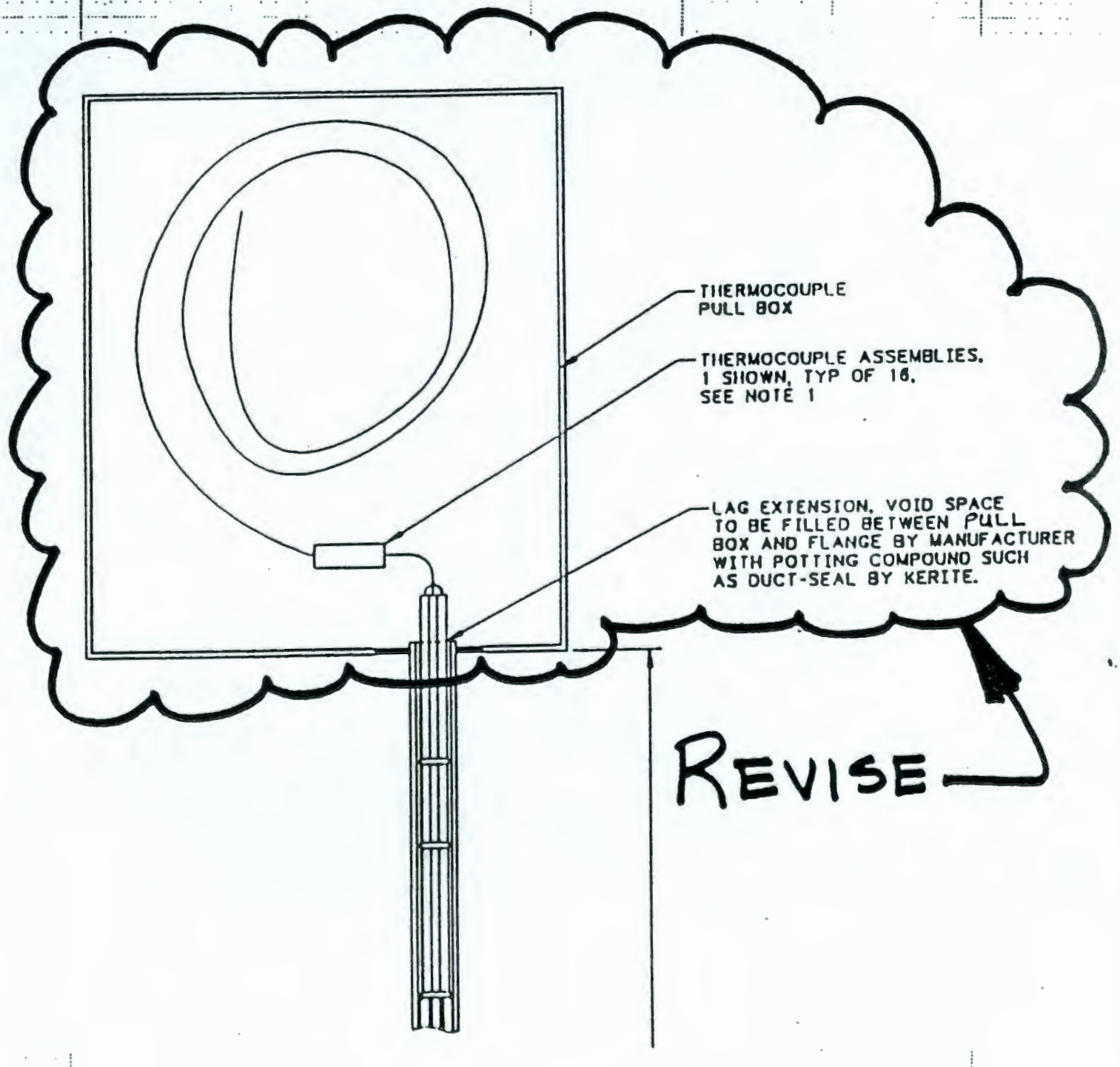
KAISER ENGINEERS HANFORD	ENGINEERING CHANGE NOTICE SKETCH					
Ref. Dwg.	Sh.	Rev.	Prepared By	Checked By	ECN No.	Page
H-2-77619	1	1	TK EHRHARD	PC BARROWS	B-714-84	9/11
H-2-78491	1	1				



KAISER ENGINEERS HANFORD

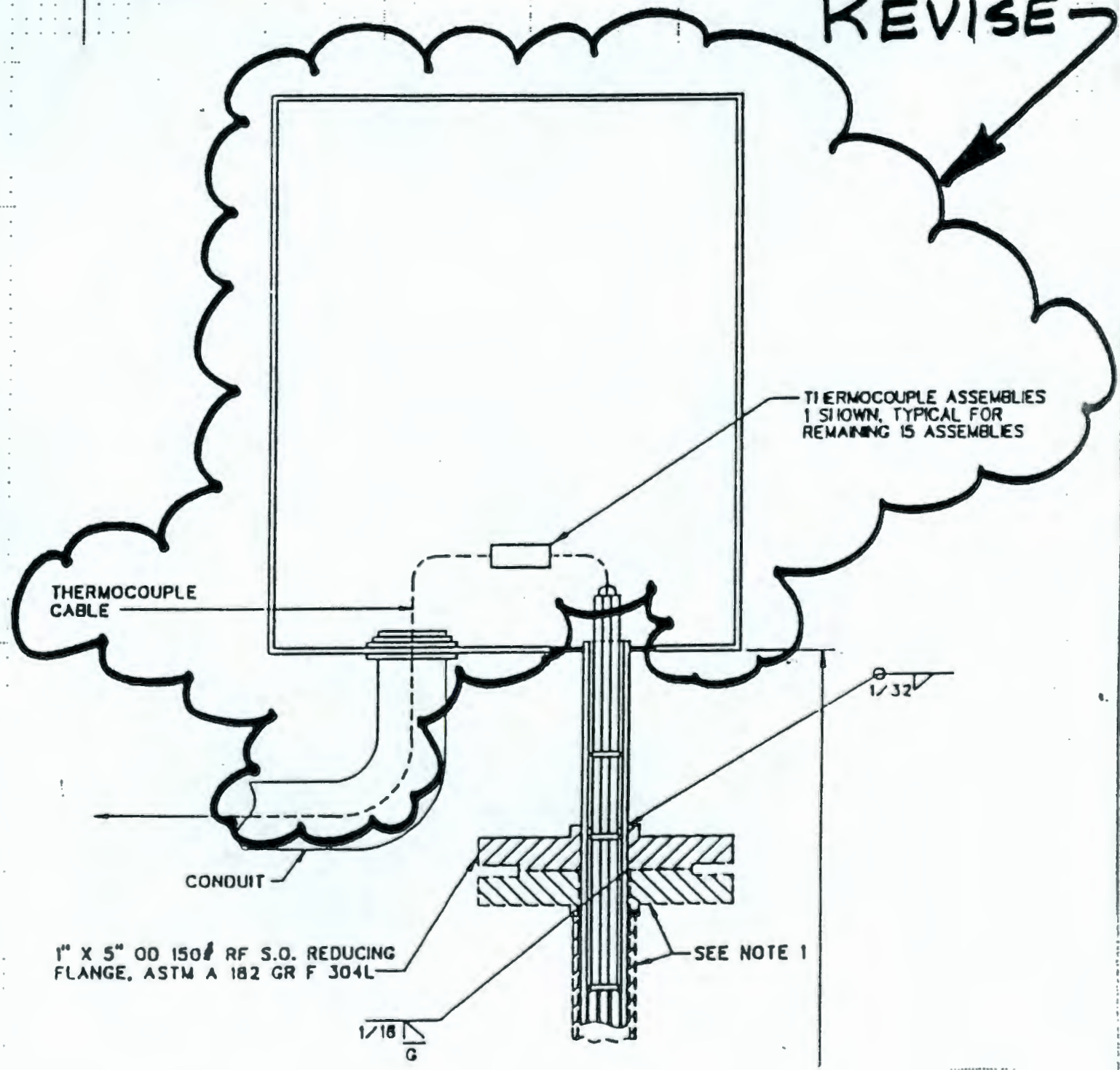
ENGINEERING CHANGE NOTICE SKETCH

Ref. Dwg.	Sh.	Rev.	Prepared By	Checked By	ECN No.	Page
H-2-77620	1	0	GF MCKEE	PC BARROWS	B-714-84	10/11
H-2-78492	1	0				



KAISER ENGINEERS HANFORD					ENGINEERING CHANGE NOTICE SKETCH	
Ref. Dwg.	Sh.	Rev.	Prepared By	Checked By	ECN No.	Page
H-2-77620	2	1	GF MCKEE	PC BARROWS	B-714-84	11/11
H-2-78492	2	1				

REVISE



ENGINEERING CHANGE NOTICE

1. ECN ~~142799~~
Proj. ECN B-714-86

2. ECN Category (mark one)	3. Originator's Name, Organization, MSIN, and Telephone No.	4. Date
Supplemental ■	A. R. Snowhite, KEH, E6-32, 6-6741	03-28-91
Direct Revision ☐		
Change ECN ☐		
Temporary ☐		
Supersedure ☐		
Discovery ☐		
Cancel/Void ☐		

5. Project Title/No./Work Order No.	6. Bldg./Sys./Fac. No.	7. Impact Level
See Block 12	218-E-16	3

8. Document Number Affected (include rev. and sheet no.)	9. Related ECN No(s).	10. Related PO No.
See Block 12	None	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)	UNKNOWN	Cog. Engineer Signature & Date	Cog. Engineer Signature & Date

UNKNOWN

12. Description of Change

Block 5: B-714, Grout Vault Pair (218-E-16-102 & 103)(218-E-16-104 & 105)/ER8007

Block 8: Specification B-714-C2, Rev 1
(V-B714C2-003, Rev 1)

****

1) SECTION 01400, APPENDIX A, Pg 01400-A-6

Delete Spec ref. 2.1.4, 2.1.4.1, 2.1.4.2, and 2.1.4.3 in their entirety. Replace with new ref. 2.1.4, 2.1.4.1 thru 2.1.4.6 as shown on page ~~4~~ 5 of this ECN. Ltr. 4-8-91

*** BLOCK 12 CONTINUED ON PAGE 3 ***

Block 13b:
This ECN does not affect the Technical function of the sensing cable or of any of the sensing cable accessories.

13a. Justification (mark one)	13b. Justification Details
Criteria Change ☐ Design Improvement ☐ Environmental ☐ As-Found ■ Facilitate Const. ☐ Const. Error/Omission ☐ Design Error/Omission ☐	The minimum diameter opening for installation of specified sensing cable, as stipulated by mfr, is 0.75". Opening between outer 4" pipe and pipe supports at 90° pipe turns is 0.625". Due to this condition a "Low Profile" sensing cable (0.625" opening req'd) is being specified in place of originally specified cable. The manufacturer's stipulated diameter of 0.75" was not published at the time of the original design. *** CONTINUED IN BLOCK 12 ***

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

FOC

KEH DISTRIBUTION		~~J. K. Epperley~~	~~S0-05~~
Const Doc Cntl	E2-50	O. A. Halverson	R3-09
Engrg Doc Cntl	E6-52	J. S. Hill [2]	~~R4-57~~
		K. S. McCullough	NI-83
WHC DISTRIBUTION		D. B. Powell [4]	R4-03
Project Files	R1-28	J. E. Vanbeek	R3-27
S. R. Briggs(PE)	R3-27	LUPE GARZA	A3-80
T. K. Cordray	S1-54	DOE	
STATION 10	A3-87	A. G. Lassila	A5-18

RELEASE STAMP

OFFICIAL RELEASE
BY WHC
DATE APR 11 1991
STATION 12

13

[redacted]

ENGINEERING CHANGE NOTICE

1. ECN (use no. from pg. 1): B-714-86

15. Design Verification Required	16. Cost Impact		17. Schedule Impact (days)
	ENGINEERING	CONSTRUCTION	
■ Yes	Additional ☒ $ 1820	Additional ☒ $ 6540	Improvement ☐ NA
☐ 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	☐	_____	☐

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

20. Approvals

OPERATIONS AND ENGINEERING	Signature	Date
Cog./Project Engineer	D R Bruce	4/11/91
Cog./Project Engr. Mgr.	[illegible]	4/11/91
QA	D. K. Condray	4-11-91
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		

ARCHITECT-ENGINEER	Signature	Date
PE	K C Bergard	4/10/91 4-11-91
QA	T D Hoop	4-10-91
Safety	C. D. Eggen	4/9/91
Design ELEC:	A. R. Snowden	4-8-91
Other ENVIR:	R Hollenbeck	4-10-91
SPECS:	J. E. Breed	4/10/91
PLE:	E. G. Cooley for G. Koci	4/10/91
DEPARTMENT OF ENERGY		
ADDITIONAL		

2) SECTION 16400

A) Change paragraph 2.1.4 and 2.1.4.1 to read as follows:

2.1.4 Sensing Cable, Low Profile Type with 18 inches of four conductor leader cable, factory connected to each end: Raychem TraceTek, Catalog No. TT 3000-MSC-XX-LP. "XX" denotes cable length in feet. Specify custom cut length based on distance between two pull points.

2.1.4.1. Connectorized Jumper Cable: Male connector on one end, female connector on opposite end, Raychem TraceTek, Catalog No. TT-MJC-3-MC. (Required only at pull points that have a sensing cable termination.)

B) Change paragraph 2.1.4.2 heading to read: End Termination:

C) Add paragraph 2.1.4.3, 2.1.4.4, 2.1.4.5, and 2.1.4.6 as follows:

2.1.4.3 Scotchlok plastic connector, for connecting one half of Connectorized Jumper Cable to Sensing Cable, Raychem TraceTek, Catalog No. TT-JSK-SL, package quantity 20.

2.1.4.4 Heat Shrinkable Tubing, for covering of Connectorized Jumper Cable connectors after both connectors are connected together, Raychem TraceTek.

2.1.4.5 Portable Test Box, Raychem TraceTek, Catalog No. TT-PTB-1000 with operating instructions for testing of TT 3000-MSC-XX-LP sensing cable.

2.1.4.6 Sensing Cable Map: Provide sensing cable map that shows entire sensing cable routing from Grout Processing Facility to each of four vaults (102-105). Indicate pipe length in segments not greater than 20 feet and indicate the location of all pull point terminations. Provide glass and frame for map. Maximum size not larger than 40 inches by 28 inches.

D) Change words in paragraph 3.2.8.1 from: access port to pull point.

E) Change paragraph 3.2.8.3 to read as follows:

3.2.8.3 Connect one half of a Connectorized Jumper Cable to the end of a Sensing Cable using Scotchlok plastic connectors, 8 connectors required at each pull point where sensing cable is terminated. Terminations shall be made at the following listed pull points: PP-11, PP-12, PP-14, PP-16, PP-21, PP-22, Vault Pit 102, Vault Pit 103, PP-12, PP-24, PP-26, PP-28, PP-30, PP-32, PP-38, Vault Pit 104, and Vault Pit 105.

F) Renumber paragraph 3.2.8.4 and 3.2.8.5 to 3.2.8.5 and 3.2.8.6 respectively.

G) Add new paragraph 3.2.8.4 as follows:

3.2.8.4 Connect together male and female connectors of Connectorized Jumper Cables and install heat shrinkable tubing over both connectors. Shrink using heat gun.

H) Change paragraph 3.3.3.1 to read as follows:

3.3.3.1 During installation immediately after sensing cable is pulled in and terminated: Connect one end of the sensing cable to the portable test box and an end termination to the opposite end of sensing cable. Check that the sensing cable is functioning properly by following operating instructions provided with the portable test box. If test indicates sensing cable is not functioning properly, replace the sensing cable and retest.

I) Delete paragraph 3.3.3.2.

J) Replace Approval Data List and Vendor Information list with revised Lists shown on pages 6 & 7 of this ECN.

SPEC/DWG REF	ITEM DESCRIPTION	ACCEPTABLE VALUE, CONDITION OR TOLERANCE	METHOD OF VERIFICATION	SAMPLE SIZE
16400				
2.1.4	Sensing Cable	Identification: Raychem TraceTek Catalog No. TT 3000-MSC-XX-LP Configuration: As described in manufacturer's catalog	Visual: Catalog number on shipping container	100%
2.1.4.1 thru 2.1.4.6	Sensing Cable Accessories	Identification: Raychem TraceTek Catalog Nos. TT-MJC-3-MC (Connectorized Jumper Cable) TT-MET-MC (End Termination) TT-JSK-SL (Plastic Connector) Heat Shrink Tubing TT-PBT-1000 (Portable Test Box)	Visual: Catalog number on shipping container or on item	100%
		Sensing Cable Map	Submit for approval	100%

Project No B-714 Grout & Waste Disposal
Project Title ~~Facility Grout Vault Pair (218-E-16)~~
Specification Section 16400

APPROVAL DATA LIST
("X" Indicates Required Data)

1 EPN IDENTIFICATION	2 DESCRIPTION	3 REFERENCE DRAWING	4 SPECIFICATION PARAGRAPH	5 DATA									6 REMARKS
				Dimensional Drawings	Equipment Weights	Specifications	Material Description	Performance Data	Circuit or Control Diagrams	Data Sheets	Illustrative Cuts	Installation Instructions	
	Annunciator	H-2-77640	2.2.3	X	X	X					X		
	Sensing Cable	H-2-77635	2.1.4			X						X	
	and Accessories	Sh 1 & 2	thru										
		H-2-77596	2.1.4.6										
		H-2-78501											
		Sh 1 & 2											
		H-2-78467											

Project No B-714 Grout & Waste Disposal

Project Title Facilities Grout Vault Pair (218-E-16)

Specification Section 16400

VENDOR INFORMATION LIST

("X" Indicates Required Data)

1	2	3	4	5 VENDOR INFORMATION (VI)												
									Instructions							
EPN IDENTIFICATION	DESCRIPTION	REFERENCE DRAWING	SPECIFICATION PARAGRAPH	Dimensional Drawings	Equipment Weights	Specifications	Certified Test Data	Circuit or Control Diagram	Installation	Operation	Maintenance	Spare Parts List	Data Sheets	Illustrative Cuts	
	Annunciator	H-2-77640	2.2.3			X		X		X	X	X		X	
	Sensing Cable	H-2-77635	2.1.4	*		X			X					~~X~~	
	and Accessories	Sh 1 & 2	thru												
		H-2-77596	2.1.4.6												
		H-2-78501													
		Sh 1 & 2													
		H-2-78467													

END OF SECTION
16400 - 13

* MAP ONLY

ENGINEERING CHANGE NOTICE

Page 1 of 4

1. ECN 129080 — Proj. ECN

2. ECN Category (mark one)	3. Originator's Name, Organization, MSIN, and Telephone No.	4. Date
Supplemental [X] / Direct Revision [ ] / Change ECN [ ] / Temporary [ ] / Supersedure [X] / Discovery [ ] / Cancel/Void [ ]	D. W. Hendrickson/DWRD/GF/GT/R4-03/3-5075	March 20, 1991

5. Project Title/No./Work Order No.	6. Bldg./Sys./Fac. No.	7. Impact Level
Grout Facilities WA514 J8550		2

8. Document Number Affected (include rev. and sheet no.)	9. Related ECN No(s).	10. Related PO No.
WHC-SD-WM-PLN-005, Rev. 0	NA	

11a. Modification Work	11b. Work Package Doc. No.	11c. Complete Installation Work	11d. Complete Restoration (Temp. ECN only)
[ ] Yes (fill out Blk. 11b) [X] No (NA Blks. 11b, 11c, 11d)	NA	NA — Cog. Engineer Signature & Date	NA — Cog. Engineer Signature & Date

12. Description of Change

Text change replacing Appendix II of WHC-SD-WM-PLN-005, Revision 0, "Grout Treatment Facility Land Disposal Restriction Management Plan." Text change clarifies definition and application of treatment standards for grout waste candidates and provides for new analytical information.

13a. Justification (mark one)	13b. Justification Details
Criteria Change [ ] / Design Improvement [ ] / Environmental [X] / As-Found [ ] / Facilitate Const. [ ] / Const. Error/Omission [ ] / Design Error/Omission [ ]	Clarity is required to insure compliance with Land Disposal Restrictions.

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

BNFL LIMITED. OK

See distribution

RELEASE STAMP

OFFICIAL RELEASE BY WHC DATE MAR 22 1991 Sta #4

A-7900-013 (11/88)

ENGINEERING CHANGE NOTICE

1. ECN (use no. from pg. 1): 129080

15. Design Verification Required	16. Cost Impact		17. Schedule Impact (days)
	ENGINEERING	CONSTRUCTION	
☐ Yes	Additional ☐ $ NA	Additional ☐ $ NA	Improvement ☐ NA
☒ No	Savings ☐ $ NA	Savings ☐ $ NA	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	☐	_____	☐

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
WHC-SD-WM-SAR-042 (Draft)		
DOE/RL-88-27, Rev. 2		

20. Approvals

	Signature	Date
OPERATIONS AND ENGINEERING		
Cog./Project Engineer	D. W. Hendrickson	3/20/91
Cog./Project Engr. Mgr.	J. A. Voogd	3-20-91
QA	3-21-91 D D Volkman for J. D. Schaeffer	3-21-91
Safety		
Security		
Proj.Prog./Dept. Mgr.		
Def. React. Div.		
Chem. Proc. Div.		
Def Wst. Mgmt. Div.	G. W. Jackson	3/22/91
Adv. React. Dev. Div.		
Proj. Dept.	3/21/91	
Environ. Div.	R. E. Lepen for REL	3/21/91
IRM Dept.		
Facility Rep. (Ops)	R. T. Kimura	3/22/91
Other	R. K. Sanan	3/20/91
	S. H. Rifaey	3/21/91
	G. F. Williamson	3-21-91

	Signature	Date
ARCHITECT-ENGINEER		
PE		
QA		
Safety		
Design		
Other		
DEPARTMENT OF ENERGY		
ADDITIONAL		

Appendix II
Treatment Standards for Land Disposal Restricted Wastes

A. Definition of Waste Stream - Wastewater versus Nonwastewater

Treatment standards for several waste codes are expressed in terms of dependence upon whether the waste is a wastewater or a nonwastewater. Wastewaters are defined [40 CFR §268.2 and 55 FR 22537] as those wastes that contain less than 1% total organic carbon (TOC) and less than 1% total suspended solids (TSS), except those wastes identified as F001 through F005.

F001 through F005 solvent-water mixtures are wastewaters if the waste contains less than 1% by weight TOC or less than 1% by weight total F001 through F005 solvent concentrations. 51 FR 40612 and 40613[2] further defines solvent-water mixtures as aqueous solvent waste that is primarily water (approximately 99%) and contains either (1) less than 1% TOC or (2) less than 1% total solvents. Those wastes that do not meet these criteria are nonwastewaters.

Grout candidate waste feeds have been designated as solvent-water mixtures. The designation has been determined to be derived-from F003 and F005 wastes, and potentially F001 wastes. Preliminary investigations on wastes from Tanks 241-AN-106 and 241-AW-101 indicate that waste feed will contain 38 wt% to 77 wt% water, TOC of 0.07 wt% to 0.46 wt% (Hendrickson, 1990), and total solvents of approximately 2×10^{-5} wt%[3]. Since the tank contents are not primarily water as defined in 51 FR 40612, the solvent fraction of grout candidate waste feeds should be considered nonwastewaters.

The non-F001-through-F005 solvent fraction of grout candidate waste feeds should be considered wastewaters. Grouted wastes will meet the criteria of nonwastewaters and must comply with nonwastewater standards (55 FR 22537). In summary, wastes should be considered:

Waste Material	Classification
Grout Candidates excluding F001 - F005 constituents	Wastewater
F001 - F005 Constituents	Nonwastewater
Grouted Waste	Nonwastewater

These criteria should be evaluated for each Grout candidate, in its candidate tank, as it remains possible that specific candidate wastes may vary between wastewater and nonwastewater and because dilution or partial treatment to switch standards is impermissible.

---

2 "Hazardous Waste Management System Land Disposal Restrictions," 51 Federal Register 40572, et seq., November 7, 1986.

3 Welsh, 1991, "Tank 241-AN-106 Characterization Results," WHC-SD-CP-TP-065, Rev. 0, March 8, 1991.

B. Treatment Standards and Technologies

Treatment standards and treatment technologies for the waste codes under consideration of LDR were promulgated June 1, 1990. The following is a summary of such:

Table 1
Waste Treatment Standards and Technologies

Waste Code	Name/Characteristic	Technology[4]		CCWE[5]		CCW[6]	
		WW[7]	NWW[8]	WW (mg/l)	NWW	WW (mg/l)	NWW (mg/kg)
D002	Corrosivity	DEACT[9]	DEACT	NA[10]	NA	NA	NA
D004	Arsenic	NA	NA	NA	5.0	5.0	NA
D006	Cadmium	NA	NA	NA	1.0	1.0	NA
D007	Chromium	NA	NA	NA	5.0	5.0	NA
D008	Lead	NA	NA	NA	5.0	5.0	NA
D011	Silver	NA	NA	NA	5.0	5.0	NA
F001	1,1,1-Trichloroethane	NA	NA	1.05	0.41	0.030	7.6
F001	Methylene Chloride	NA	NA	0.20	0.96	NA	NA
F003	Acetone	NA	NA	0.05	0.59	NA	NA
F003	Methyl Isobutyl Ketone	NA	NA	0.05	0.33	NA	NA
F003	1-Butyl Alcohol	NA	NA	5.0	5.0	NA	NA
F005	Methyl Ethyl Ketone	NA	NA	0.05	0.75	NA	NA

4 Technology-Based Standards by RCRA Waste Code, Table 2, 55 Federal Register 22694, June 1, 1990.

5 Constituent Concentrations in Waste Extracts, Table CCWE, 55 Federal Register 22690, June 1, 1990.

6 Constituent Concentrations in Wastes, Table CCW, 55 Federal Register 22701, June 1, 1990.

7 Wastewaters

8 Nonwastewaters

9 Deactivation to remove characteristic (i.e. 2.0 < pH < 12.5)

10 Not Applicable

ESSENTIAL
ENGINEERING CHANGE NOTICE

CPF #13G

Page 1 of 2

1. ECN 130602
Proj. ECN

2. ECN Category (mark one)	3. Originator's Name, Organization, MSIN, and Telephone No.	4. Date
Supplemental [X]	R. L. Olsen. 85540 R4-02 3-4843	3-28-91
Direct Revision [ ]		
Change ECN [ ]		
Temporary [ ]		
Supersedure [ ]		
Discovery [ ]		
Cancel/Void [ ]		

5. Project Title/No./Work Order No.	6. Bldg./Sys./Fac. No.	7. Impact Level
J8550 P&ID Legend Correction	243 - G1 & G9	4

8. Document Number Affected (include rev. and sheet no.)	9. Related ECN No(s).	10. Related PO No.
H-2-95878 Sh. 1 Rev.0	N/A	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) [X] No (NA Blks. 11b, 11c, 11d)	N/A	Cog. Engineer Signature & Date	Cog. Engineer Signature & Date

12. Description of Change

Revise H-2-95878 by.

1. Remove the word "Hand" from heading "Hand Valve Identification." Zone C-3.

2. Add Instrument Tag identification. "PS-Pressure Safety (Relief)" to list of Process Variables just below "PR-Pressure Regulating", Zone D-4.

3. Change wording of symbol identification to "Typical Instrument Package supplied with each automatic 2-way valve (Pneumatic actuator with electric signal control)." Zone C-5.

4. Add test point  symbol and description.

ESSENTIAL DRAWING

13a. Justification (mark one)	13b. Justification Details
Criteria Change [ ]	Legends and titles should be consistant and complete.
Design Improvement [ ]	
Environmental [ ]	
As-Found [X]	
Facilitate Const. [ ]	
Const. Error/Omission [ ]	
Design Error/Omission [ ]	

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

G. W. Jackson	R4-01	(1)
R. T. Kimura	S4-43	(1)
R. L. Olsen	R4-02	(1)
S. H. Rifaey	R4-02	(1)
A. R. Tedeschi	R4-02	(1)
J. S. Hill	H4-57	(2)

RELEASE STAMP

OFFICIAL RELEASE BY WHC (12)
DATE APR 16 1991
Sta 3

Ltr 3-4-6

ENGINEERING CHANGE NOTICE

1 ECN (use no. from pg. 1): 130602

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	☐	N/A	☐
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		

20 Approvals

Signature	Date	Signature	Date
OPERATIONS AND ENGINEERING		ARCHITECT-ENGINEER	
Cog./Project Engineer [signature]	4-5-91	PE	
Cog./Project Engr. Mgr. [signature]	4/9/91	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. J. Hamkill	4/11/91	ADDITIONAL	
IRM Dept.			
Facility Rep. (Ops)			
Other [signature]	3-29-91		

ESSENTIAL
ENGINEERING CHANGE NOTICE

CPF #13G

Page 1 of 2

1. ECN 130604
Proj. ECN

2. ECN Category (mark one)	3. Originator's Name, Organization, MSIN, and Telephone No.	4. Date
Supplemental [X] Direct Revision [ ] Change ECN [ ] Temporary [ ] Supersedure [ ] Discovery [ ] Cancel/Void [ ]	R. L. Olsen, 85540 R4-02 3-4843	3-28-91
	5. Project Title/No./Work Order No. J8550 P&ID Drawing Revisions	6. Bldg./Sys./Fac. No. 243-G1, G2, G3
	8. Document Number Affected (include rev. and sheet no.) See Block 12	9. Related ECN No(s). N/A
		7. Impact Level 4
		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) [X] No (NA Blks. 11b, 11c, 11d)	N/A	Cog. Engineer Signature & Date	Cog. Engineer Signature & Date

12. Description of Change

H-2-95879 Sh. 1 Rev.2
Add "H-2-95878 Legend P&ID" to References, Zone A-4
H 2 95880 Sh. 1 Rev.2
Add "H-2-95878 Legend P&ID" to References, Zone A-4
H-2-95881 Sh. 1 Rev.2
Add "H-2-95878 Legend P&ID" to References, Zone A-4
H-2-95882 Sh. 1 Rev.0
Add "H-2-95878 Legend P&ID" to References, Zone A-4
Delete the word "nozzle" in Note 1, Zone F-2
Add notation "ESSENTIAL DRAWING" near title block.
H-2-95883 Sh. 1 Rev.0
Add "H-2-95878 Legend P&ID" to References, Zone A-4
Replace the word "nozzles" with "connections" in Note 1, Zone A-8
Add notation "ESSENTIAL DRAWING" near title block.
H-2-95884 Sh. 1 Rev.1
Add "H-2-95878 Legend P&ID" to References, Zone A-4
H-2-95885 Sh. 1 Rev.0
Add "H-2-95878 Legend P&ID" to References, Zone A-4
Add notation "ESSENTIAL DRAWING" near title block.

ESSENTIAL DRAWINGS

13a. Justification (mark one)	13b. Justification Details
Criteria Change [ ] Design Improvement [ ] Environmental [ ] As-Found [X] Facilitate Const. [ ] Const. Error/Omission [ ] Design Error/Omission [ ]	P&ID symbol description drawing is not referenced on P&ID drawings that use the P&ID symbols. "Note" wording changes made for consistancy. Essential drawings need to be identified as such.

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

S. O. Deleon	S1-52 (1)
G. W. Jackson	R4-01 (1)
R. T. Kimura	S4-43 (1)
R. L. Olsen	R4-02 (1)
S. H. Rifaey	R4-02 (1)
A. R. Tedeschi	R4-02 (1)
J. S. Hill	H4-57 (2)

Sta 3-4-6

RELEASE STAMP

OFFICIAL RELEASE BY WHC
DATE APR 16 1991
Sta 3
12

ENGINEERING CHANGE NOTICE

1. ECN (use no. from pg. 1): 130604

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	☐	N/A	☐
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		

20. Approvals

	Signature	Date		Signature	Date
OPERATIONS AND ENGINEERING			ARCHITECT-ENGINEER		
Cog./Project Engineer	R. Schmidt	4-5-91	PE		
Cog./Project Engr. Mgr.	S. [illegible]	4/9/91	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.	J. Stan Hill	4/11/91	ADDITIONAL		
IRM Dept.					
Facility Rep. (Ops)					
Other	[illegible]	4-2-91			

Attachment 7

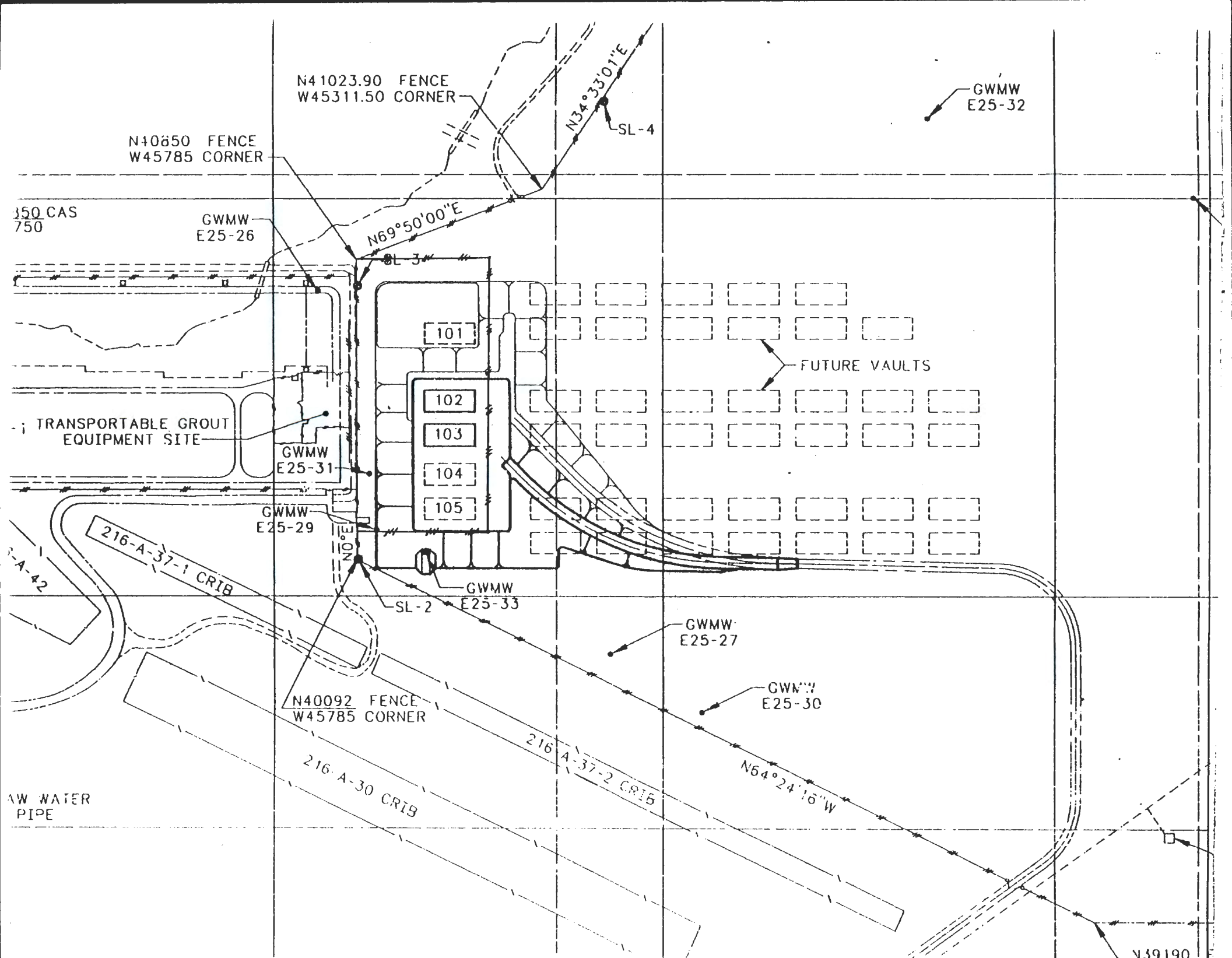
Grout Treatment Facility
Unit Managers Meeting
June 26, 1991

Drawing Package for Closure of Vault Piping

VAULT CONSTRUCTION ISOLATION

1. Install chain link fence to isolate the vaults under construction from those in operation.

   a. See site plan attached.


N41023.90 FENCE
W45311.50 CORNER
N34°33'01"E
SL-4
GWMW
E25-32
N40650 FENCE
W45785 CORNER
GWMW
E25-26
N69°50'00"E
SL-3
101
FUTURE VAULTS
102
103
104
105
TRANSPORTABLE GROUT
EQUIPMENT SITE
GWMW
E25-31
GWMW
E25-29
216-A-37-1 CRIB
SL-2
GWMW
E25-33
GWMW
E25-27
GWMW
E25-30
N40092 FENCE
W45785 CORNER
216-A-37-2 CRIB
216-A-30 CRIB
N64°24'16"W
PIPE

GROUT VAULT DISPOSAL SYSTEM

1. Vault Closure Plan (preliminary):

   a. Removal of excess liquid.

   b. Removal of excess liquid pumps.

   c. Installation of cold cap grout.

   d. Removal of cover blocks & pipe manifolds.

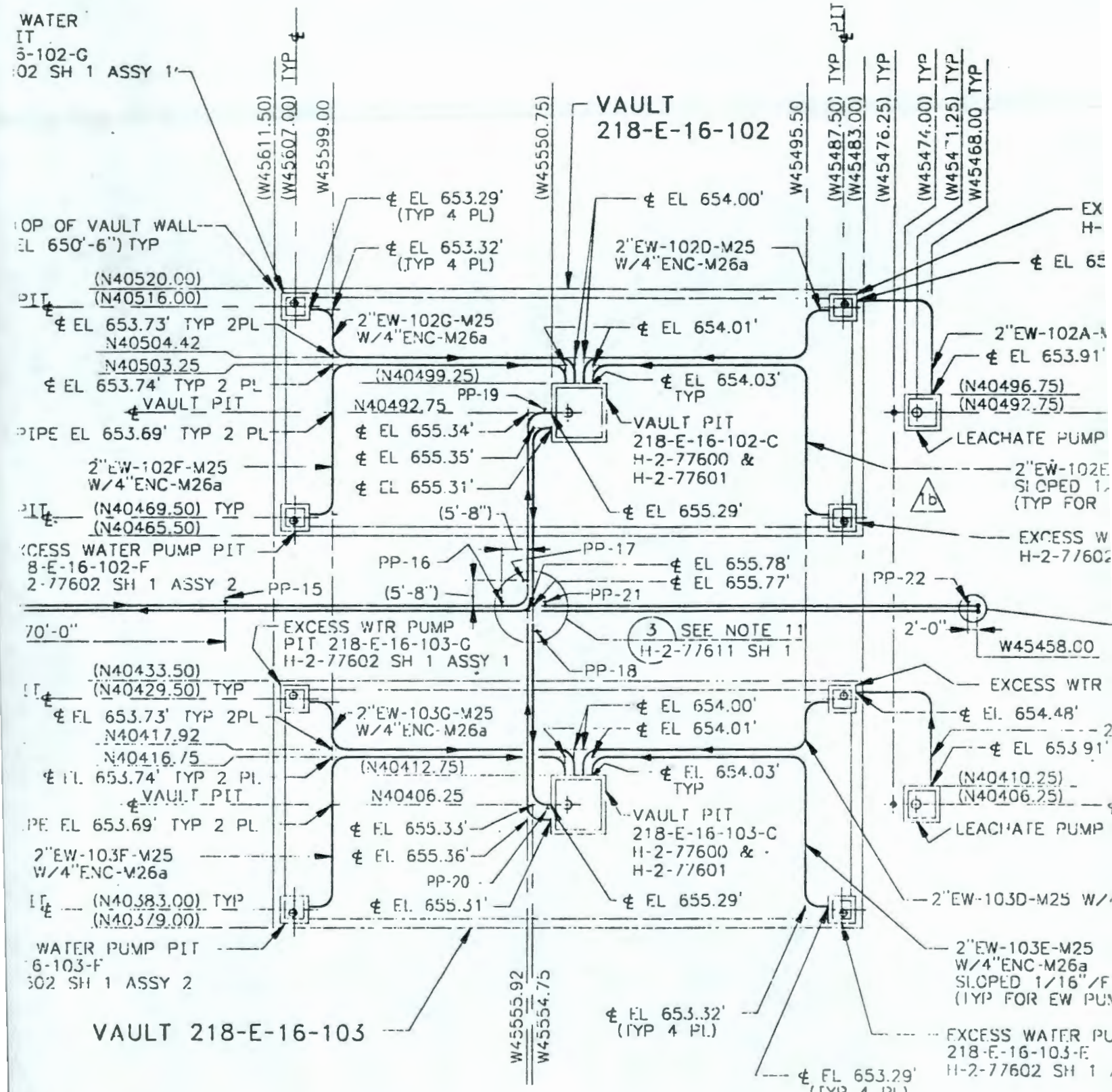
   e. Insert grout into process pipe & pipe encasement.

   f. Fill pits with non-radioactive grout.

   g. Install asphalt diffusion barrier over pits.

   h. Raise leachate sump pit.

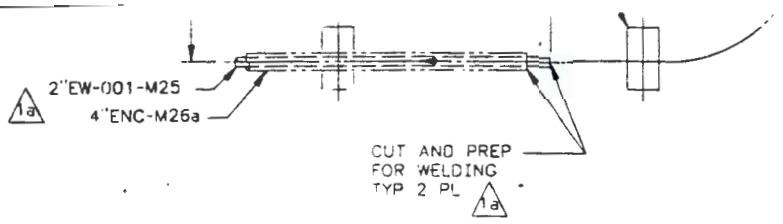
   i. Install closure cover.



PLAN

SCALE: 1" = 20'-0"

(VAULT SHOWN W/COVER REMOVED FOR CLARITY)



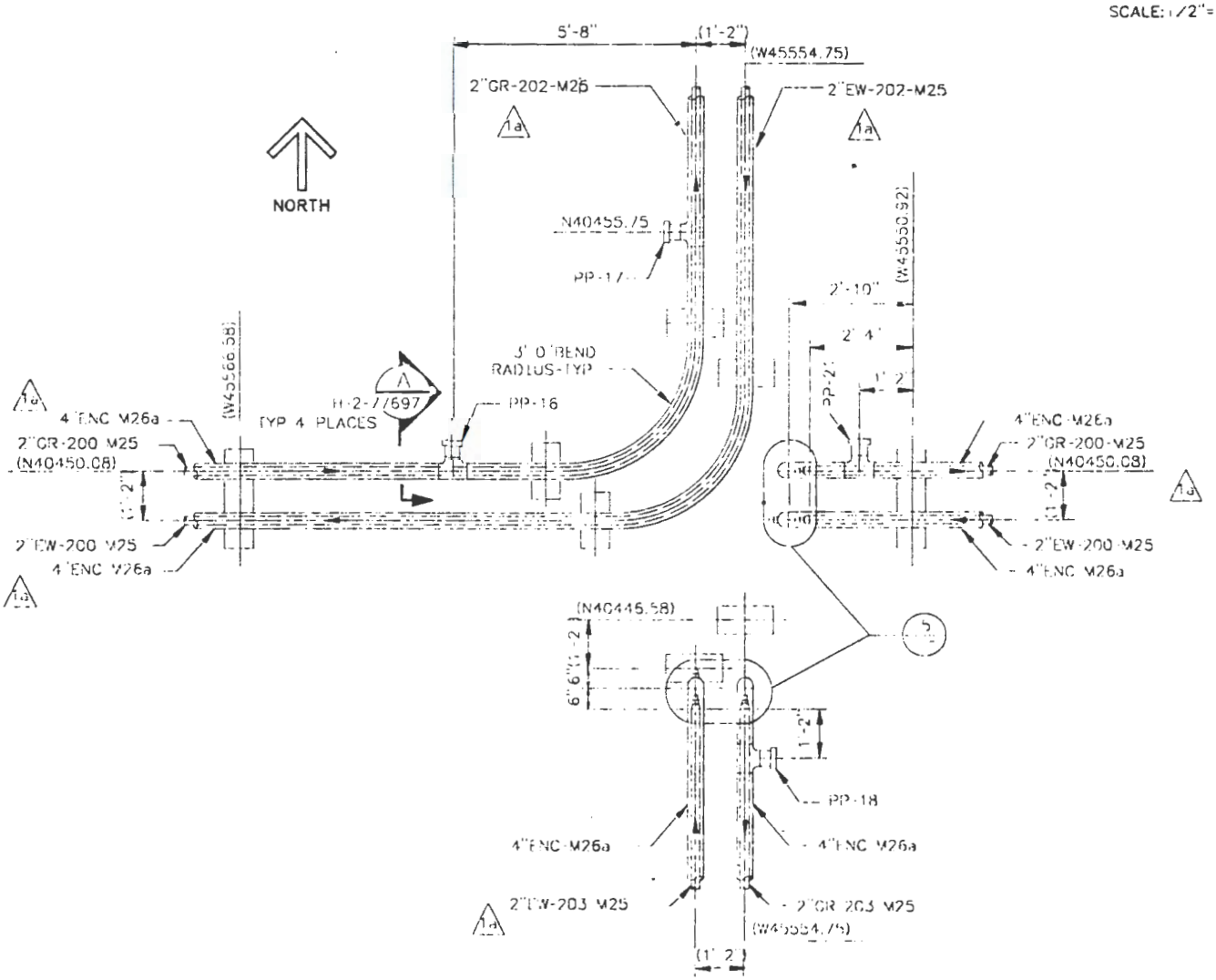
SEE NOTE 2 ON DWG H-2-77611 SH 2

DETAIL 1
SCALE:1/2"=1'-0"
H-2-77596 SH 1

1b TYP

FOR NEW SUPPORT
SEE DRAWING H-2-

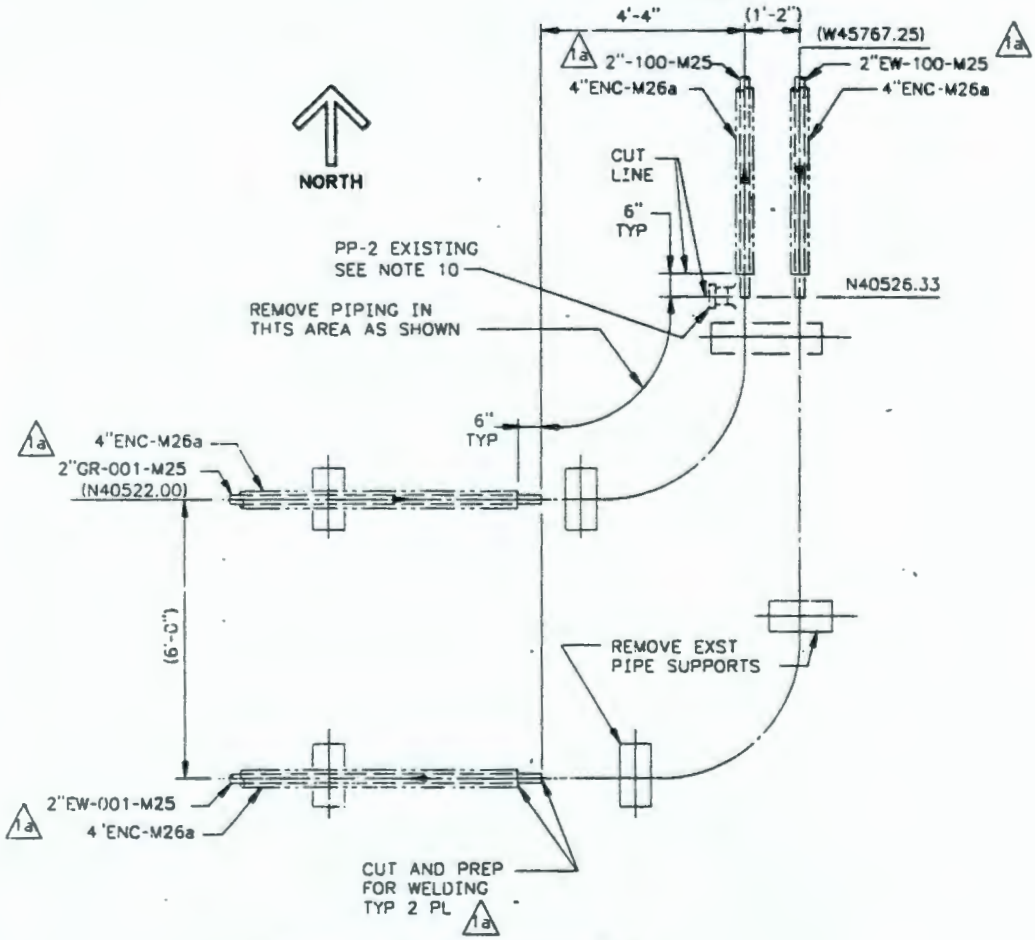
DETAIL
SCALE:1/2"=1'-0"



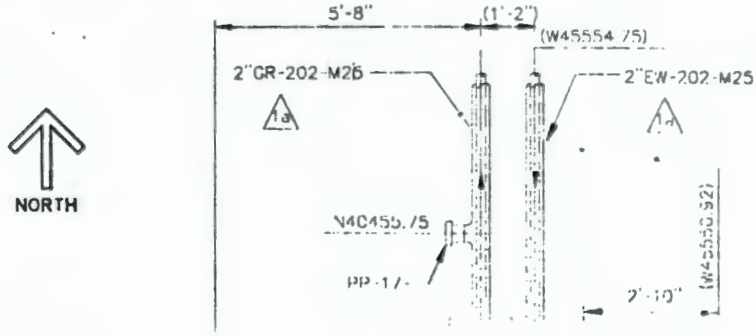
SEE NOTE 4 ON DWG H-2-77611 SH 2

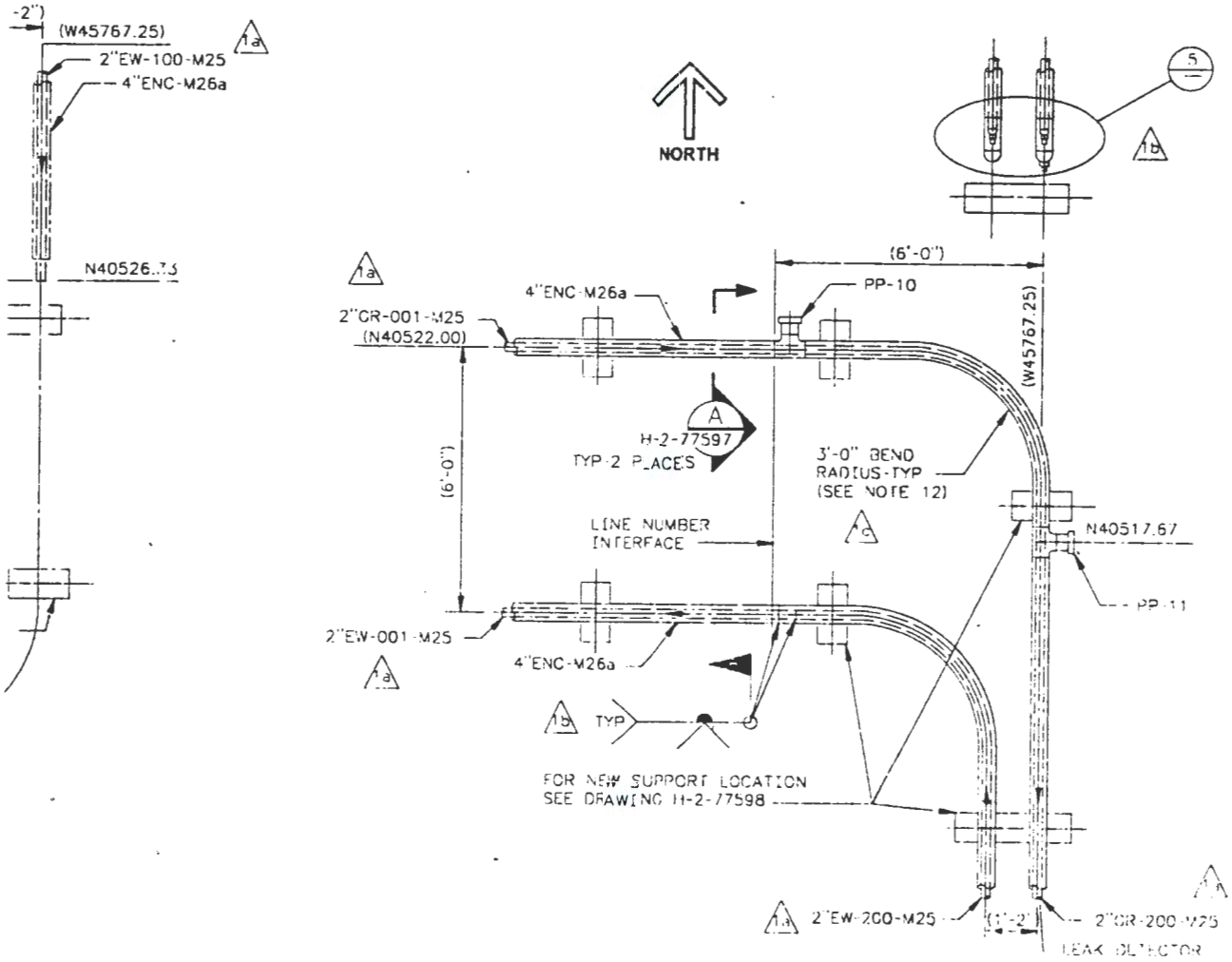
DETAIL 5
SCALE:1/2" 1'-0"
H-2-77596 SH 1

NUMBER

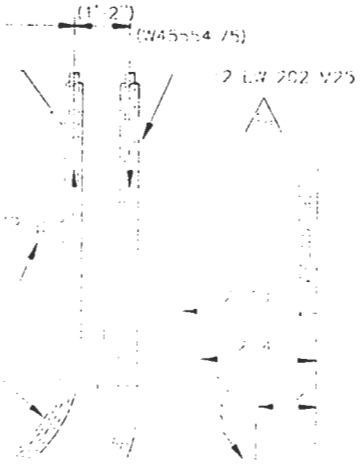


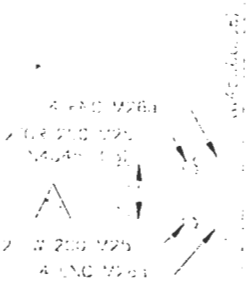
DETAIL 1
SCALE:1/2"=1'-0"
H-2-77596 SH 1

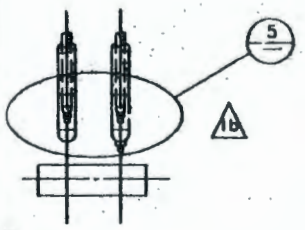


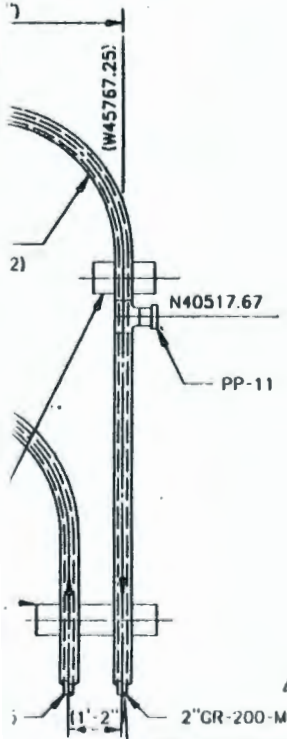


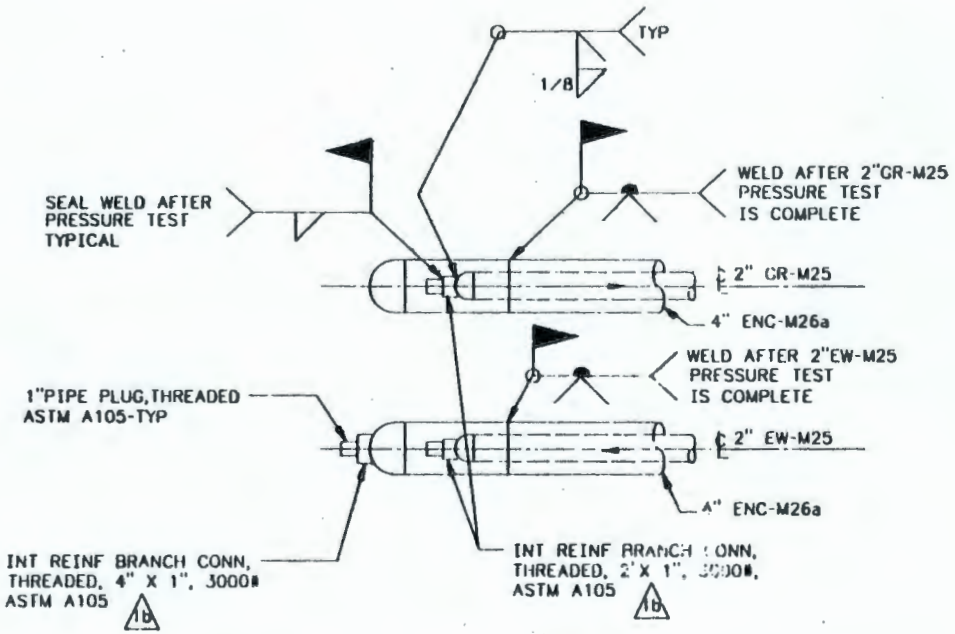
DETAIL 2 H-2-77596 SH 1
SCALE: 1/2"=1'-0"









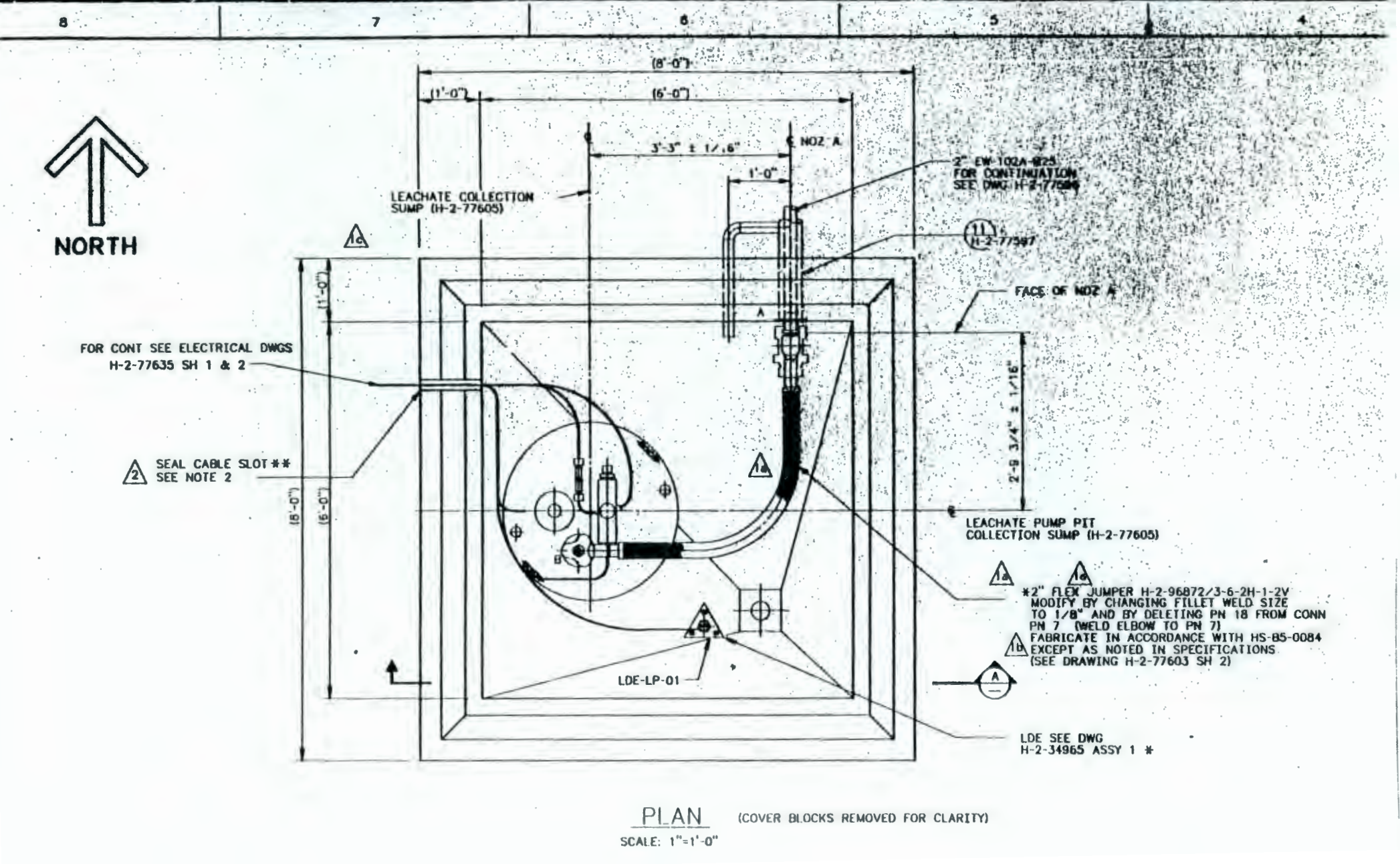


SEE NOTE 6 ON DWG H-2-77611 SH2

DETAIL 5

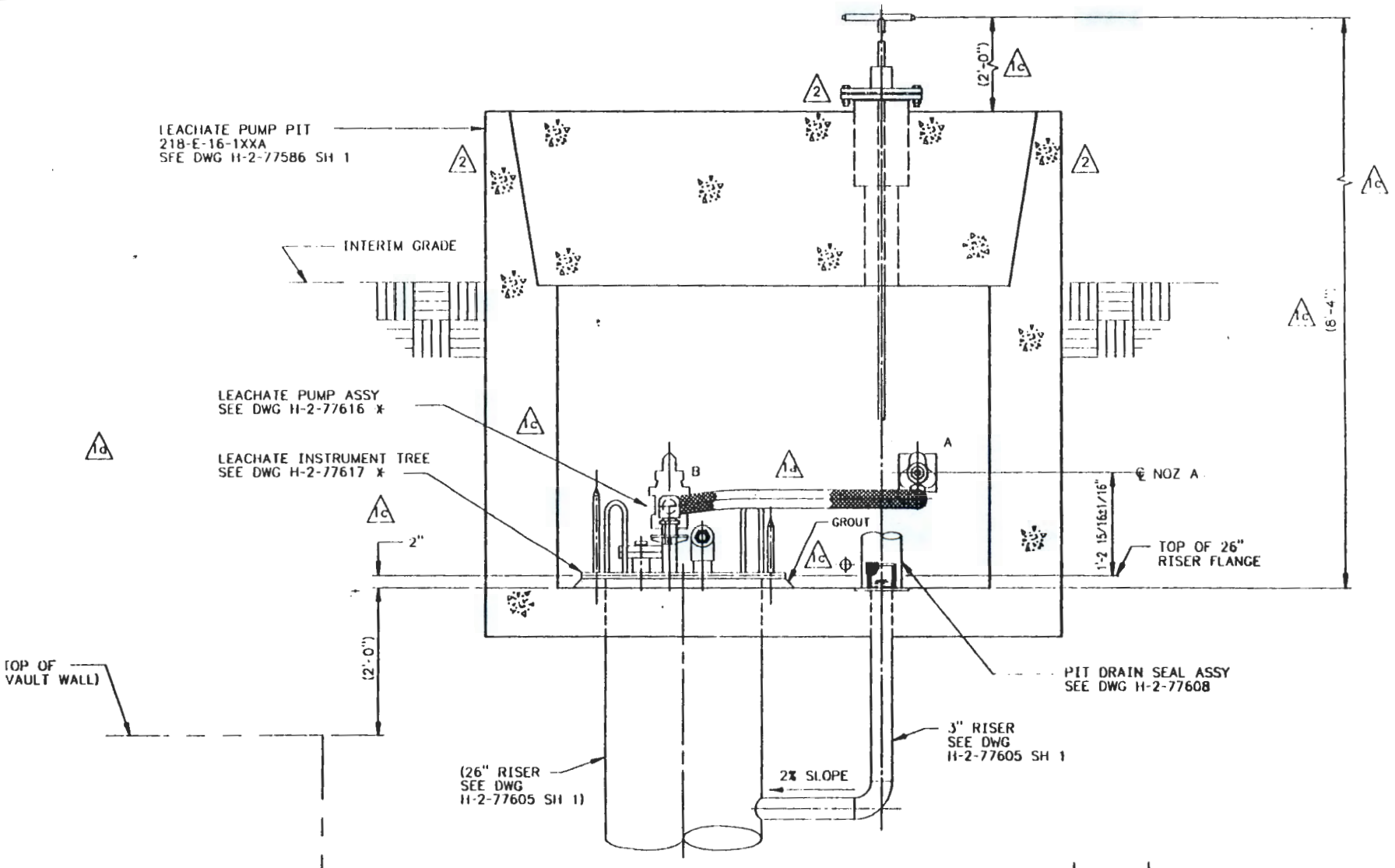
SCALE: 1 1/2"= 1'-0" H-2-77596 SH1 1b

(FOR TRUE ORIENTATION SEE PIPING PLAN)



PLAN (COVER BLOCKS REMOVED FOR CLARITY)

SCALE: 1"=1'-0"



SECTION

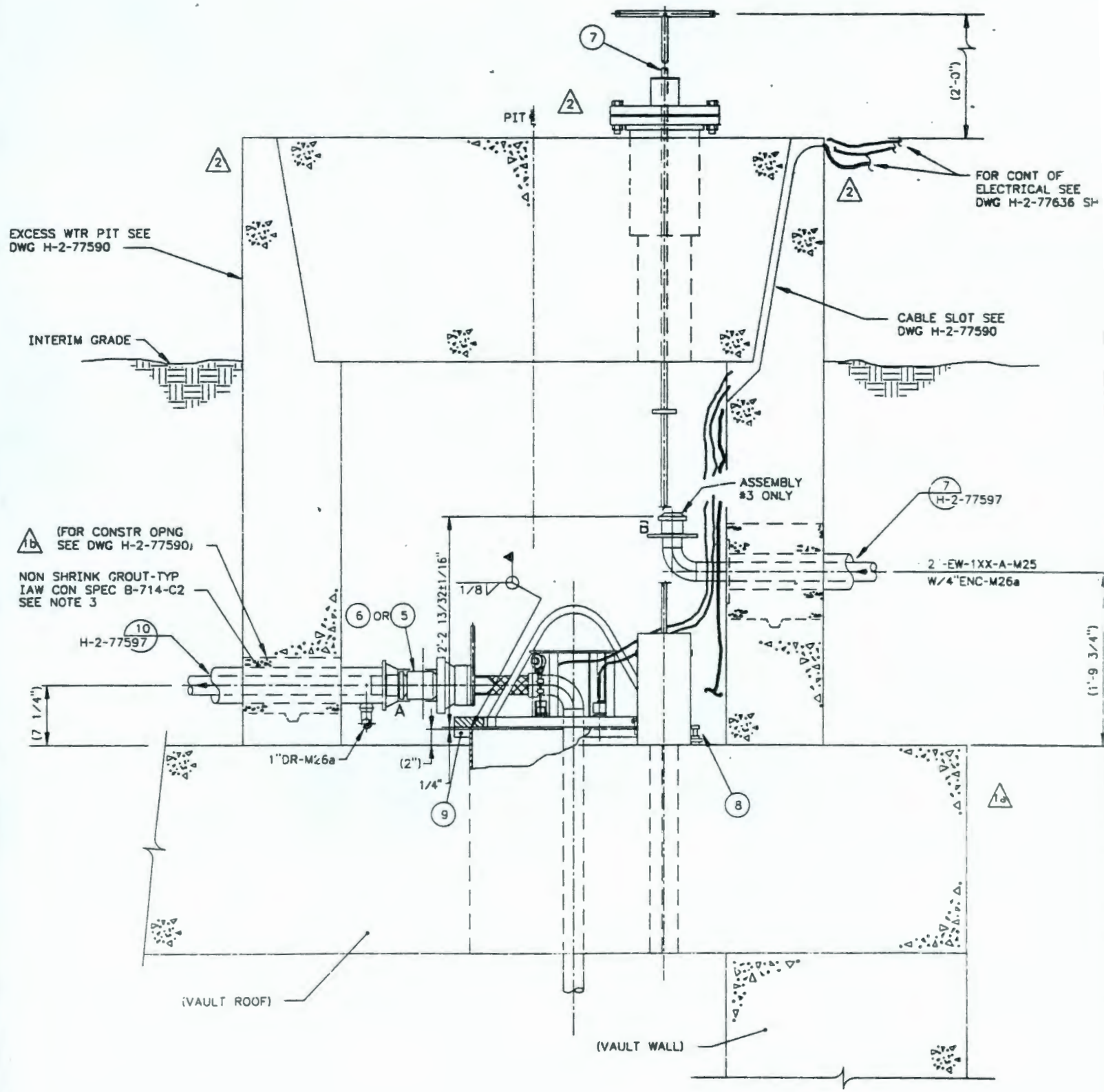
SCALE: 1"=1' 0"

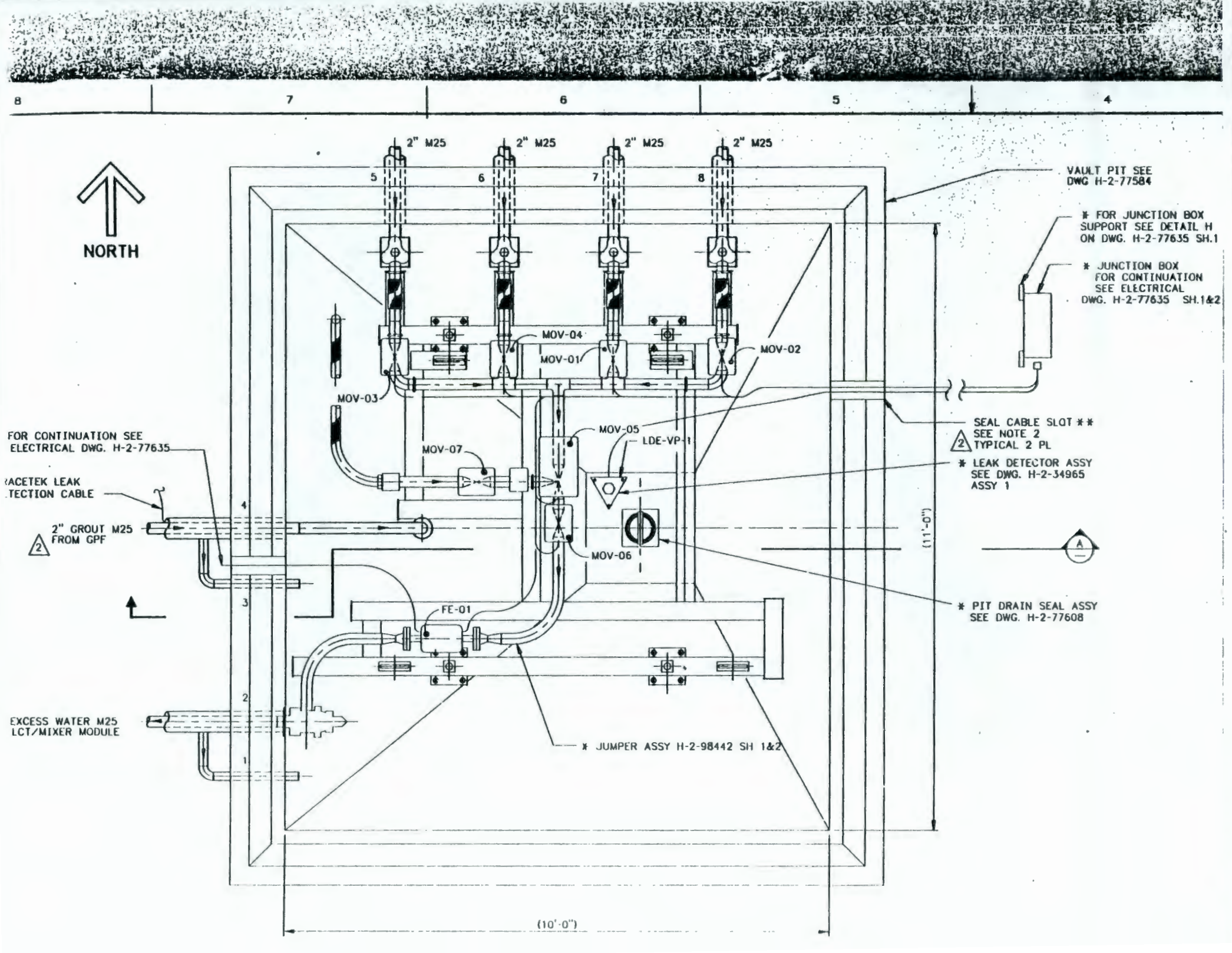
A

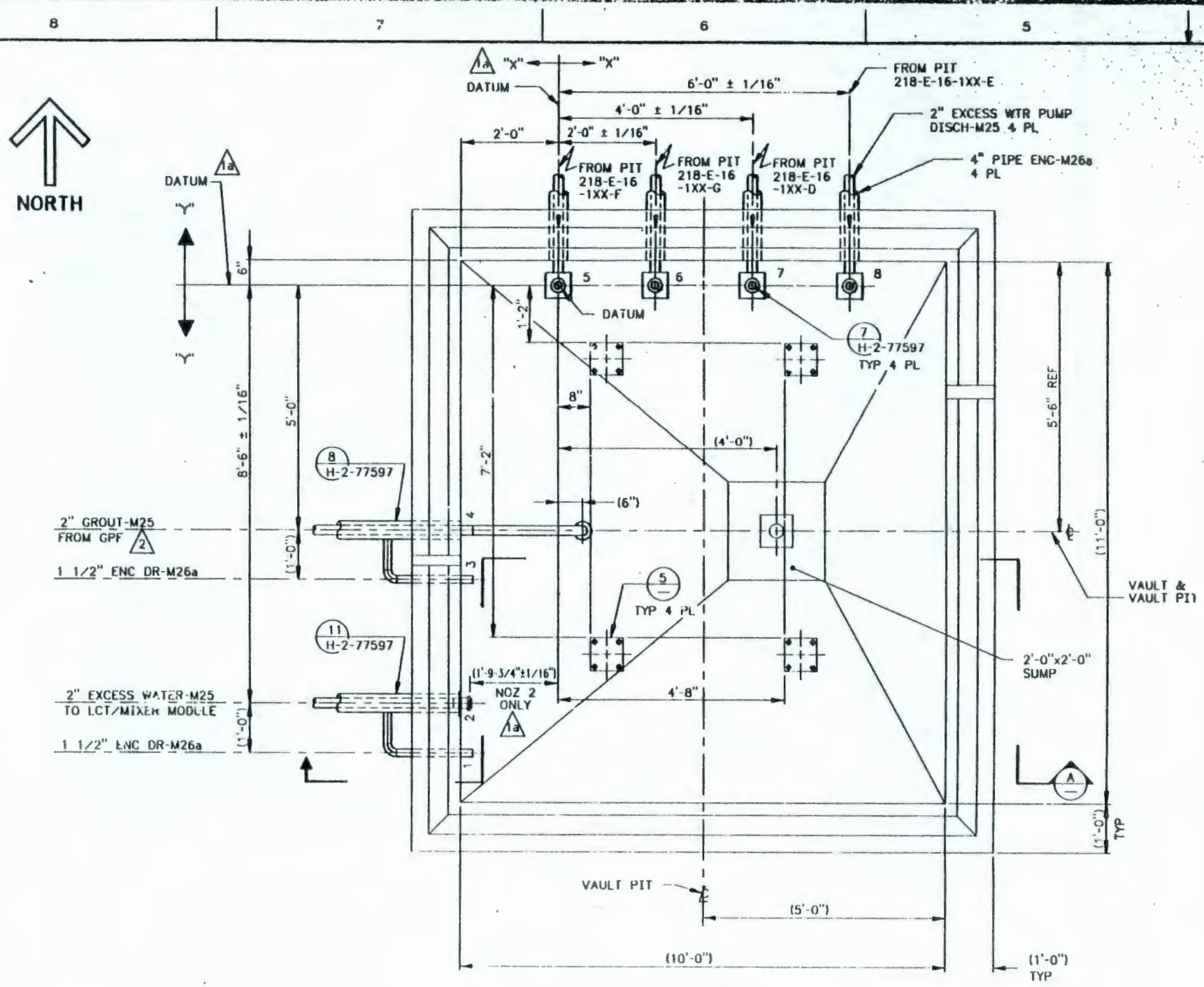
NUMBER	TITLE	REFERENC
	DRAWING [illegible] QUALITY LIST	NEXT USED ON

H-2-77573	DRAWING LIS
NUMBER	

8 7 6 5 4


7
2
PIT
(2'-0")
2
FOR CONT OF ELECTRICAL SEE DWG H-2-77636 SH
2
EXCESS WTR PIT SEE DWG H-2-77590
CABLE SLOT SEE DWG H-2-77590
INTERIM GRADE
ASSEMBLY #3 ONLY
7 H-2-77597
1b (FOR CONSTR OPNG SEE DWG H-2-77590)
2"-EW-1XX-A-M25 W/4"ENC-M26a
NON SHRINK GROUT-TYP IAW CON SPEC B-714-C2 SEE NOTE 3
1/8
6 OR 5
2'-2 13/32±1/16"
10 H-2-77597
(1'-9 3/4")
(7 1/4")
A
1"DR-M26a
(2")
1/4"
9
8
1a
(VAULT ROOF)
(VAULT WALL)

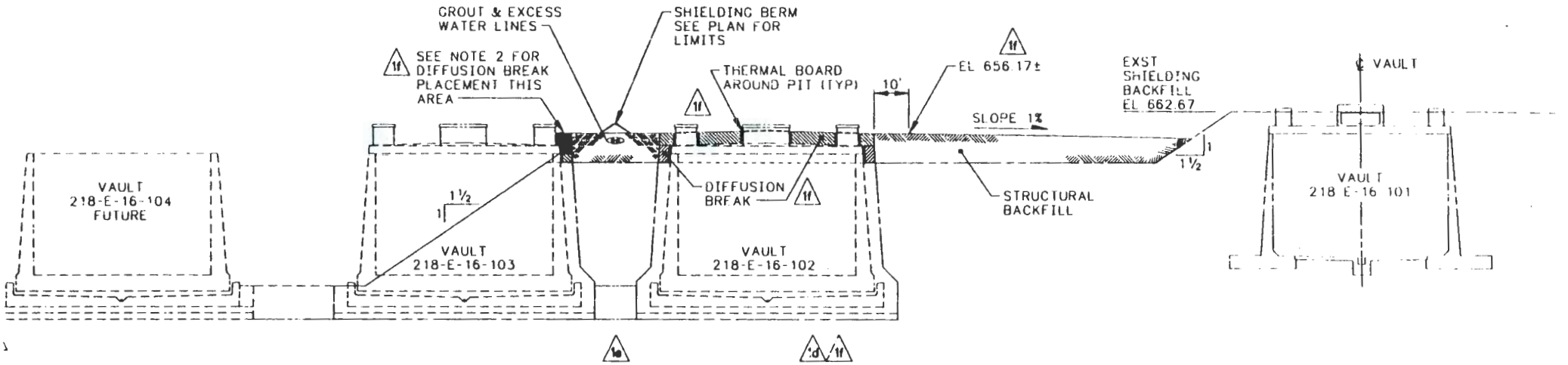

8
7
6
5
4
NORTH
2" M25
2" M25
2" M25
2" M25
5
6
7
8
VAULT PIT SEE DWG H-2-77584
* FOR JUNCTION BOX SUPPORT SEE DETAIL H ON DWG. H-2-77635 SH.1
* JUNCTION BOX FOR CONTINUATION SEE ELECTRICAL DWG. H-2-77635 SH.1&2
MOV-04
MOV-01
MOV-02
MOV-03
MOV-05
LDE-VP-1
MOV-07
SEAL CABLE SLOT ** SEE NOTE 2 TYPICAL 2 PL
* LEAK DETECTOR ASSY SEE DWG. H-2-34965 ASSY 1
FOR CONTINUATION SEE ELECTRICAL DWG. H-2-77635
(ACETEK LEAK TECTION CABLE
2" GROUT M25 FROM GPF
MOV-06
(11'-0")
* PIT DRAIN SEAL ASSY SEE DWG. H-2-77608
FE-01
EXCESS WATER M25 LCT/MIXER MODULE
* JUMPER ASSY H-2-98442 SH 1&2
(10'-0")



PLAN
VAULT PIT

SCALE: 3/4" = 1' 0"
SHOWN WITH COVER BLOCKS REMOVED

SCALE 1"=40'



SECTION A

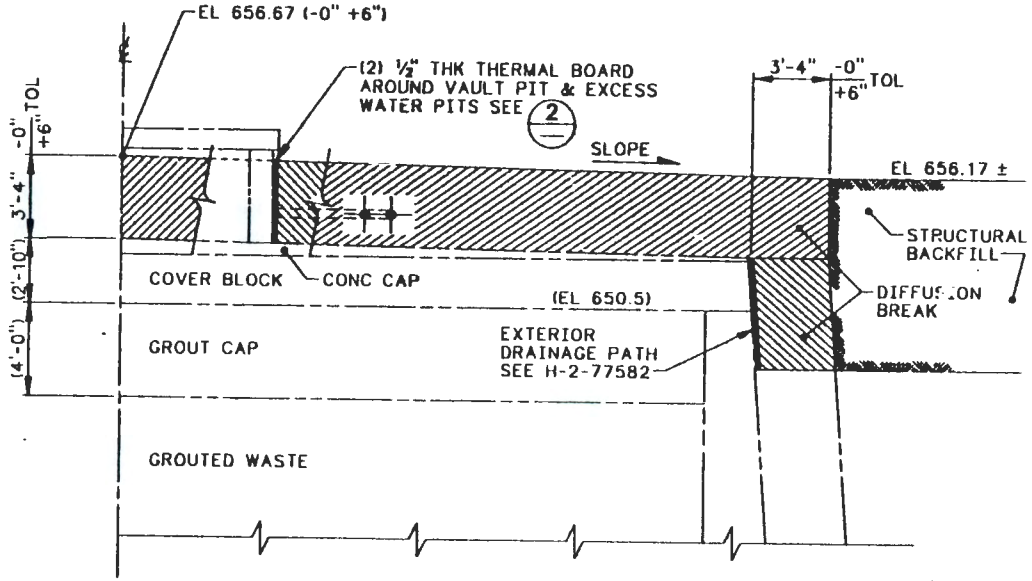
SCALE 1"=20'

NUMBER	TITLE	REFERENCES
DRAWING TRACEABILITY LIST		NEXT USED ON

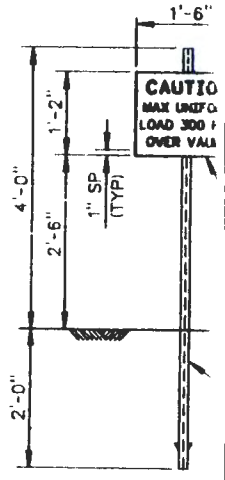
H-2-77573	DRAWING LIST
NUMBER	TITLE

MICROFILMED

7 6 5 4

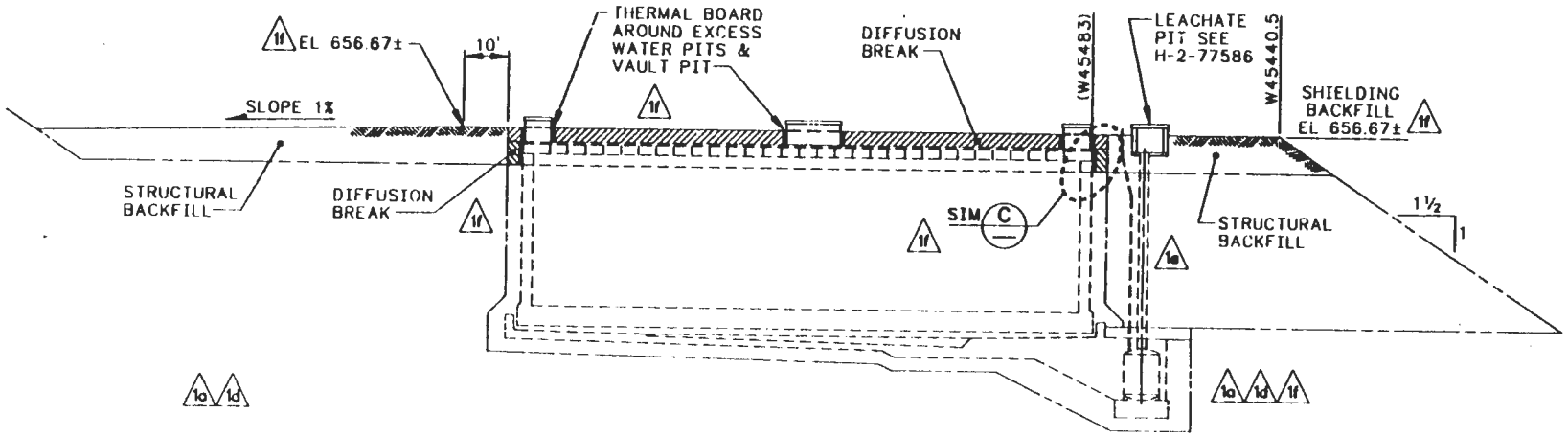


SECTION C
SCALE ¼"=1'-0"



DETAI
SCALE ¾"=1'

B



SECTION B
SCALE 1"=20'

Attachment 8

Grout Treatment Facility
Unit Managers Meeting
June 26, 1991

Grout Monthly Status Report

CORRESPONDENCE DISTRIBUTION COVERSHEET

Author	Addressee	Correspondence No.
R. F. Wood, 3-4731	K. W. Bracken, DOE-RL	9154372

Subject: GROUT MONTHLY STATUS REPORT FOR WASHINGTON STATE DEPARTMENT OF ECOLOGY

INTERNAL DISTRIBUTION

Approval	Date	Name	Location	w/att
		Correspondence Control	R1-03	X
		President's Office	B3-01	X
		R. J. Bliss	R3-04	X
		J. S. Hill	H4-57	X
		D. J. Newland	R2-28	X
		S. M. Price	H4-57	X
		J. H. Roecker	R2-28	X
X TBU by telecon 6/14/91		T. B. Veneziano	B2-35	X
		J. A. Voogd	R4-03	X
X	6/14/91	G. F. Williamson	R4-01	X
		R. F. Wood	R4-01	X
		GFW File/LB	R4-01	X

Westinghouse
Hanford Company

P.O. Box 1970 Richland, WA 99352

June 14, 1991 9154372

Mr. K. W. Bracken, Director
Waste Management Division
U.S. Department of Energy
Richland Operations Office
Richland, Washington 99352

Dear Mr. Bracken:

GROUT MONTHLY STATUS REPORT FOR WASHINGTON STATE DEPARTMENT OF ECOLOGY

Attached is the Grout Monthly Status Report for May. This report is to be transmitted to Washington State Department of Ecology with the enclosed transmittal letter.

Very truly yours,

J. L. Epstein, Manager
Grout Facilities
Defense Waste Remediation Division

mrs

Attachments 2

DOE-RL - C. E. Clark
J. L. Daily
R. O. Puthoff (w/o attachment)
S. H. Wisness

S&WE - J. D. King
T. J. Woebkenberg

Department of Energy
Richland Operations Office
P.O. Box 550
Richland, Washington 99352

Mr. Paul T. Day
Hanford Project Manager
U.S. Environmental Protection Agency Region 0
712 Swift Boulevard, Suite 5
Richland, Washington 99352

Mr. Timothy L. Nord
Hanford Project Manager
State of Washington
Department of Ecology
Mail Stop PV-11
Olympia, Washington 98504-8711

Dear Messrs. Day and Nord:

GROUT MONTHLY STATUS REPORT FOR WASHINGTON STATE DEPARTMENT OF ECOLOGY

Attached is the Grout Monthly Status Report for May.

Sincerely,

Steven H. Wisness
Hanford Project Manager

Attachment
Grout Monthly Status

cc: T. B. Veneziano
R. F. Wood

GROUT MONTHLY STATUS REPORT FOR WASHINGTON STATE DEPARTMENT OF ECOLOGY

FINAL SAFETY ANALYSIS REPORT (FSAR)

- Department of Energy (DOE) is continuing the review for the Revision "A" of the FSAR. Open items are planned to be closed during June in preparation for the functional review of Revision "0" later this summer.

DRY MATERIAL FACILITY READINESS

- Inventoried the parts for the blender bypass modification which will provide an alternate path for discharging an out of specification batch. Two weld neck flanges and the quick disconnect fitting were missing. They are being ordered.

PART B PERMIT

- A management review of the Grout Facility Part B Permit Application was completed May 14, 1991, to verify the accuracy and completeness of the document. Planned application submittal to Ecology is expected in mid September 1991.

PHOSPHATE/SULFATE WASTE (PSW) VAULT

- The core sampling test plan has been routed for approval.

- The PSW vault coring is expected to commence the week of June 24, 1991. The test plan is prepared and the required Job Control System documentation is being prepared. Test cores will be extracted from the nonradioactive ATP tank in mid-June in preparation to finalizing methods for coring the PSW vault.

GROUT SAMPLING PLAN

- WHC comments were returned to Westinghouse Environmental and Geotechnical Services on the first section of the sampling plan, "Sampling Points."

PROJECT TANK 104-AP UPGRADES

- Reviewed Kaiser Engineers resolution of electrical and instrumentation comments on the design of Tank AP-104 Upgrades and found then acceptable.

- Design will complete one month behind schedule.

PROJECT B-714

- Progress on Project B-714, Grout Disposal Vaults 102-105, has been hampered during the period, due to difficulties with applying the asphalt coating within the vaults. Based on field tests, the interior walls will have to be sacked to achieve a coating application that is acceptable. This issue was presented at the May 30, 1991, Unit Managers Meeting in Seattle.

PROJECT W-089

- Bids submitted for the design, fabrication and delivery of the Project W-089, Grout Vault Ventilation System, has been completed. KEH procurement is in the process of reconciling inconsistences with the proposals before a contract can be awarded. Additional CENRTC funding is also needed from Grout Facilities to support Procurement contract.

VAULT EXCESS LIQUID AND LEACHATE REMOVAL SYSTEM

- A draft plan has been completed to document the methods to be pursued to remove excess liquid from the grout vaults.

VAULT EXHAUSTERS

- Alternate vault exhausters from existing equipment are being investigated. It may be possible to modify surplus exhauster equipment for use on the vaults.

GROUT FORMULATION

- The criteria document, "Grout Formulation Material Specification," WHC-SD-WM-CSD-003, was issued for final review on May 17, 1991.

- Two letters were issued to Oak Ridge National Laboratory reaffirming the agreed to schedule and activities for their grout reformulation work.

GROUT PROGRAM BASELINE

- The Tri-Party Agreement change request negotiations have concluded and a 27-month delay to the interim and major milestones are planned. A program change request package is being assembled including red-lined level 2/3 program baseline schedules, marked up Cost Account Authorizations, and updated Activity Data Sheets.

VERIFICATION OF GROUT PERFORMANCE

- Ecology has expressed its willingness to evaluate nondestructive techniques for verification of grout performance. Therefore, technical conversations were initiated with the University of California-Davis, Department of Electrical Engineering and Computer Science.

WASTE TRANSFER

- A meeting was held on April 26, 1991 to detail status of actions for the transfer of 241-AN-106 concentrated phosphate waste to the 241-AP-102 Grout feed tank. Work packages have been prepared for all work and transfer should be able to occur in late June 1991.

Attachment 9

Grout Treatment Facility
Unit Managers Meeting
June 26, 1991

Grout Treatment Facility "Draft" NOD Response Table

No.	Comment/Response	Ecology Concurrence
1.	Page 1-1. Although the U.S. Government holds legal title to this facility, the DOE-RL, for purposes of defining RCRA facilities, is considered the legal owner of this facility. A statement to this effect should be added. (51 FR 7722) **DOE-RL/WHC Modified Response: Text was modified to read, "The Hanford Site is owned by the U.S. Government and managed by the U.S. Department of Energy-Richland Operations Office (DOE-RL). For purposes of RCRA and WAC 173-303, the DOE-RL is the owner/operator and Westinghouse Hanford is a co-operator, with DOE-RL, of certain hazardous waste management units on the Hanford Site." [p 1-1, ln 9-16].**	03/16/90
2.	Page 1-1. The Grout Treatment Facility (GTF) must also include the Dry Materials Facility (DMF). The blending of this material is an integral aspect of the grout treatment process and must therefore be reviewed as part of this application. [173-303-040(30)] **DOE-RL/WHC Response No. 1: The DMF will not be included as a regulated facility under RCRA. The DMF does not treat, store, or dispose of dangerous waste. Materials received and produced by the DMF are products; therefore, the DMF is not subject to regulation under RCRA. Text will remain unmodified.** Ecology Response: Although the DMF does not treat, store, or dispose of dangerous waste, it is an integral aspect of the grout treatment process. The DMF requires critical oversight to ensure the proper and consistent feed to the transportable grout equipment. Accurate blending of the dry materials is essential to successful grouting operations. General permit conditions in state dangerous waste regulations require the permittee to "properly operate and maintain all facilities and systems of treatment and control installed or used by the permittee to achieve compliance with the conditions of the permit." This regulation also specifies requirements for "proper operation and maintenance." Therefore, the DMF must be included in the permit application by addressing the following issues: 1) personnel training, 2) quality assurance/quality control plans, 3) a contingency plan for unexpected shutdown of the DMF, and 4) an inspection program. [173-303-810(6)] **DOE-RL/WHC Response No. 2: The inspection of the DMF has already been covered in Chapter 6, Section 6.3 of the permit application. Text has been modified to describe the activities affecting material quality control required to ensure proper and consistent feed to the GTF. This will include the items requested by Ecology. [p 1-2, ln 47-51; p 1-3 ln 1-2; p 3-34, ln 35-36 and 40-41; and p 3-35 ln 1-4]**	01/10/91

No.	Comment/Response	Ecology Concurrence
3.	Page 1-7. All references listed here, as well as throughout this application, must be made available for review, upon request, to any regulatory agency or public commentor. A statement to this effect must be made. [173-303-840(6)] **DOE-RL/WHC Response: A statement has been added to the text regarding reference availability. [p 1-6, ln 21-33]**	01/23/90
4.	Page 2-1. Washington State Dangerous Waste Regulations (WAC 173-303) were revised in January 1989. The application should reflect this most current version. Please update. [173-303-806(3)] **DOE-RL/WHC Response: Text has been modified to delete the date. The reference will imply the latest version of WAC 173-303 at the time of issuing the permit. [p 15-12, ln 40-41]**	01/23/90
5.	Page 2-4. The permit application must address the most current design. The definitive design now scheduled for submittal in September 1989 will be reviewed before issuance of the permit. Therefore, all statements in this application which address the proposed, definitive design should be amended after the incorporation of this information. **DOE-RL/WHC Response: Design reports have been incorporated and the referenced submittal date deleted. [App 4I]**	02/26/90
6.	Page 2-5. Is the GTF transfer piping above or below ground? How is this piping marked to identify mixed waste hazards and prevent inadvertent damage? [173-303-310] **DOE-RL/WHC Response No. 1: The transfer piping from the waste feed tank to the Grout Processing Facility (formerly referred to as the Transportable Grout Equipment) is below ground for radiation protection. Radiation signs will be posted above ground along the entire length of the transfer piping to identify pipe location.** Ecology Response: The GTF transfer piping must be appropriately marked to identify mixed waste hazards. A sample mixed waste sign was provided to Westinghouse Hanford personnel during the February 26, 1990, GTF unit managers meeting. This type of identification is consistent with discussions between Westinghouse Hanford's Facility Compliance personnel and Ecology concerning the integration of mixed waste signs at the Hanford Site. Replace 'radiation' with 'mixed waste'. (173-303-310) **DOE-RL/WHC Response No. 2: All facilities used for treating, storing, and disposing of dangerous waste will comply with the sign requirements per WAC 173-303-310(2a). All**	

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aboveground tank systems used for the treatment, storage, and disposal of dangerous waste will be marked with the appropriate radiation and/or dangerous waste labels/signs per WAC 173-303-640(5d). Tank systems within buildings used for the treatment, storage, and disposal of dangerous waste will be marked with the appropriate radiation and/or dangerous waste labels/signs per WAC 173-303-640(5d). Underground piping will not routinely be labeled. Protection of underground piping is accomplished by requiring an excavation permit prior to digging a hole. During the preparation of an excavation permit, an engineer identifies the location of pipelines near the proposed excavation site. Petitions for modification of inspection and labeling requirements were submitted to Ecology in September 1989 (Milestone M-21-01). Milestone M-23-00 of the Calendar Year 1990 Update of the Tri-Party Agreement states that "pending resolution, inspections, and labeling will be performed per existing operations procedures." Text has been modified. [p 2-4, ln 33-37]

Ecology Response No. 3: Section 2.2.1, The 241-AP-02D Waste Pump Pit, Page 2-5. It appears from Response No. 2 that the DOE-RL position is to not mark the transfer piping with dangerous waste or radiation signs. This is unacceptable. Marking the pipe with both dangerous and radiation signs is necessary to provide adequate security and to meet the general operating requirements for tank systems. Regulatory inspectors must be aware of the location and types of hazards when performing routine functions at the Hanford Reservation. In an emergency situation, the time and resources may not be available to determine the location and hazards of underground dangerous waste structures by reviewing paperwork. Furthermore, the arguments given for not marking certain types of mixed waste containers and tank systems in your September 1989 petition are not applicable in this case. The petition is an effort to change sign and labeling requirements in situations where workers will be unreasonably exposed to radiation hazards. Marking the underground transfer piping will not require any additional exposure to workers. Without a resolution on the petitions, determinations on issues such as signing and labeling will be addressed on a case-by-case basis.
Ecology Requirement: The location of the GPF transfer piping must be indicated with a sign or combination of signs identifying the presence of both dangerous and radioactive wastes. These signs should be posted above ground at least every 50 feet along the length of the pipe from the point it exits the tank farm to the point it enters the GPF.
[173-303-640(5)(d) and -310(2)].
DOE-RL/WHC Response No. 3: This issue will be resolved in the Hanford Facility Permit meeting discussions. Text will be modified in accordance with the outcome of these discussions.

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7.	Page 2-6. Typo. "progressive" should be "progressing". **DOE-RL/WHC Response: Text has been modified. [p 2-5, ln 20]**	01/23/90
8.	Page 2-7. Comment #6 also applies to the distribution piping. **DOE-RL/WHC Response No. 1: The transfer piping between the Grout Processing Facility and vaults is below ground and radiation signs will be posted aboveground along the length of the transfer piping to identify pipe location and the nature of the piping.** Ecology Response: Comment #6 also applies to the distribution piping. **DOE-RL/WHC Response No. 2: All facilities used for treating, storing, and disposing of dangerous waste will comply with the sign requirements per WAC 173-303-310(2a). All aboveground tank systems used for the treatment, storage, and disposal of dangerous waste will be marked with the appropriate radiation and/or dangerous waste labels/signs per WAC 173-303-640(5d). Tank systems within buildings used for the treatment, storage, and disposal of dangerous waste will be marked with the appropriate radiation and/or dangerous waste labels/signs per WAC 173-303-640(5d). Underground piping will not routinely be labeled. Protection of underground piping is accomplished by requiring an excavation permit prior to digging a hole. During the preparation of an excavation permit, an engineer identifies the location of pipelines near the proposed excavation site. Petitions for modification of inspection and labeling requirements were submitted to Ecology in September 1989 (Milestone M-21-01). Milestone M-23-00 of the Calendar Year 1990 Update of the Tri-Party Agreement states that "pending resolution, inspections, and labeling will be performed per existing operations procedures." Text has been modified. [p 2-6, ln 27-32]** Ecology Response No. 3: Comment #6 also applies to the distribution piping. **DOE-RL/WHC Response No. 3: This issue will be resolved in the Hanford Facility Permit meeting discussions. Text will be modified in accordance with the outcome of these discussions.**	
9.	Page 2-9. Is the nonradioactive grout used to fill the void space and cover penetrations also a nondangerous waste grout? How long is the grout monolith allowed to cure before filling the last 4 ft of the vault with nonradioactive grout? **DOE-RL/WHC Response No. 1: The void space grout is not a dangerous waste. The radioactive grout will be allowed to cure for a minimum of 28 days before placing the nonradioactive grout in the last 4 ft (void space) of the vault. Both the cement industry**	

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and the grout disposal program have found that the heat released from hydration (curing) reactions is essentially complete by the end of 28 days. The adiabatic calorimetry studies for the current formulation show that the hydration reactions are 90 to 99 percent complete after the first 20 days of curing. The temperature of the grout will be monitored during and after the vault filling process with an array of 64 thermocouples to determine the extent of the grout cure. Leak detection systems underneath the vault and visual observation (e.g., photographs) of the grout surface will verify that excess liquid has been removed before the void space is filled with nonradioactive grout. The text has been revised. [p 2-7, ln 4-6]

Ecology Response: Discuss in detail the criteria which will be used to determine that the grout has solidified. In other words, at what point will the vault be considered a landfill? Some criteria which have been discussed by the unit managers include; 1) nondestructive post-solidification verification results, 2) temperature changes within the vault, 3) results from grout tests with actual waste, 4) the amount of liquid entering the LDCRS, and 5) coring of the vault.

DOE-RL/WHC Response No. 2: The mixed waste grout will be considered to have solidified when the following conditions have occurred:

- The portion of grout placed last shall have cured for a minimum of 28 days
- The heat of hydration at the midpoint of a continuous placement (as measured by the thermocouple trees) will have reached a peak and demonstrate a definite plateau
- Any leachate going into the LCDRS has been determined not to be coming from the grouted waste based on an analysis of the leachate.

and one or both of the following:

- Samples prepared and tested in the laboratory from bottle-on-a-string samples meet the requirements for unconfined compressive strength of 200 psi
- Tests performed on cored (core drilled or tube-in-tube sampler) material demonstrates an unconfined compressive strength which meets or exceeds 200 psi.

Text has been modified. [p 3-23, ln 1-19]

Ecology Response No. 3: Ecology requires that core drilling be performed on at least the first mixed waste vault in addition to the bottle-on-string sampling and non-destructive testing required for every vault. Each of these requirements must be used to verify adequate solidification.

Ecology Requirement: The application must state that verification of solidification includes: 1) non-destructive testing results, 2) temperature changes within the vault,

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3) results from bottle-on string sampling, 4) the cessation of any liquid entering the LDCRS indicating leakage through the primary liner, and 5) coring results. Should these conditions not be met within 60 days of completing the filling of the vault, the 60-day time frame for developing the preliminary recovery plan (see comment 25) will begin.
(173-303-140, -283, and -300)
DOE-RL/WHC Response No. 3: The permit application has been modified to state that the techniques used to verify solidification will include nondestructive testing (NDT), temperature monitoring, bottle-on-string sampling, and core drilling. Core drilling will be performed on at least the first mixed waste vault (Vault 102). Confidence in the NDT and bottle-on-string methods will be gained by comparing the results of these two methods with core drilling results.

NDT, temperature monitoring and bottle-on-string data will be conducted during and after the grout pour. Core drilling, will not begin until after at least a 28 day cure time. In addition, core drilling is a time consuming process. Lab testing, data analysis, report generation and report clearance must be completed prior to submittal of core drilling data to Ecology. Currently these activities are estimated to require at 3-5 months to complete. Ecology will be notified if data from any or all of the above techniques indicate a lack of grout solidification.

Using LDCRS monitoring as a method of determining solidification is not appropriate as this liquid could be coming from other sources (see RAP, Appendix 7A). Sample testing (pH, Gamma Energy Analysis [GEA]) will determine whether the liquid is leachate from the vault.

10. Page 2-13. List the dry solids, and their quantities, actually used for the phosphate/sulfate waste campaign and those which are intended for use in the following campaigns.
DOE-RL/WHC Response No. 1: The amounts of dry material used for double-shell tank grout, per campaign, has been provided in the revised permit application. [p 2-9, ln 1-9]
Phosphate/sulfate waste has been determined to be nonhazardous. Information covering phosphate/sulfate waste designation was provided to Ecology on December 12, 1989.

Ecology Response: Although the phosphate/sulfate waste vault is not part of this application, it is beneficial to correlate data, problems, successes, etc., to the mixed waste vaults. It is, therefore, necessary that Ecology be provided with all data, reports, etc., which have resulted from the phosphate/sulfate waste campaign. Please provide all such information to our office as it becomes available. As part of this requirement, please

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	provide our office with a copy of the video tapes produced within the vaults during this campaign and a report on the sampling and analysis of the leachate from the phosphate/sulfate waste vault. [173-303-390(3)]	
	DOE-RL/WHC Response No. 2: The video tape made while processing phosphate/sulfate waste, leachate sample analysis, and the campaign report have been previously transmitted to Ecology.	08/30/90
11.	Page 2-13. Fly ash is a potentially dangerous material based upon toxicity criteria. This material must be designated (including aquatic bioassay testing). Similarly the phosphate/ sulfate grouted waste must also be designated (including aquatic bioassay testing). (173-303-070)	
	DOE-RL/WHC Response: The Washington State Department of Ecology issued a certificate of non-designation (84-3) for the Centralia fly ash in 1984. A copy of the certificate of non-designation was included as an Appendix. [APP 2E]	08/30/90
	Phosphate/sulfate waste has been determined to be nonhazardous. Information covering phosphate/sulfate waste designation was provided to Ecology on December 12, 1989.	
12.	Page 2-15. The "Hanford standard flange assembly" should be detailed for our review since it is not typically used outside of the Hanford Reservation.	
	DOE-RL/WHC Response: A detailed figure has been provided. [p F2-7]	01/23/90
13.	Page 2-21. At what location were the flow rates on the Columbia and Yakima Rivers recorded? The average flow rates were calculated from data collected prior to dam construction as well as data collected subsequent to the dam construction. Average and peak flow rates should also be reported as they occurred exclusively after dam construction. This provides the most accurate characterization of flow as it presently occurs.	
	DOE-RL/WHC Response: For this permit application, the Columbia River flow rates were obtained from Priest Rapids Dam, and the Yakima River flow rates were obtained from the Kiona gaging station. The Columbia River has a current average flow rate of 3,500 m^3/s, and the Yakima River has a current average flow rate of 100 m^3/s.	01/23/90
	Peak flow rates are prior to dam construction and would give the worst possible case scenario with the exception of a dam failure. Text has been modified to reflect the current average flow rate. [p 2-13, ln 20-25]	

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14.	Page 2-30. The first sentence of the last paragraph should be rewritten as "The dry material blended at the DMF ...". **DOE-RL/WHC Response: Text has been modified. [p 2-19, ln 6-7]**	01/23/90
15.	Page 3-1. Table 3-2 indicates the presence of approximately 3,000 ppm of organic materials in the waste to be processed. The majority of this concentration consists of organic acids. The West Valley Demonstration Project reported difficulties in grouting materials with 150 ppm of organic acids. Explain why the concentration of organics in the waste to be managed at Hanford's GTF will not adversely effect the solidification process. **DOE-RL/WHC Response: The presence of organic materials in the grout feed material has been accounted for in all formulation development activities. In particular, organic acids and chelating agents have been incorporated in all simulants used for formulation testing and no adverse effects have been seen.** **In addition, Appendix 3D contains data indicating that grouts prepared with actual waste material from Tank 241-AN-106 successfully met formulation criteria and the EP Toxicity test indicated the organic waste was undesignated waste. A report on this testing has been included in the revised permit application. [APP 3E]** **As described in Section 3.4, similar testing using actual waste feed for all campaigns will be performed prior to grouting. Text will remain unmodified.**	03/16/90
16.	Page 3-5. The text here provides justification for the presence of less-than signs (<) in Tables 3-1, 3-2, and 3-3. Does the absence of these signs in Tables 3-2 and 3-3 indicate that all of the constituents on these two tables were detectable, or is their absence due to a typographical error? **DOE-RL/WHC Response: The absence indicates that all constituents listed were detected and this was not a typographical error. The text has been modified referencing Table 3-1 as containing the less-than signs. [p 3-3, ln 16-18]**	01/23/90
17.	Page 3-6. The analysis conducted on each candidate grout feed must be submitted to our office for approval before grouting continues. A statement to this effect must be made.	

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DOE-RL/WHC Response No. 1: This permit application presents an expected waste composition, defines the variability, and establishes the performance requirements for the waste form product. Any waste processed by the GTF will be within the compositional range defined in this permit application and will meet the established waste form performance criteria. The composition of wastes processed by the GTF will be presented in the annual report (Chapter 12.0) and will be available with other facility records. In addition, a checksheet will be provided to Ecology (by 'Certified Mail - Return Receipt' or equivalent) 30 days prior to processing. Grouting will proceed if Ecology does not respond within 30 days after transmission of the letter. Text has been modified. [p 3-26, ln 26-30]

Ecology Response: The checksheet provided to Ecology should contain both the physical and chemical analysis indicated in Table 3-13 along with the detailed organic analysis depicted in Table 3-2. Explain why silver and iron are reported in Appendix 3J, but not listed in Table 3-13. Provide a detailed description of how the mixing is accomplished to simulate the TGE grout mixer. (173-303-300)

DOE-RL/WHC Response No. 2: The check sheet of Appendix 3J does not address physical properties indicated on Table 3-13 as the properties on that Table deal solely with the grouted waste. Appendix 3J will be modified to include physical properties. [APP 3J]

The checksheet of Appendix 3J addresses silver and iron, which are not listed on Table 3-13. Silver and iron determinations result from the same inductively coupled plasma analyses as other metals. Table 3-13 has been modified to include silver and iron. [p T3-14.1, line 21-22]

If organic species identified in WAC-173-303-9904 are determined present, the Appendix 3J check sheet will be modified to address these species. Organic chemical constituents not specifically identified in WAC 173-303-9904 are only of gross concern with regard to set delay of the grouted waste form. Thus, total organic carbon is measured with the methods of Table 3-13, and reported under the Appendix 3J check sheet.

Ecology Response No. 3: Although it is acceptable to compile a list of only the organic constituents detected in a feed or candidate tank which are also found in WAC 173-303-9903 (not WAC 173-303-9904 as indicated in the response) along with their measured concentrations, all chemical analysis data must be attached to the checksheet. Furthermore, the description of how mixing is accomplished to simulate the TGE grout mixer was not provided in your response. (173-303-300)

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Ecology Requirement: The checksheet must identify any detectable organics listed in WAC 173-303-9903 along with their concentration. In addition, all chemical analysis data must be attached to the checksheet. The description of mixing, as requested previously, should be provided in the application.233.
DOE-RL/WHC Response No. 3: The checksheet of Appendix 3J identifies detectable organic constituents listed in WAC 173-303-9904. WAC 173-303-9903, as cited, applies solely to Discarded Chemical Products (U and P wastes). Such U and P wastes are commercial chemical products, identified under WAC 173-303-081, as unused chemicals, their containers, and residue or contaminated soil from the spill of such unused chemicals. It has never been the intent of the GTF to dispose of U and P wastes. Rather, organic constituents under WAC 173-303-9904, when from a listed source, are dangerous wastes and will be so identified in the checksheet of Appendix 3J. In addition, DOE-RL/WHC will submit a complete analytical data package at the time of Appendix 3J checklist submission. This analytical package will include all organic constituents and their concentrations that were detected.

Laboratory scale dry materials are typically blended in a V blender. Laboratory grout slurries are typically blended in a Hobart blender. Procedures have been prepared to assure that laboratory scale blending practices approximate full scale conditions as closely as possible. Likewise, laboratory scale mixing data can provide input to process control parameters for product quality control. A discussion on laboratory blending operations has been provided in the permit application (Rev. 2).

18. Page 3-7. The columns in Table 3-5 are incorrectly labeled. The column which is labeled "mg/g" should be relabeled "Molecular Weight". This quantity is not a compound concentration and should therefore not be located under the "Compound Concentration" column. Please correct.
DOE-RL/WHC Response No. 1: Text has been modified. [p T3-5]

Ecology Response: The columns in Table 3-5 are still incorrectly labeled. Please correct. The 'Equivalent Concentration' column must indicate that the values presented are in percent. To aid in the evaluation of the data presented, indicate the source for determining the toxicity category, e.g., EPA spill tables, NIOSH, etc. According to EPA spill tables, soluble cyanide salts, such as sodium hexacyano iron III, are toxicity category 'A' substances. Therefore, Table 3-5 should be amended and the designation recalculated.
DOE-RL/WHC Response No. 2: The text of Table 3-5 has been modified to read "Equivalent Concentration %." [p T3-5] 08/30/90

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Toxicity categories referenced were from EPA spill tables (40 CFR §302.4). Table 3-5 has been modified to Table 3-6 and include a footnote to this effect [p T3-6]. In addition, the reference has been added.

The application of Table 302.4 from 40 CFR, "List of Hazardous Substances and Reportable Quantities," is limited to specified substances. Although sodium ferricyanide [also known as sodium hexacyanoferrate(III)] is not specifically identified on Table 302.4, Ecology is correct in noting that "Cyanides (soluble cyanide salts), not elsewhere specified" are listed with a toxicity category 'A.' Sodium ferricyanide solubility in water exceeds the Reference Double-Shell Tank Waste concentration. Table 3-5 has been amended and the designation recalculated. [p T3-5]

19. Page 3-9. Explain why a "corrosive" environment (pH>12.5) complies with DST specifications for corrosion protection of tanks and piping.
DOE-RL/WHC Response: The caustic concentration of the waste can be high enough that the environmental laws could classify the waste as 'corrosive.' However, corrosive is a relative term. A solution that is corrosive to one material is not necessarily corrosive to all materials. 09/07/90

The principal concern from a materials compatibility standpoint is the corrosion of iron due to caustic. To determine the regions within which corrosion occurs, a Pourbaix-type diagram is useful (Reference 1). This is a diagram that relates pH and electrical potential (Eh) for a metal. This diagram indicates that at a pH of greater than 10, the iron is in a passive condition. Bickford (Reference 2) sums up the corrosion of carbon steel as:

"The net result of Eh and pH on the dissolution of iron or carbon steel is ..., that the Eh/pH diagram is divided into regions of immunity, corrosion and passivation. In the immunity region, there is no thermodynamic driving force for dissolution, and no corrosion occurs. In the corrosion region, there is sufficient driving force for corrosion, and corrosion proceeds. In the passivation region, there is sufficient driving force for corrosion, but the initial corrosion results in the formation of a protective hydrated oxide layer which restricts corrosion to negligible levels. Thus, even though the dissolution of iron is predicted at all pH and Eh conditions, it can be ignored for many conditions in water at pH 10 and higher."

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In addition to the more general thermodynamic studies on iron, there have been several studies that have been site specific. These are summed up in a publicly released document (Reference 3). These coupon studies looked at typical steels used at the Hanford Facility with
typical synthetic wastes. Various temperatures and waste compositions were studied. The results of these studies were to set waste tank content composition standards. The standards were set at levels which ensure that the carbon steel tank walls corrode at less than a mil (.001 inch) a year.

References:

1) Pourbaix, Marcel, *Atlas of Electrochemical Equilibria in Aqueous Solutions*, National Association of Corrosion Engineers, 1974.
2) Bickford, D. F., DPST--86-275, *Thermodynamic Model of Waste Tank Corrosion With Implications to Pitting During In-Tank Processing, Washing and Storage*, February 14, 1986.
3) Divine, J. R., W. M. Bowen, D. B. Mackey, D. J. Bates, K. H. Pool, PNL-5488, *Prediction Equations for Corrosion Rates of A-537 and A-516 Steels in Double Shell Slurry, Future PUREX and Hanford Facilities Wastes*, Pacific Northwest Laboratory, Richland, Washington, 1985.

Text has been modified. [p 3-6, ln 30-50; and p 3-7, ln 1-12]

20. Page 3-10. The formation of hydrogen gas and slurry growth have been reported in the double-shell tanks. A discussion of these two mechanisms should be presented as they relate to reactivity and/or ignitability.
DOE-RL/WHC Response No. 1: The generation of hydrogen by radiolysis of water in the grout, or grout feed material, does not present a reactivity or ignitability concern for the GTF as this accumulation is prevented by either active ventilation systems (feed tank, processing module, and vault during operation), or by not allowing pockets of hydrogen to accumulate by eliminating void spaces (vault after closure).

The mechanism identified as the cause of slurry growth is the generation and trapping of gas pockets in the waste. The slurry growth phenomenon only has been observed in wastes which are highly concentrated, viscous, and have a tendency to form crusts which prevent the rapid escape of any generated gases. The grout feed material will not exhibit slurry growth as it

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is low in viscosity, and because the formation of a crust will be prevented by the mixing of the grout feed material. This will prevent the accumulation of gas pockets in the waste and, therefore, slurry growth will not occur. Text will remain unmodified.

Ecology Response No. 2: Based upon information provided to Ecology at the January 4, 1991 unit manager meeting, it is our understanding that a concern has arisen regarding the generation of hydrogen gas within the vaults. This concern has led to a design change which provides gas vents from the LDCRS, through the asphalt cocoon, to the soil for the purpose of relieving any hydrogen gas which may accumulate. All data regarding the generation of hydrogen gas, expected volumes, rates, etc. must be provided to our office as soon as possible. Engineering calculations, assumptions, and other data relevant to the design of the proposed venting system must also be provided.
DOE-RL/WHC Response No. 2: Information presented at the January 4, 1991, Unit Managers meeting discussed design changes have been made to mitigate any problems that may arise from radiolytic hydrogen generation. These design changes were made to assure the safety of the disposal system, based on conservative assumptions for hydrogen generation and venting. The information relevant to hydrogen generation and venting was provided to Ecology at the March 22, 1991, GTF Unit Managers Meeting.

21. Page 3-12. The reference to Table 3-8 is incorrect. Please determine proper reference and amend.
DOE-RL/WHC Response: Text has been modified to reference Table 3-1. [p 3-9, ln 31] 01/23/90

22. Page 3-13. Designation by carcinogenicity is based, in part, on waste quantities exceeding 220 pounds (100 kilograms), not 400 pounds. Please correct. [173-303-084(7)].
DOE-RL/WHC Response: Text has been modified. [p 3-10, ln 37] 03/16/90

23. Page 3-13. The last sentence on this page is confusing. In light of the fact that specific conductance is high in relation to groundwater properties, explain why specific conductance would not be a useful release detection parameter in the groundwater. Unless we state otherwise, specific conductance must be measured. [173-303-645(4)(a)]
DOE-RL/WHC Response: Specific conductance of the waste is not being measured as it is uniformly high for all wastes to be processed by the GTF. Therefore, knowledge of the specific conductance of any given waste batch processed by the Grout Processing Facility does 01/23/90

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not add to the usefulness of specific conductance as a release detection parameter. The specific conductance will be measured in the groundwater. The text has been modified to clarify this point. [p 3-11, ln 2-13]

24. Page 3-15. As is stated, the use of technetium-99 as a tracer is highly dependent on the background concentration. This concentration may be as high or higher than that found in the tanks or grout system. There is some data already available for the 200 Areas, but perhaps not for this immediate area. This historical data should be compared to newly gathered data.
DOE-RL/WHC Response: The commentor is correct in noting that the background Tc-99 concentration may affect the ability to use Tc-99 as a groundwater monitoring parameter. 01/23/90

The recent measurements of Tc-99 in the upgradient wells at the Transportable Grout Equipment site (Wells 2-E25-25 and 2-E25-32) will be used to determine the Tc-99 concentration difference (upgradient - downgradient) that would be required to detect a leak.

The calculations in Appendix 5C-2 have been repeated using this value and the corresponding minimum detectable leak rate calculated. The calculations show that it is still possible to detect a very small leak using Tc-99 as a tracer despite the background groundwater concentration. Text has been modified accordingly. [p 3-11, ln 42-45; and APP 5C-2]

25. Page 3-17. As is stated here, this treatment technology involves "complex chemistry" which "does not allow a precise calculation of treatment effectiveness". With this in mind, what actions can and will be taken should the slurry, or portions of the slurry, not set after being pumped into the vault?
DOE-RL/WHC Response No. 1: A significant amount of up front testing and waste characterization is conducted to ensure this does not occur. This testing includes sampling of the waste before processing and the preparation of grouts from that waste to ensure that the grout will solidify and meet the treatment standards established by this permit (for details see Chapter 3.0, Section 3.4). Ecology will be provided with a final test report on laboratory work performed with actual waste.

If, despite these procedures, the grout slurry does not solidify after being pumped to the vault, the slurry will be managed as dangerous waste in a surface impoundment until a retreatment plan for the waste is developed and implemented. This retreatment plan would be submitted to Ecology for approval prior to implementation. In addition, grout processing

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would not resume until the reasons for the failure were understood and measures to prevent future recurrence were established and implemented. [p 3-32, ln 25-29; and p 7-1, ln 25-33]
Ecology Response: Line 3, insert the following: "The retreatment plan will consist of in situ resolidification or removal from the vault for further processing. Under no circumstances will unsolidified wastes remain in the vault."

Line 4, edit to read: "for approval within 60 days of determining the waste has not solidified and before being implemented."
DOE-RL/WHC Response No. 2: As discussed at the March 26, 1990, GTF Unit Managers Meeting, a 'preliminary recovery plan' will be submitted to Ecology 60 days after determining that the grout did not properly set up. The 'preliminary recovery plan' would discuss the options and studies being undertaken by the DOE-RL and WHC to recover from this event and achieve final disposal in accordance with the landfill requirements. The final plan will be approved by the appropriate regulatory agencies prior to implementation. Text has been modified in Chapter 7.0. [p 7-1, ln 25-33]

Ecology Response No. 3: Although the vaults will be considered surface impoundments for purposed of filling them with a liquid, Ecology's review and acceptance of this facility is centered on the premise that the grout slurry will solidify and become a monolith acceptable for land disposal. Ecology is willing to permit the use of the vaults as a temporary surface impoundment, not as a long term storage or disposal impoundment.
Ecology Requirement: The application must indicate that both the landfill requirements and the performance criteria for solidification established in the permit will be achieved upon completion of the retreatment plan. [173-303-140(4) and -283]
DOE-RL/WHC Response No. 3: The final waste form will comply with the landfill requirements. In particular, the final waste form will comply with EPA Guidance Document EPA/530-SW-86-016, "Prohibition on the Placement of Bulk Liquid Hazardous Waste in Landfills." This document specifies the particular tests that the waste must pass in order to comply with the environmental laws concerning the disposal of bulk liquids in landfills. As specified in the previous response, the appropriate regulatory agencies will approve any retreatment plan prior to implementing. This will allow the regulatory agencies to make an informed decision that is consistent with the current regulations and with the specific circumstances of the event taking place. In addition, due to the unknown nature of the possible anomalies of solidification in this material, the retreatment plan will justify in detail any deviation from the landfill requirements and solidification performance criteria. No deviation will be allowed unless specific written approval from Ecology is received. Text has been modified.

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26. Page 3-17. Post-curing verification of the actual vault monolith must be conducted to prove the effectiveness of this treatment process. Discuss the type of verification to be utilized. [173-303-283]
DOE-RL/WHC Response No. 1: The actual verification techniques to be used are being developed. A discussion of the options for post-curing verification has been added to the permit application. [p 3-22 through 3-26]

Ecology Response: Post-curing verification of the grout monolith must include the coring of, at least, the first mixed waste vault. Upon correlation of this coring (and the coring conducted at the phosphate/sulfate waste vault) to nondestructive verification methods, the need for coring additional vaults will be determined. Although coring may be partially suspended, all vaults must be designed to accommodate such coring should this activity be required in future vaults. (173-303-283 and -300)
DOE-RL/WHC Response No. 2: The first mixed-waste vault will be physically sampled to ensure that the grout has solidified, and to demonstrate that data from other types of testing can be relied upon to verify that solidification has occurred.

Compressive strength and leach testing will be performed on the samples. In addition, testing may be performed to provide a more complete description of the cured grout.

Text has been modified. [p 3-25, ln 27-30]

Ecology Response No. 3: The response does not explicitly state that coring will be conducted.
Ecology Requirement: The term "physically" must be replaced with "core" in the response. The application must also state that a report will be submitted to Ecology with a comparison of the coring results to the bottle-on-string sampling and the non-destructive testing results. Ecology's review of this report may lead to the partial suspension of future vault coring. The application must also state that all vaults will be designed and built to accommodate such coring should this activity be required in future vaults.
(173-303-140, -283 and -300)
DOE-RL/WHC Response No. 3: The permit application will state that core drilling will be conducted until confidence in other verification methods increases such that core drilling is no longer necessary. The permit application will also state that a report will be transmitted to Ecology with a comparison of core drilling results to the bottle-on-string and NDT results, and that Ecology's review of this report may lead to the suspension of the requirement to core drill future vaults. The core drilling plan will be submitted to Ecology

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for review. Coring drill will proceed if Ecology does not respond within 60 days. All vaults will be designed to accommodate sampling, including core drilling. Sampling is expected to be conducted through 4 inch risers installed for sampling access and cold cap placement. Text has been modified (Rev. 2).

As presented to Ecology at the October 26, 1990, GTF Unit Manager's meeting, core drilling will have negative schedule and resource impacts on the Grout Program. This will impact the ability to meet current Tri-Party Agreement Milestones.

27. Page 3-17. A means to sample the grout slurry as it passes from the pump to the vault should be developed. This will allow sampling of actual feed material for lab testing. [173-303-300]
DOE-RL/WHC Response No. 1: The mixed waste vault design provides access for obtaining grout samples from the vault. Text will remain unmodified.

Ecology Response: The text must be revised to indicate that samples can be taken from the vault. How often will grout slurry samples be taken? What type of analysis will be done? The results of this analysis should be compared to both laboratory scale testing done on actual waste and the core samples from the vault. The comparison of these three types of samples may lead to the partial suspension of vault sampling or vault coring. (173-303-300)
DOE-RL/WHC Response No. 2: Samples of the fluid grout (slurry) may be obtained by the bottle-on-a-string method. Samples of the cured (solidified) grout may be obtained by core drilling or by the tube-in-tube method. Bottle-on-a-string sampling and tube-in-tube sampling were demonstrated on the PSW vault placement. These three methods pose hazards to personnel and are very time consuming. The sampling methods and the number of samples to be taken have not be determined. These issues will be pursued in future Unit Manager Meetings to determine final resolution.

Ecology Response No. 3: Bottle-on-string sampling must be conducted on each vault.
Ecology Requirement: The text must be revised to indicate that bottle-on-string samples will be taken from each vault. Describe the frequency of sampling and the type of analyses that will be performed. (173-303-140, -283, and -300)
DOE-RL/WHC Response No. 3: The application will state that bottle on string samples will be taken from the first vault (vault 102). Bottle-on-string sampling results in exposure to operating personnel. The requirement to take samples in subsequent vaults may be suspended

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if another sampling method or NDT are judged to be suitable to verify grout solidification. Text has been modified. (Rev. 2).

A detailed sampling plan will be completed in FY 1991 and provided to Ecology for review. The sampling plan will be finalized if Ecology does not respond within 60 days.

28. Page 3-18. What are the "other materials" which may be combined with DST wastes to bring their composition within the formulation envelope? Will different tank wastes be mixed? If so, is each tank pumped separately to the feed tank or are they combined prior to transfer?
DOE-RL/WHC Response No. 1: The 'other materials' which may be combined with DST waste to bring their composition within the formulation envelope will be other low-level wastes that are present in the tank farms system prior to concentration. These waste streams are described in Section 2.8.

The waste will be blended and combined to the maximum extent practical before they are introduced into the grout feed tank; however, it is expected that in most cases, the individual waste streams that will be blended to form the feed material for a campaign will be transferred into the grout feed tank separately. After the transfer of all waste is complete, the tank will be administratively isolated, mixed, and sampled to verify tank composition as described in Chapter 3.0 of this permit application.

Ecology Response: Which table lists these sources? What page can it be found on? The application should specifically state "other low-level waste materials listed in Table 3-10." The term 'low-level waste' is used in the response but not in the application.
DOE-RL/WHC Response No. 2: Table 3-11 in has been referenced in the text listing the sources. In addition, the term 'low-level waste' has been added to the permit application. [p 3-26, ln 22-24 and 33] 08/30/90

29. Page 3-20. The heat of hydration that will develop in the vault may raise the curing temperature above 90 degrees centigrade. These higher temperatures may have adverse effects on the solidification process. A discussion of how to mitigate this effect along with supporting justification must be provided before a permit can be issued.
DOE-RL/WHC Response No. 1: The grout formulation currently is being adjusted to ensure the temperature does not exceed 90°C. Adiabatic calorimetry is being conducted to provide the

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necessary data to show that grout temperature limits will not be exceeded during operation. This data will be provided to Ecology when available. Text will remain unmodified.

Ecology Response: Have the adiabatic calorimetry tests been completed? The response indicates that it is not, but the application provides some results from 'adiabatic testing'. If the testing is complete, please provide the test procedures and results; if not, the procedures alone should be provided until the results are complete. Temperature effects on the vault, liners, and grouting process are still under review.
DOE-RL/WHC Response No. 2: The adiabatic calorimetry tests have not been completed. The procedure for this testing will be provided in a separate transmittal to Ecology.

Ecology Response No. 3: Concurrence with this issue will be determined after receipt and review of the adiabatic calorimetry procedure and results.
DOE-RL/WHC Response No. 3: Adiabatic calorimetry data and vault thermal modeling indicate that the current grout formulation may exceed 90°C at the centerline of the grout waste form. The modeling data and modeling continue to support that the vault walls and liners will continue to be well below 90°C. A number of options are being pursued to assure grout quality. Options currently under evaluation include feed pretreatment, grout formulation and controlled vault filling. The results of calorimetry and modeling have been presented to Ecology at the July 26, 1990, and the February 26, 1991, GTF Unit Manager Meetings. The technical reports will be given to Ecology in a separate transmital when they are cleared. Text will remain unmodified.

30. Page 3-20. The frictional pressure drop criterion given here, 10 lb_f/in^2 per 100 ft, does not correspond with that given in Table 3-9 (11.2 lb_f/in^2/100ft). Please clarify.
DOE-RL/WHC Response: The correct value for frictional pressure drop limit is 14.0 lb_f/in^2 per 100 ft. The values in Table 3-12 (previously Table 3-9) and the criteria statement have been corrected to this value; the calculation as presented is correct. The text has been modified to 14 lb_f/in^2 per 100 ft. [p 3-30, ln 10; and p T3-12] 03/16/90

31. Page 3-20. Upon substitution of the figures provided into the equation given for frictional pressure drop, it appears that grout slurry densities greater than 11 lb/gal would cause a frictional pressure drop greater than your criterion. In addition, your reference was found to be superseded by a 1987 version. It is recommended that the equation and units be rechecked with the latest edition. Please clarify or provide updated information.

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	DOE-RL/WHC Response: The equation has been rechecked, is correct, and has not been changed in subsequent versions of the reference. The commentor is correct in noting that this equation implies a density limit on the grout slurry product; however, the limit has been incorrectly calculated as 11 lb/gal. The correct limiting value for density, given the values presented, is 12.5 lb/gal.	03/16/90
	When the pressure drop criteria were established, a total of 70 vaults were envisioned to be required for grouted waste disposal. Current projections indicate that approximately 43 vaults will be required; therefore, the allowable pressure drop can be increased due to the shorter pipe length required.	
	The next four vaults will be constructed with schedule-80 distribution piping, and if a change in distribution piping design is required for future vaults, it will be presented with the design media for these vaults as an amendment to this permit application. Text has been modified accordingly. [p 3-30, ln 11]	
32.	Page 3-22. The NRC criterion for unconfined compressive strength has been raised to 60 PSI. Furthermore, it is expected that this limit be doubled to add a factor of safety. It is suggested that your compressive strength criteria be raised to 120 PSI in order to avoid future changes should you choose to meet NRC standards. **DOE-RL/WHC Response: The compressive strength criterion used for the grout disposal program has been changed to 200 psi. Text has been modified to reflect a compressive strength of 200 psi. [p 3-32, ln 37]**	*
33.	Page 3-23. The free liquid criterion was reported as less than or equal to 3.0% at a June 21, 1989, presentation by WHC and USDOE. The text indicates 5%. Which limit will be used? **DOE-RL/WHC Response: The 5% limit will be used. The 3% criterion is used as an internal goal established to encourage minimization of waste generation from grout disposal. Text will remain unmodified.**	03/16/90
34.	Page 3-23. The 40 CFR 268 toxicity levels are based upon the Toxicity Characteristic Leaching Procedure (TCLP) and not the EP Toxicity Test. Therefore, EP Toxicity results cannot be used to evaluate 40 CFR 268 applicability. Please correct. (40 CFR 268.40)	

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	DOE-RL/WHC Response: The reference to 40 CFR 268.40 is incorrect and has been removed.	03/16/90
35.	Page 3-25. Section 3.5.2 does not adequately provide sampling and analysis details of waste feed candidates. The application must provide more detailed information or reference the applicable documents containing these details. (173-303-300) **DOE-RL/WHC Response No. 1: Additional detail regarding the sampling and analysis of candidate waste feed is contained in Sections 3.5.3 through 3.6.3 of the original submittal. Text will remain unmodified.** Ecology Response: Sections 3.5.3 through 3.6.3 provide sampling and analysis details for the feed tank. No details, however, are provided for candidate tank sampling and analysis. If sampling and analysis of the candidate tanks are the same as the feed tank, then provide a statement indicating that is the case. Otherwise, provide details of candidate tank sampling and analysis or a reference to the applicable documents containing these details. (173-303-300) **DOE-RL/WHC Response No. 2: The sampling procedures, sample shipping, sample handling, and analytical procedures described for waste feeds are those which will be applied to candidate waste feeds with the exception that mixing of the candidate tanks is not anticipated. Candidate feed tanks, in general, are not equipped with an internal mixing pump sufficient to provide adequate mixing. In addition, sampling of candidate tanks will address only the supernatant liquor which would be transferred to feed tanks via float and suction pumps. The text has been modified for clarity. [p 3-35, ln 14-19]**	08/30/90
36.	Page 3-25. How are sludges evaluated when sampling candidate wastes? **DOE-RL/WHC Response No. 1: Sludge measurements are taken before sampling. If sludge is present in the feed tank, the mixer is operated to suspend the solids and a minimum of one sample is taken at the sludge level (see page 3-26 of original submittal). Text will remain unmodified.** Ecology Response: Provide a discussion detailing the fact that a method does not currently exist to sample the tank sludge. Explain how sampling near the sludge-liquid interface best characterizes the waste. **DOE-RL/WHC Response No. 2: Methods do exist to sample tank sludge. However, that portion of the text cited addresses sampling of waste feed tanks rather than waste candidate tanks which**	

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may contain greater sludge levels. Methods for sampling waste candidate tanks include the use of a sample core operation such as the current single-shell tank core truck. The sampling and processing of sludge is outside the scope of this permit application. Samples collected near the sludge-liquid interface of waste feed tanks enables evaluation of the entrained solids and dissolved salts. Text will remain unmodified.

Ecology Response No. 3: The discussion is still unclear as to the differences between candidate tank sampling and waste feed tank sampling. DOE-RL/WHC Response No. 2 indicates that "sampling waste candidate tanks include the use of a sample core operation". This contradicts Response No. 2 for comment 35 which states "sampling of candidate tanks will address only the supernatant liquor". This response also indicates that sludge-liquid interface sampling will be conducted on waste feed tanks. This contradicts the text in Section 3.5.3 which states that the feed tank will be blended prior to sampling thus eliminating an interface to sample. Furthermore, the response does not indicate that interface sampling will be done on the candidate tanks which are more likely to have a sludge layer.
Ecology Requirement: It is Ecology's understanding that 1) a sludge measurement will be taken, prior to sampling, from both the candidate tanks and the feed tanks, 2) if sludge is present in a candidate tank, only the supernatant liquid will be sampled to include at least one sample location near the sludge-liquid interface, and 3) if sludge is present in the feed tank, sampling will not occur until after the mixer has been operated and will include at least one sample location below the sludge level which existed prior to mixing. These statements should be verified and the application text should be edited to indicate how sampling is effected by the presence of sludge. (173-303-300)
DOE-RL/WHC Response No. 3: Although no sludge layer is anticipated in the feed tanks, Ecology's understanding of the sampling process is correct. The text has been revised to state that if a sludge layer is found, the feed tank will be mixed and the sampling done in such a way as to ensure that at least one sample is taken from the depth of the previously identified sludge layer. The candidate feed tank will not have the sludge sampled. Text has been modified. [p 3-36, ln 20-23]

37. Page 3-25. Do sampling procedures change if the candidate waste must be "blended"? (173-303-300)
DOE-RL/WHC Response No. 1: The final waste feed sampling always is conducted after the tank has been mixed using the in-tank mixer; therefore, changes are not required to account for the blending of waste. Text will remain unmodified. 01/23/90

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38. Page 3-38. Certain radionuclides should be included in toxicity testing. These radionuclides are not only considered radioactive but also toxic (i.e., uranium).
DOE-RL/WHC Modified Response No. 1: Under Section 1004 (27) of RCRA, source, special nuclear, and byproduct material, as defined in the Atomic Energy Act (AEA), is excluded from the definition of solid waste. The AEA, Section 11 (aa), defines special nuclear material as "plutonium, uranium enriched in the isotope 233 or in the isotope 235,... or any material artificially enriched by any of the foregoing..." Section 11 (z) of the AEA defines source material as "uranium, thorium,... or ores containing one or more of the foregoing materials..." Because the uranium is not a solid waste, it is not subject to regulation under RCRA or the Washington Dangerous Waste Act.

Byproduct material is also excluded from the definition of solid waste. In 10 CFR 962, the Department of Energy has declared that the chemical constituents of the byproduct material will be subject to RCRA and that the radionuclides in the material will be subject to regulation under the AEA. Therefore, the requested information on radionuclides will not be provided. Text will remain unmodified.

Ecology Response: Washington State Dangerous Waste Regulations do not exclude source, special nuclear, and by-product materials as does the federal RCRA program. Therefore, any radionuclides which exhibit toxicity, e.g., uranium, must be included in toxicity testing. (173-303-071)
DOE-RL/WHC Response No. 2: The Grout Treatment Facility NOD Response Table, presented at the February 26, 1990, Unit Managers Meeting, explained that the basis for regulation of a federal activity by Ecology must be found in an enabling federal statute. The federal statute at issue, the RCRA, specifically excludes from the definition of 'solid wastes,' source, special nuclear, and byproduct materials, as defined by the *Atomic Energy Act of 1954* (AEA), as amended, since these nuclear materials (including uranium) are all regulated exclusively under the AEA.

Since Congress has specifically excluded source, special nuclear, and byproduct materials from the definition of 'solid waste' and federal facilities are only authorized to comply with requirements related to 'solid waste' (as defined in RCRA), an attempt by a state to broaden the definition of 'solid waste' to regulate these materials at a federal facility is constitutionally invalid. Recognition and agreement that separate AEA and RCRA (or state)

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	regulatory programs apply to the radioactive component and the nonradioactive component, respectively, of radioactive mixed waste is also found in the October 1989 joint guidance document issued by the EPA and the NRC.	
	Ecology Response No. 3: The regulation of radionuclides is currently under investigation. **DOE-RL/WHC Response No. 3: This issue will be resolved in the Hanford Facility Permit meeting discussions. Text will be modified in accordance with the outcome of these discussions.**	04/29/91
39.	Page 3-43. It appears that the generator is the Tank Farm Surveillance and Operations Department. The transporter is also the T.F.S. & O. Department. Is the receiver and operator of the GTF also the T.F.S. & O. Department? **DOE-RL/WHC Modified Response: There has been a reorganization since this comment was generated. Tank Farm Process Operations is responsible for all tank farm transfers to the grout feed tanks 102-AP and 104-AP. Grout Process Operations is responsible for all transfers from the grout feed tanks to the GTF. Text has been changed to clarify the areas of responsibility for each organization. [p 3-47, ln 33-34, 39 and 41; and p 3-48, ln 5-8, 13-17, and 25-28]**	04/29/91
40.	Page 4-3. How does the slope in the waste feed pipeline allow drainage back to the feed tank and TGE? It seems logical to think it could only drain one way or the other. **DOE-RL/WHC Modified Response: Approximately 85% of the feedline is sloped back to the 241-AP-102 Tank. The remaining piping is sloped to the Grout Processing Facility. This allows drainage back to both sites. Text has been modified. [p 4-3, ln 19-21]**	03/16/90
41.	Page 4-3. How do 90-degree long radius bends alleviate the effect of thermal expansion or contraction? **DOE-RL/WHC Modified Response: Long radius bends minimize the effects of horizontal thermal expansion on the straight pipe sections over standard radius bends by providing a greater surface area for absorption of expansion effects. Text has been modified. [p 4-3, ln 16-19]**	03/16/90
42.	Page 4-3. As per the Part A Application, a large percentage of the waste to be treated at	

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this facility is corrosive. What is the effect of this waste on the carbon steel transfer line and distribution piping as well as other carbon steel equipment used in this facility?
DOE-RL/WHC Modified Response: The caustic concentration of the waste can be high enough that the environmental laws could classify the waste as 'corrosive'. However, corrosive is a relative term. A solution that is corrosive to one material is not necessarily corrosive to all materials. 09/07/90

The principle concern from a materials compatibility standpoint is the corrosion of iron due to caustic. To determine the regions where corrosion occurs, a Pourbaix-type diagram is useful (Reference 1). This is a diagram that relates pH and electrical potential (Eh) for a metal. This diagram indicates that a pH of greater than 10, the iron is in a passive condition. Bickford (Reference 2) sums up the explanation as:

"The net result of Eh and pH on the dissolution of iron or carbon steel is shown in Figure 4, where the Eh/pH diagram is divided into regions of immunity, corrosion and passivation. In the immunity region, there is no thermodynamic driving force for dissolution, and no corrosion occurs. In the corrosion region, there is sufficient driving force for corrosion, and corrosion proceeds. In the passivation region, there is sufficient driving force for corrosion, but the initial corrosion results in the formation of a protective hydrated oxide layer which restricts corrosion to negligible levels. Thus, even though the dissolution of iron is predicted at all pH and Eh conditions, it can be ignored for many conditions in water at pH 10 and higher."

In addition to the more general thermodynamic studies on iron, there have been several studies that have been site specific. These are summed up in a publicly released document (Reference 3). These coupon studies looked at typical steels used at the Hanford Facility with typical synthetic wastes. Various temperatures and waste compositions were studied. The results of these studies were to set waste tank content composition standards. The standards were set at levels which ensure that the carbon steel tank walls corrode at less than a mil (.001 inch) per year.

References:

1) Pourbaix, Marcel, *Atlas of Electrochemical Equilibria in Aqueous Solutions*, National Association of Corrosion Engineers, 1974.

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2) Bickford, D. F., DPST--86-275, *Thermodynamic Model of Waste Tank Corrosion With Implications to Pitting During In-Tank Processing, Washing and Storage*, February 14, 1986.

3) Divine, J. R., W. M. Bowen, D. B. Mackey, D. J. Bates, K. H. Pool, PNL-5488, *Prediction Equations for Corrosion Rates of A-537 and A-516 Steels in Double Shell Slurry, Future PUREX and Hanford Facilities Wastes*, Pacific Northwest Laboratory, Richland, Washington, 1985.

Text has been modified. [p 3-6, ln 30-50; and p 3-7, ln 1-12]

43. Page 4-3. How much leakage must occur before leak detection sensor (LDE-621) is activated? This figure should be provided for all leak detectors in the GTF.
DOE-RL/WHC Response: The leak detector LDE-621 is an electrode probe wire suspended into a horizontal section of the annular drain pipe, 0.5 inch from the bottom of the pipe. Assuming no coating or friction effects in the piping, an alarm will be activated after approximately 0.4 gal has leaked. Leak detection sensors in pits are similar probes but mounted in a tripod unit activated when liquid is greater than 1.0 inch. Thus, volumes in the pits depend on pit size. The leak detection cable in the annular space piping detects a leak as small as a drop. Volumes have been calculated and provided. [p T4-2] — 02/26/90

44. Page 4-4. The cover blocks should be described. What is their design and function?
DOE-RL/WHC Response: The cover blocks are part of the Liquid Collection Tank (LCT)/Mixer Module. Their design and function are described in Section 4.2.3 of the original submittal. Text will remain unmodified. — 02/26/90

45. Page 4-5. What does the symbol consisting of a circle with radiating lines indicate on Figure 4-1?
DOE-RL/WHC Response: This is a spray nozzle. A notation has been added to Figure 4-1. [p F4-1] — 01/23/90

46. Page 4-7. What is the turn-around time for lab analysis of the dry blend? What is the frequency of this analysis?

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	DOE-RL/WHC Response No. 1: Results are obtained from the analytical laboratories within 4-12 hours after receipt of a sample. These analyses are provided for equipment checkout only, and they are not used routinely for facility operations. Text will remain unmodified.	
	Ecology Response: Please modify the text in accordance with the response. **DOE-RL/WHC Response No. 2: The text has been revised to clarify that this sample point is not routinely analyzed, but can be used to verify equipment operation when required. [p 4-6, ln 5-7]**	08/30/90
47.	Page 4-9. As stated on Page 4-8, "The rate at which dry material is fed to the mixer is important..." in light of this, why add an extra variable to the mixing proportions of dry material and waste feed by recycling baghouse (V33) dust back to the mixer? What are typical rates of baghouse dust production? **DOE-RL/WHC Response: This dust stream is added back to the dry blend feed stream because it is potentially radioactive. This stream is insignificant compared to the normal dry material flow through this line. Maximum flow amounts are estimated at 30 pounds an hour and are inconsequential compared to an approximate 12 tons an hour dry blend feed (9 lb blend/gal with 45 gpm waste feed). Text has been modified. [p 4-7, ln 32-41]**	01/23/90
48.	Page 4-10. What chemical will be used as the fluidizer? What is the function of the fluidizer? **DOE-RL/WHC Modified Response: The fluidizer is not intended to be used. The system is for future capability only. Ecology will be notified if use is anticipated. Text has been modified to discuss the function. [p 4-9, ln 1-6]**	03/16/90
49.	Page 4-10. What chemical will be used as the set regulator? What is the function of the set regulator? **DOE-RL/WHC Modified Response: The set regulator is not intended to be used. The system is for future capability only. Ecology will be notified if use is anticipated. Text has been modified to discuss the function. [p 4-9, ln 8-13]**	03/16/90

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50.	Page 4-10. What is the function of the air deentrainer? **DOE-RL/WHC Response: The air deentrainer is not intended to be used. The system is for future capability only. Ecology will be notified if use is anticipated. Text has been modified to discuss the function. [p 4-9, ln 15-21]**	01/23/90
51.	Page 4-10. It should be noted that tributylphosphate is a dangerous material and that a spill or discharge of this material, or material with which this has been mixed, will be considered a dangerous waste. (173-303-101) **DOE-RL/WHC Response: All spills of material from the Grout Processing Facility will be designated and disposed of in accordance with the applicable regulations. This is, discussed in Chapter 7.0 of the permit application (see page 7-23 of the original submittal). Tributylphosphate was deleted from the text since future use is not anticipated.**	03/16/90
52.	Page 4-10. R05 is the only fluidizer-metering pump, therefore, the sentence beginning with "Fluidizer-metering pumps R05, R06, and R07..." should be amended to read "Metering pumps R05, R06, and R07...". **DOE-RL/WHC Response: Text has been modified. [p 4-9, ln 41]**	01/23/90
53.	Page 4-10. Describe the scenario when each of the three additives might be used. **DOE-RL/WHC Response No. 1: Current formulations for double-shell tank waste do not require the use of any liquid additives.** **The tanks are provided should a liquid additive be required for any reason in the future. If these additives are required, Ecology will be notified of their use through a modification to this permit application. Text will remain unmodified.** Ecology Response: Prior to using any additives, a request for their use must be submitted to Ecology. If Ecology agrees to their use, a permit modification will be made. Include a statement to this effect. (173-303-830) **DOE-RL/WHC Response No. 2: When additives have been selected, the permit application has been modified as appropriate to reflect the necessary information. The text in Section 4.2.2.1 has been revised in a manner similar to the waste feed in Section 3.4.1. [p 4-8, ln 34-38]**	

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Ecology Response No. 3: Although Ecology agrees that a permit modification is required for the use of additives, it cannot be determined at this time what class of modification is required. As per 40 CFR 270.42 and WAC 173-303-830 (October 16, 1990), if the modification is not specially listed in the regulation, it must be submitted as a class 3 modification; or, a request may be submitted to Ecology to treat the modification as a class 1 or 2 along with supporting documentation. Since the additives to be used, quantities, etc. are not known, Ecology cannot make this determination.
Ecology Requirement: Neither the response nor the application should specify which class of modification will be required should the use of additives become necessary.
DOE-RL/WHC Response No. 3: The class of modification will not be included in the permit application. 04/29/91

54. Page 4-11. What decontamination fluids will be utilized?
DOE-RL/WHC Response No. 1: The decontamination fluids to be used have not yet been determined. Whenever possible, water will be used as the decontamination fluid. Any change in decontamination fluid will be submitted to Ecology for a class 1 permit change in accordance with 40 CFR 270.42, Appendix 1. Text will remain unmodified.

Ecology Response No. 2: Provide a discussion indicating that water is currently planned for use as the decontamination fluid and that the use of any other fluid will be requested from Ecology. If Ecology agrees to the alternate decontamination solution, a permit modification will be made. Include a statement to this effect. (173-303-830)
DOE-RL/WHC Response No. 2: Water is currently planned for use as the decontamination fluid. Work has been ongoing to identify additional acceptable decontamination fluids. Any change in decontamination fluid will be submitted to Ecology for a class 1 permit change in accordance with 40 CFR 270.42, Appendix I. Text has been modified. [p 4-11, ln 25-28]

Ecology Response No. 3: Although Ecology agrees that a permit modification is in order for the use of a decontamination fluid other than water, it cannot be determined at this time what class of modification is required. (See comment 53)
Ecology Requirement: Neither the response nor the application should specify which class of modification will be required should the use of a decontamination fluid other than water become necessary.
DOE-RL/WHC Response No. 3: The class of modification will not be included in the permit application. 04/29/91

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55.	Page 4-11. When flushing process piping and equipment, how is it known that all the grout slurry has been purged? If flushing does not commence before the slurry sets in this equipment, what is the disposition of the equipment? **DOE-RL/WHC Response: Pipe pressure at discharge of the grout pump is monitored. Slurry hardening can force replacement of equipment. If any hardened buildup reduces effective pipe radius, thus increasing pressure drop beyond processing capability, new piping may be required and proper disposal of abandoned line would be required. Text has been modified to address dispositioning of equipment. [p 4-11, ln 39-44]**	01/23/90
56.	Page 4-11. What is the destiny of decontamination fluids for each part of the system which may potentially be flushed? **DOE-RL/WHC Response No. 1: Decontaminating process equipment normally would involve discharging solutions to the vault. This liquid would be pumped through the LCT to the tank farm. Decontamination of exterior surfaces in the LCT/Mixer Module would accumulate material in the LCT where it would be transferred back to the tank farms. All grout process equipment can be flushed and the resultant solution is routed to the LCT. Text has been modified accordingly. [p 4-10, ln 22-30]** Ecology Response: Recycling liquids, from a number of sources, into the vault is being investigated. It is our current position that liquids generated during the first mixed waste campaign should be carefully monitored and quantified. Based upon the resulting data, and analysis of their effects on grouting operations, recycling of liquids into future vaults may be permitted. Unless otherwise determined, all decontamination fluids must be routed back to the tank farms. **DOE-RL/WHC Response No. 2: This issue will be pursued in future Unit Manager Meetings to determine the final resolution. Text will remain unmodified.** Ecology Response No. 3: Decontamination fluids and flush water may be recycled to the vault via the LCT under the following conditions: 1) only an Ecology approved decontamination fluid has been used, 2) sampling and analysis of the LCT is conducted prior to recycle, 3) recycle of decontamination fluids and flush water does not exceed 3600 gallons per campaign, and 4) only decontamination fluids and flush water are present in the LCT. Ecology Requirement: The recycling of decontamination fluids and flush water should be described in the application including the conditions stated above. The description should identify which sample analyses can be conducted immediately and the analysis time for the	

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remaining parameters. Based upon this information, recycling may be allowed prior to receipt of all analytical results. (173-303-303)

It is our understanding the Figure 4-1 should indicate a flow path between the grout pump and the LCT/mixer module sump. Verify this flow path and correct all applicable drawings if this path exists.
DOE-RL/WHC Response No. 3: The four conditions stated for the recycle of liquids in the LCT have been incorporated in the text. The pH, GEA, and OH- of the LCT contents was stated as a minimum requirement for the analysis work. In addition, Figure 4-1 has been revised to indicate the drain line from the grout line in the revised permit application. [p 4-17]

57. Page 4-12. It should be noted that sodium hydroxide is a dangerous material and that a spill or discharge of this material, or material with which this has been mixed, will be considered a dangerous waste. (173-303-101)
DOE-RL/WHC Response: All spills of material from the Grout Processing Facility will be designated and disposed of in accordance with the applicable regulations. This is discussed in Chapter 7.0 of the original permit application (page 7-23). Text will remain unmodified. 03/16/90

58. Page 4-13. Provide a more specific description and analysis of the chemically resistant paint.
DOE-RL/WHC Response: Data has been provided in the revised permit application. [p 4-13, ln 37-39; and APP 4F] 02/26/90

59. Page 4-16. The LCT, along with any other tank at the GTF which will contain dangerous waste must meet tank regulations irregardless of the duration they will store such waste. The application must include a list of these tanks along with their age and required certifications. (WAC 173-303-283 and -640)
DOE-RL/WHC Response No. 1: An evaluation to certify the LCT is ongoing. Text will be modified to incorporate the certification when it becomes available. [Work is still in progress on the certification.]

Ecology Response: Besides the LCT, what other tanks are being evaluated for compliance with tank regulations? When will these evaluations be complete? The application must contain a

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list of the tanks which will or may contain dangerous materials along with their age and required certifications. (173-303-283 and -640)
DOE-RL/WHC Response No. 2: The LCT and the associated piping are being evaluated for integrity assessment requirements under WAC 173-303-640. The LCT tank system is composed of jumpers and piping from the feed tanks to the Grout Processing Facility (GPF) and all GPF components involved in the storage/treatment of dangerous waste. The LCT tank and associated piping is the only tank system used for the storage/treatment of dangerous waste. The leachate collection sump is considered part of the disposal system; therefore, it will not be included in the integrity assessment. The integrity assessment report for equipment in place, and planned assessments for equipment not yet installed, will be completed prior to startup. The integrity assessment report will identify the components of the tank system, their age, and certification of integrity. Text will remain unmodified.

Ecology Response No. 3: Concurrence with this comment will be based upon the submittal of the tank integrity assessment plan.
DOE-RL/WHC Response No. 3: The tank integrity assessment plan submitted to Ecology/EPA at the April 24, 1991, Unit Manager Meeting is currently being reviewed and revised. The revised tank integrity assessment plan will be included in the permit application (Rev. 2).

60. Page 4-16. Is the only means to return LCT waste to the double-shell tank farms via the transfer pipe? If this is the only route, then does the possibility exist that grout operations will have to be discontinued if the LCT is filled with wastes which are unacceptable for reprocessing directly into the grout mixer?
DOE-RL/WHC Response No. 1: Material is transferred back to the tank farms through the waste feed transfer pipe. Grout processing stops if the material level in the LCT accumulates over the high-level interlock. This material then will be returned to the tank farms. Text will remain unmodified.

Ecology Response: The response states that the LCT will fill every 2-5 days. Is this number based on all decontamination fluids, LDCRS, and sump fluids going to the LCT? Provide the

liquid generation assumptions which led to this estimation. Explain the impact of emptying the LCT every 2-5 days on grouting operations. The fact that grout operations will be interrupted by other factors, thus allowing the collected liquids to be pumped back to the tank farms, should be taken into account. What is the chemical effect of adding LCT liquids to the feed tank or grout mixer on the grout formula?

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	DOE-RL/WHC Response No. 2: The stated LCT fill rate was based on experience gained during the phosphate/sulfate waste campaign. The actual LCT fill rate will depend on the frequency of any operating and/or maintenance problems. For example, if the facility is operating smoothly, with minimum maintenance required, the LCT will fill approximately every 5 days. If operating or maintenance problems require the facility to shut down frequently, the LCT could fill every 2 days. **The introduction of this liquid waste into the feed tank should have a negligible effect on the grout formula based on the small volume of waste compared to the large inventory in the feed tank, and based on the fact that the liquid waste generated will be primarily water. The original design intent was to provide the ability to make grout from this liquid feed along with any returned liquid from the vault. Text will remain unmodified.**	01/10/91
61.	Page 4-20. The last paragraph on this page is misleading. Ecology may require secondary containment on any or all of the tanks, irregardless of the presence or absence of listed wastes. Section 4.2.3.4.4 should be deleted. [173-303-640(4)(a)(i)] **DOE-RL/WHC Response: This section has been deleted.**	01/23/90
62.	Page 4-24. Although the GTF will not store dangerous waste for over 90 days, an area must be designated for temporary storage until shipment away from the facility occurs. Indicate where this area will be located. (173-303-200) **DOE-RL/WHC Response: Satellite accumulation area(s) will be established as needed in compliance with WAC-173-303-200. Text has been modified. [p 4-23, ln 44-48; and APP 4L]**	03/16/90
63.	Page 4-25. Definitive information on the leak detection cable should be provided. **DOE-RL/WHC Response: Data on the leak detection cable has been provided in the revised permit application. [APP 4F]**	03/16/90
64.	Page 4-27. Will excavation for the first four vaults still be completed by FY 1989? If not, please amend this date. **DOE-RL/WHC Response: The excavation was completed in FY 1989. Text will remain unmodified.**	01/23/90

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65.	Page 4-28. What is the thickness of the grout cap layer to be placed over the cover blocks? **DOE-RL/WHC Response: The concrete topping is 8 inches thick in the center, tapering to 2 inches thick at the edge. This information is located in Appendix 4A, drawing H-2-77581, sheet 2. Text will remain unmodified.**	03/16/90
66.	Page 4-30. The waste/liner compatibility test data was not provided in April 1989. Please amend this date. **DOE-RL/WHC Response: The design reports have been incorporated in the revised permit application and the referenced date has been deleted. [APP 4K]**	01/23/90
67.	Page 4-30. The vault design report was not submitted in April 1989. Please amend this date. **DOE-RL/WHC Response: The design reports have been incorporated in the revised permit application and the referenced date has been deleted. [p 4-25, ln 47-48; and APP 4I]**	01/23/90
68.	Page 4-30. A discussion should be presented on the effects of 90°C temperatures on liner materials. What is the expected duration that the liners will be subjected to such temperatures? If the duration exceeds 120 days, EPA Test Method 9090 should be run for a duration more closely depicting the disposal scenario [173-303-665(2)(a)] **DOE-RL/WHC Response No. 1: The maximum grout temperature will be near or below 90°C. The liner in the catch basin and the exterior vault liner will be a few degrees cooler. The liner temperatures will slowly decrease approaching ambient soil temperatures in an estimated 100 years. Clearly, the compatibility tests cannot be run for that period of time. Such logic would also require landfill operators to run compatibility tests for 30 years or longer. The purpose of the 9090 test is to identify if there is a likely compatibility problem that would be identified in short-term tests. Text will remain unmodified.** Ecology Response No. 2: The use of high-density polyethylene (HDPE) as a liner material for the grout facility is still under review. We expect that additional EPA Method 9090 testing, conducted at higher temperatures, will be required. The elevated temperatures (possibly 100°C) would account for equipment control limitations and add a factor of safety. Specific testing guidelines will be provided no later than May 17, 1990. [173-303-665(2)(a)] **DOE-RL/WHC Response No. 2: The EPA 9090 tests on HDPE in simulated double-shell slurry feed waste have been performed at 75°F and 90°C. The maximum design temperature for the grout is 90°C which will occur in the center region of the poured grout. Temperatures will be lower**	

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outside the vault where the HDPE will be used. This is expected to provide the margin of safety desired. A thermal analysis is being conducted to determine the temperatures within the grout disposal system. The results on this analysis will be provided to Ecology in a separate transmittal. Text will remain unmodified.

Ecology Response No. 3: Ecology recognizes the justification for using simulated leachates and temperature estimates in compatibility tests since neither actual leachate nor temperature data exist. However, the chemical analysis of actual leachate and free liquid generated during a campaign can be compared to the simulated waste used and actual temperatures can be measured to determine real condition compatibility. WAC 173-303-665(2)
Ecology Requirement: The DOE-RL must submit a comparison of actual to simulated leachate and free liquid based upon chemical analysis of the actual liquids generated. This comparison should be accompanied by a justification for the adequacy of the simulated waste in compatibility tests. In addition, the temperature in the LDCRS and along one wall must be monitored by the installation of some temperature measuring device. The data received must be reported and compared to the temperature models and heat transfer equations. Ecology will determine the need for further compatibility tests based upon these results. Additional compatibility tests may require the use of liquids actually generated.
DOE-RL/WHC Response No. 3: An analysis of the PSW leachate was provided to Ecology at the July 17, 1990, Unit Managers Meeting. This analysis demonstrated that the leachate consisted of dilute, high pH water. A presentation of the temperature models and thermocouple placement was given to Ecology at the August 1, 1990, Unit Managers Meeting. Drawings will be generated to show thermocouple placement in the next revision (Rev. 2). [APP 4A]

Ecology Response No. 4: Although Ecology accepts the provisions being made to monitor temperature directly within the vault walls, there is no mention in the response to Ecology's requirement for the comparison of data.
Ecology Requirement: A report must be submitted to Ecology comparing the actual chemical composition of leachate sump liquids collected from the first mixed waste vault to the simulants used in the compatibility tests conducted on the LDCRS materials. The report must also include the maximum temperatures reached by each thermocouple to assess the temperatures at which the compatibility tests were run. Should this comparison indicate that the simulant used was a aggressive or more aggressive than the actual leachate (from both chemical and temperature aspects) to the LDCRS material, no further compatibility testing will be required as long as the waste, liner material, and dry blend material does not significantly change. If the comparison indicates that actual leachate chemistry or actual temperatures are more aggressive, compatibility tests must be conducted under the more severe conditions. The

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	application must state that such a report will be submitted to Ecology within 60 days after the vault is determined to be solidified. [173-303-650(2), and -665(2)]	
	DOE-RL/WHC Response No. 4: A report will be submitted to Ecology comparing the actual chemical composition of the leachate sump liquids collected from the first mixed waste vault to the simulants used in the compatibility tests conducted on the LDCRS materials. The report will include the maximum temperatures reached by each thermocouple to assess the temperatures at which the compatibility tests were run. The report on leachate composition and the actual maximum temperatures reached in the grout vault will be submitted to Ecology within 90 days after the grout has solidified and the grout temperature is determined to be no longer rising and leachate data has been received. Additional compatibility tests will be run on the liner material if the actual leachate is more aggressive than the simulant. The results of any additional compatibility tests will be submitted to Ecology after completion. Text has been modified. [p 4-35]	04/29/91
69.	Page 4-31. What length of time will the vault be subjected to hydrostatic testing?	
	DOE-RL/WHC Response No. 1: The length of time is 48 hours after filling the vault with 33 ft of water. This information is in Appendix 4I. Text will remain unmodified.	
	Ecology Response: The technical justification for only hydrostatically testing the vault for 2 days must be provided. Factors such as liner breakthrough, time of travel to the sump, and minimum quantities detected by the sump should be considered. How long does it take to fill the tank with water and how long does it take to empty it?	
	DOE-RL/WHC Response No. 2: Based on the available water supply, it will take at least 60 hours to fill a vault. Emptying the vault after the test is envisioned to take another 60 hours. Coupled with the 48 hour test, the bottom of the vault is actually under a hydrostatic load for 169 hours. The maximum time to detect a leak when accounting for liner breakthrough and time to travel to the sump is only 7.7 hours which is far less than the total duration of the test. Text will remain unmodified.	01/10/91
70.	Page 4-36. In addition to the described leachate detection/collection and removal system described here, the design must include a vadose zone monitoring system around each vault. This system is required to prove the ability of 1) the vault to retain the grout slurry and 2) the diffusion layer to channel leachate into the catch basin. This requirement may be suspended in future vaults pending results. (173-303-283)	

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	DOE-RL/WHC Response No. 1: The ability of the vault to retain grout slurry is demonstrated by the catch basin and leachate detection/collection, and removal system. Any leachate from the vault is channeled to the catch basin by the HDPE liner hung outside the vault. Therefore, vadose zone monitoring provides no environmental benefit and is not appropriate. Text will remain unmodified. Ecology Response: Ecology will determine the need for vadose zone monitoring based on the final liner design. **DOE-RL/WHC Response No. 2: No response required at this time.**	08/30/90
71.	Page 4-37. What is the composition of the "expected leachate"? **DOE-RL/WHC Response No. 1: No leachate is expected; however, the system has been designed to handle a leachate with the same composition as the waste material. Text will remain unmodified.** Ecology Response: As per the Response Action Plan, liquid in the LDCRS (including leachate) is expected. Add the following statement to line 30: "The LDCRS is designed to handle the types and quantities of leachate identified in the Response Action Plan." **DOE-RL/WHC Response No. 2: Text has been modified as follows: "The LDCRS is designed for leachate with a pH greater than 12." [p 4-35, ln 14-15]**	08/30/90
72.	Page 4-41. The run-on/run-off control system was not submitted in April 1989. Please amend this date. **DOE-RL/WHC Response: The design reports have been incorporated in the revised permit application and the referenced date has been deleted. [p 4-38, ln 47-49; and APP 4J]**	01/23/90
73.	Page 4-47. The design of the relocatable vault exhauster was not submitted in April 1989. Please amend this date. **DOE-RL/WHC Response: A description has been provided and the date has been deleted. [p 4-44 through 4-48]**	01/23/90
74.	Page 5-22. After considering the first three paragraphs on this page, shouldn't the primary	

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	emphasis be to determine the differences in conductivities between these lithologies and what these hydraulic conductivities may actually be, or at least their ranges? **DOE-RL/WHC Response: Plans call for conducting an aquifer ('slug') test in Well E-25-32 in the lower piezometer that is completed in this zone to provide a comparison between hydraulic conductivities. The test results have been included in the revised permit application. [p 5-16, ln 28-40; and APP 5B]**	02/26/90
75.	Page 5-23. New data from Dr. Gee (PNL) reported in 1987 and 1989 indicate recharge rates as high as 10 cm/yr on bare surface areas. These references should be considered in this discussion. **DOE-RL/WHC Response: The 1987 and 1989 references have been included and an enhanced discussion added in the text. [p 5-8, ln 49-52; and p 5-9, ln 1-2]**	01/23/90
76.	Page 5-25. What are the effects of the enlargement of B Pond and the decommissioning of U and Gable Mountain Ponds? **DOE-RL/WHC Response No. 1: Enlargement, or more importantly, the redistribution of discharge to B Pond may affect the groundwater flow direction at the GTF. The flow direction at the GTF will probably be more westward as more water is discharged to the more southward lobes. Another groundwater well to the east of the GTF is planned for drilling in calendar year 1990 to account for the more westward flow. The redistribution of discharge to B Pond has been considered in the design of the groundwater monitoring system. Decommissioning of U Pond and Gable Mountain Pond probably will have little or no effect on the hydrologic dynamics at the GTF. The U Pond is distant and appears to be a relatively local effect. The groundwater flow direction to the east of U Pond appears to conform to the expected regional pattern.** **The area of influence of Gable Mountain Pond also appears to be localized and should not affect the GTF site as the pond head declines. Text will remain unmodified.** Ecology Response: Please modify the text in accordance with the response. **DOE-RL/WHC Response No. 2: Text has been modified. [p 5-9, ln 26-28 and p 5-18, ln 40-50]**	08/30/90
77.	Page 5-29. Is there more recent information than that contained in Graham 1981 or Graham et al. 1984? **DOE-RL/WHC Response:**	02/26/90

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	Para 1: The most recent report that addresses the anisotropic nature of the unconfined aquifer is Graham 1981. Para 2: Recent work by Last, et al (1989) supports the hypothesis that an erosional depression or possibly 'window' is present just north and slightly east of the 200 East Area, and about 2 miles northwest of the GTF. This study has been referenced in the text. This publication was not released prior to the submittal of the permit application in November 1988. [p 5-10, ln 13-18] Para 3: The referenced reports (Graham 1981, 1984) are the most recent integration and evaluation of hydrochemical data for the unconfined aquifer. Text will remain unmodified.	
78.	Page 5-39. New data from Dr. Gee (PNL) reported in 1987 and 1989 indicate recharge rates as high as 10 cm/yr on bare surface areas. These references should be considered in this discussion. DOE-RL/WHC Response: Both references sited have been included and an enhanced discussion added in the text. [p 5-12, ln 30-42]	01/23/90
79.	Page 5-42. The Elephant Mountain aquifer will discharge to the unconfined aquifer in this area as long as the heads in the confined aquifer are greater than the water table elevation. This fact should be noted. DOE-RL/WHC Response: The last sentence has been modified to read "The Elephant Mountain aquifer can discharge to the unconfined aquifer in this area if the heads in the confined aquifer are greater than the water table elevation." [p 5-15, ln 3-5]	01/23/90
80.	Page 5-49. This page repeats part of page 5-42 and 5-51. Please delete this page. DOE-RL/WHC Response: Page has been deleted.	01/23/90
81.	Page 5-49. Should the reference in paragraph 6 be Figure 5-10 instead of Figure 5-13? DOE-RL/WHC Response: Text has been changed to read Figure 5-10. [p 5-15, ln 9]	01/23/90
82.	Page 5-49. Your reference to Graham et al. 1984 says that the discharge to the unconfined aquifer occurs near West Lake. Since the time that this report was prepared, B Pond has been enlarged and water levels are higher near B Pond. Discharge is possibly occurring from the	

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	unconfined to the confined aquifer near the 200 East Area and from the confined to the unconfined aquifer adjacent to West Lake as stated. Please discuss this possibility. **DOE-RL/WHC Response: A statement has been included in the text that reads "Increased hydraulic head in the unconfined aquifer due to B Pond may increase the potential for groundwater flow from the unconfined aquifer into the confined aquifer in the 200 East Area and vicinity. In areas outside the influence of B Pond where the potentiometric level in the confined aquifer exceeds the water table elevation, the potential for groundwater flow is reversed." These possibilities are under investigation in connection with CERCLA related studies such as the 200 BP Work Plan. [p 5-15, ln 18-23]**	02/26/90
83.	Page 5-51. The unit of ft^2/day is transmissivity not hydraulic conductivity. Graham's tables are also listed as transmissivity, however, in m^2/day. Please correct. **DOE-RL/WHC Response: 'Hydraulic conductivity' has been changed to 'transmissivity.' Units have been changed to m^2/d as in Graham; the equivalent value in ft^2/day follows in parenthesis to provide consistency in the permit application. [p 5-15, ln 13-14]**	01/23/90
84.	Page 5-53. An outline of the GTF or waste management area should be indicated on Figure 5-22. **DOE-RL/WHC Response: An outline of the GTF has been included. [p F5-22]**	01/23/90
85.	Page 5-62. The text must indicate the fact that "T" represents transmissivity and "b" represents the thickness of the aquifer. Please amend. **DOE-RL/WHC Response: The words have been spelled out in the text. [p 5-19, ln 45-47]**	01/23/90
86.	Page 5-64. Typo, paragraph 3. "nearly" should be "nearby". **DOE-RL/WHC Response: Text has been modified. [p 5-21, ln 14]**	01/23/90
87.	Page 5-64. An explanation for the high coliform bacteria counts in 1986 should be provided. **DOE-RL/WHC Response: The reason for the elevated levels are unknown. Any such discussion would be purely speculative. Text will remain unmodified.**	01/23/90

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88.	Page 5-66. The point of compliance may change as B Pond is decommissioned. The groundwater flow direction should change resulting in the upgradient wells becoming downgradient wells if natural groundwater flow is to the Columbia River from the 200 Areas. This fact should be taken into account in your discussions regarding point of compliance. **DOE-RL/WHC Response: Section has been modified to read, "When B Pond is decommissioned, the underlying groundwater mound will dissipate and the groundwater flow direction will revert to the regional eastward direction. This may change the point of compliance resulting in the upgradient wells becoming downgradient wells, and the downgradient wells becoming upgradient wells." [p 5-23, ln 17-21]**	01/23/90
89.	Page 5-69. Initial detection monitoring wells at the point of compliance may be required in the present upgradient position before post-closure occurs, if B Pond is decommissioned before post-closure activities begin. This fact should be noted. **DOE-RL/WHC Response: Text has been added to discuss the possibility of additional upgradient monitoring wells if B-Pond is decommissioned. [p 23, ln 21-22]**	04/29/91
90.	Page 5-70. What effect will dilution have on this well? Will samples collected from this screened interval be equivalent to those collected from other upgradient wells? **DOE-RL/WHC Response: A text change has been made to correct the description of the well construction. [p 5-26, ln 1-4]** **It is recognized that the added screen length introduces the possibility of dilution. This effect is being evaluated.**	01/23/90
91.	Page 5-72. Has the model used to determine well locations been run using hypothetical conditions likely to be present when B Pond is decommissioned? If not, why not? **DOE-RL/WHC Response: Decommissioning B Pond will change the direction of groundwater flow and the hydraulic gradient of the GTF, but it will not affect the well spacing in that the wells could be spaced farther apart. This can be demonstrated by showing that the hydraulic gradient in the area does not change significantly. This is the only changed parameter that could affect the model that was run. Text will remain unmodified.**	02/26/90
92.	Page 6-2. How does the slope in the waste feed pipeline allow drainage back to the feed tank	

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	and TGE? It seems logical to think it could only drain one way or the other. **DOE-RL/WHC Modified Response: Approximately 85% of the feedline is sloped back to the 241-AP-102 Tank. The remaining piping is sloped to the Grout Processing Facility. This allows drainage back to both sites. Text has been modified. [p 6-2, ln 31-34]**	03/16/90
93.	Page 6-2. The free liquid criterion was reported as less than or equal to 3.0% at a June 21, 1989, presentation by WHC and USDOE. The text indicates 5%. Which limit will be used? **DOE-RL/WHC Response: The 5% limit will be used. The 3% criterion is used as an internal goal established to encourage minimization of waste generation from grout disposal. Text will remain unmodified.**	03/16/90
94.	Page 6-3. A description of the LDCRS was not submitted in April 1989. Please amend this date. **DOE-RL/WHC Response: The design reports have been incorporated in the revised permit application and the referenced date has been deleted. [p 6-2, ln 50-51; and APP 4I]**	01/23/90
95.	Page 6-3. The control system design was not submitted in April 1989. Please amend this date. **DOE-RL/WHC Response: The design reports have been incorporated in the revised permit application and the referenced date has been deleted. [p 6-3, ln 22-23; and APP 4J]**	01/23/90
96.	Page 6-5. How does the slope in the waste feed pipeline allow drainage back to the feed tank and TGE? It seems logical to think it could only drain one way or the other. **DOE-RL/WHC Modified Response: Approximately 85% of the feedline is sloped back to the 241-AP-102 Tank. The remaining piping is sloped to the Grout Processing Facility. This allows drainage back to both sites. Text has been modified. [p 6-5, ln 8-11]**	03/16/90
97.	Page 6-9. The reproduction of hazardous waste labels in Figure 6-1 has rendered one of the labels illegible. This page must be reproduced in a manner which allows the readability of all signs. **DOE-RL/WHC Response: A legible copy has been provided. [p F6-1]**	01/23/90

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98.	Page 6-13. The vault construction inspection plan was not submitted in April 1989. Please amend this date. **DOE-RL/WHC Response: The design reports have been incorporated in the revised permit application and the referenced date has been deleted. [p 6-12, ln 46-47; and APP 4G]**	01/23/90
99.	Page 7-1. The contingency plan should include a list of all equipment which contains potentially dangerous materials, both wastes and products, and remedial actions to be taken in the event of their discharge to the environment. **DOE-RL/WHC Response: Remedial actions are covered in Appendix 7B of the permit application. A listing of equipment containing dangerous substances has been added to the text. [p 7-1, ln 20-23]**	01/23/90
100.	Page 7-19. The DOE-RL report should also include actions already taken to mitigate the situation. Please add this requirement. [173-303-145(3)] **DOE-RL/WHC Response: Text has been added. [p 12-7, ln 3]**	01/23/90
101.	Page 7-20. WAC 173-303-082 is not applicable for spill notification. WAC 173-303-145 should be appropriately addressed in this section. **DOE-RL/WHC Response: Text has been changed to delete exclusion limits and discuss notification in accordance with WAC 173-303-145. [p 12-8, ln 17-18]**	01/23/90
102.	Page 7-21. Typo. "Tech- niques" should be "techniques". **DOE-RL/WHC Response: Chapter 7.0 was completely rewritten to be replaced by the GTF building emergency plan (APP 7B). This comment is no longer applicable.**	04/29/91

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103.	Page 7-25. To avoid confusion with the 2727-S Nonradioactive Dangerous Waste Storage Facility, Building 616 should be added to the description of where containers should be delivered. **DOE-RL/WHC Response: Chapter 7.0 was completely rewritten to be replaced by the GTF building emergency plan (APP 7B). This is no longer applicable.**	04/29/91
104.	Page 7-26. To avoid confusion with the 2727-S Nonradioactive Dangerous Waste Storage Facility, Building 616 should be added to the description of where containers should be delivered. **DOE-RL/WHC Response: Chapter 7.0 was completely rewritten to be replaced by the GTF building emergency plan (APP 7B). This is no longer applicable.**	04/29/91
105.	Page 7-26. Should liquids be detected in the LDCRS, it is not appropriate to return this liquid to the vault because the integrity of the vault is unknown. The leachate should be delivered to and held in some other storage vessel until the vault has been assessed. [173-303-650(5)] **DOE-RL/WHC Response: Liquid will be returned to the double-shell tank farm system if the vault integrity is questionable. Text has been modified accordingly. [APP 7A, p 7A-1]**	03/16/90
106.	Page 7-29. To avoid confusion with the 2727-S Nonradioactive Dangerous Waste Storage Facility, Building 616 should be added to the description of where containers should be delivered. **DOE-RL/WHC Response: Chapter 7.0 was completely rewritten to be replaced by the GTF building emergency plan (APP 7B). This is no longer applicable.**	04/29/91
107.	Page 8-14. Which of these courses, or which combination of courses, satisfies OSHA requirements requiring 40 hours of training for hazardous waste workers? (29 CFR 1910) **DOE-RL/WHC Response: Tables have been modified to show courses that satisfy OSHA requirements. [p T8-5; and p T8-7.1, ln 14-15]**	01/23/90
108.	Page 9-1. The second sentence of the first paragraph should be amended from "...disposal of	

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	wastes designated as dangerous wastes will begin." to "...disposal of wastes designated as mixed wastes will begin." **DOE-RL/WHC Response: Text has been modified. [p 9-1, ln 7]**	01/23/90
109.	Page 9-1. The last sentence in the first paragraph should be amended from "...long-term containment of the dangerous constituents..." to "...long-term containment of the dangerous and radioactive constituents...". **DOE-RL/WHC Response: Text has been modified. [p 9-1, ln 12-13]**	01/23/90
110.	Page 9-2. Typo. "Federally" should be "federally" and "Federal" should be "federal". **DOE-RL/WHC Response: Text has been modified. [p 9-1, ln 50; and p 9-2, ln 10]**	01/23/90
111.	Page 9-5. It is insufficient to only state that drinking water and withdrawal wells are not located within a 3-mile radius. What is the distance to the nearest such well, irregardless of groundwater gradients? Will this distance change after institutional control ends? This should be a consideration in pathway analysis. **DOE-RL/WHC Response: A map of withdrawal wells is located in Chapter 5.0, Figure 5-13. The 3-mile distance was cited as required by EPA guidance on preparation of the Exposure Information Report. The distance of the well is not expected to be closer than 3 miles because the DOE does not intend to relinquish institutional control; however, the pathway analysis performed considers the presence of drinking water wells as close as 5 km (approximately 3 miles) from the edge of the disposal site. The closest withdrawal well is at the Fast Flux Test Facility (FFTF) which is located approximately 11 miles away. The FFTF well distance has been included in the text. [p 9-4, ln 2-4]**	01/23/90
112.	Page 9-7. Drinking water standards, as per your reference, are given as chloride and fluoride. Table 9-2 lists these standards as chlorine and fluorine. Please amend. **DOE-RL/WHC Response: Table 9-2 has been amended to change the constituents to chloride and fluoride. [p T9-2, ln 8 and 11]**	01/23/90
113.	Page 9-7. The MCL for fluorine presented here does not match the limit in the reference. Provide the source of your limit.	

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	DOE-RL/WHC Response: The table incorrectly stated the limit for fluoride which should be 4,000 ppb. The table has been amended. [p T9-2, ln 11]	01/23/90
114.	Page 9-7. It is not clear what units are applicable to the last column of Table 9-2. Are these numbers concentrations or dimensionless fractions? Please clarify. **DOE-RL/WHC Response: The numbers are dimensionless fractions. For example, the models used to project performance of the disposal action indicate that the projected contaminant level for arsenic in a hypothetical well 5 km (approximately 3 miles) from the disposal site is approximately 6% of the standard or 3 ppb. Text will remain unmodified.**	01/23/90
115.	Page 9-6. Comment #111 also pertains to the distance from the vaults to the nearest natural surface water. **DOE-RL/WHC Response: The 3-mile distance was cited as required by EPA guidance on preparation of the Exposure Information Report. The nearest natural surface water is the Columbia River which is 7 miles from the GTF. The distance to the Columbia River has been included in the permit application. [p 9-5, ln 30-32]**	01/23/90
116.	Page 9-9. Should the word "clean" in the last paragraph on this page be amended to "cleaning"? **DOE-RL/WHC Response: The word 'clean' has been changed to 'cleaning'. [p 9-7, ln 37]**	01/23/90
117.	Page 10-3. Which evaporator is used to reduce decontamination solutions? If this evaporator is not located at the GTF, this should be stated. How are decontamination solutions transported to the evaporator? **DOE-RL/WHC Response: The evaporator detailed here is not part of the GTF. The evaporator will be covered by another permit application. A general discussion of how the solutions are routed to the evaporator from the GTF has been included. [p 10-3, ln 39-42]**	01/23/90
118.	Page 11-1. The format of closure/post-closure plans has been discussed with Ms. Carol Geier (WHC). In an effort to boilerplate dangerous waste documents, these discussions, and comments on previously submitted closure plans, should be taken into account when developing	

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	this closure/post-closure plan. The GTF closure plan should be developed to at least the level of detail in the 183-H Basin closure plan. **DOE-RL/WHC Response: The closure plan has been revised to respond to appropriate comments from previous closure plans. [p 11-1 through p 11-26]**	02/26/90
119.	Page 11-1. The engineering report was not submitted in April 1989. Please amend this date. **DOE-RL/WHC Response: The design reports have been incorporated in the revised permit application and the referenced date has been deleted.**	01/23/90
120.	Page 11-2. An additional closure performance standard should be added to provide concurrence with Mr. Troy Wade's (DOE-HQ) statement regarding closure of USDOE facilities. This statement addresses USDOE commitment to close its federal facilities in a manner which promotes maximum reclamation of the land. **DOE-RL/WHC Response: It is the intent of DOE-RL/WHC to comply with WAC 173-303-610. [p 11-2, ln 11]**	01/23/90
121.	Page 11-4. If in-ground components of the TGE cannot be decontaminated, will they be removed for dangerous waste disposal or does the possibility exist that parts of the TGE will be closed as a landfill? **DOE-RL/WHC Response No. 1: At this time, it is not envisioned that any part of the Grout Processing Facility will be closed as a landfill. As discussed in Section 11.1.4 of the original submittal, the options currently considered feasible for closure of the below ground portions of the Grout Processing Facility are decontamination and clean closure or disassembly and removal. Text will remain unmodified.** Ecology Response: The response cites the wrong section. Please correct. **DOE-RL/WHC Response No. 2: The response citation was corrected.**	08/30/90
122.	Page 11-4. The sampling and analysis plans to be used for all closure activities must be included as part of this permit application. [173-303-610(3)(a)] **DOE-RL/WHC Response No. 1: Additional information has been provided in the text. [p 11-8 through 11-14]**	

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	Ecology Response: The grout closure plan is still under review. [173-303-610(3)(a)] **DOE-RL/WHC Response No. 2: No response required.**	06/19/90
123.	Page 11-4. The closure plan should designate the locations where concrete, steel, and soil background samples will be taken. [173-303-610(3)(a)] **DOE-RL/WHC Response No. 1: Additional information has been provided in the text regarding background sample locations. [p 11-8 through 11-14]**	
	Ecology Response: The grout closure plan is still under review. [173-303-610(3)(a)] **DOE-RL/WHC Response No. 2: No response required.**	06/19/90
124.	Page 11-4. A set number of vaults are to be constructed as per Action Plan Milestone M-01-00. The discussion should reflect the requirements of this milestone. **DOE-RL/WHC Response: Action Plan Milestones and changes to these milestones are handled through the Tri-Party Agreement. Incorporating dates and commitments from the action plan could result in unnecessary changes to the permit. Text will remain unmodified.**	04/29/91
125.	Page 11-5. Disposal of double-shell tank wastes is no longer scheduled to be in 1990. Please amend this date. **DOE-RL/WHC Response: Disposal is now scheduled to be started in FY 1993. Text has been modified accordingly. [p 11-4, ln 32-34]**	01/23/90
126.	Page 11-9. The sampling of flushed solvents may not be adequate to determine the extent of contamination, if any, remaining in system piping. Describe this process in more detail to justify the use of this procedure. [173-303-610(3)(a)] **DOE-RL/WHC Response No. 1: Text has been modified to justify the procedure selected for determining the extent of contamination. [p 11-8 through 11-14]**	
	Ecology Response: The grout closure plan is still under review. [173-303-610(3)(a)] **DOE-RL/WHC Response No. 2: No response required.**	06/19/90

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127.	Page 11-9. The "appropriate disposal facility" must be identified and justified. [173-303-610(3)(a)] **DOE-RL/WHC Response: Additional discussion has been provided in the revised permit application concerning the use of different facilities based on the waste characteristics. [p 11-6, ln 34-36; and p 11-12, ln 18-20]**	02/26/90
128.	Page 11-9. What constituents will be analyzed to prove the success of decontamination? [173-303-610(3)(a)] **DOE-RL/WHC Response No. 1: Text has been modified to list the constituents that will be used to prove decontamination is successful. [p T11-1]** Ecology Response No. 1: The grout closure plan is still under review. [173-303-610(3)(a)] **DOE-RL/WHC Response No. 2: No response required.** Ecology Response No. 2: Page 11-13, Section 11.1.4.4.1, Decontamination and Indicator Parameters and Analytical Methods. This section references Table 11-1 for parameters to be evaluated when determining the success of decontamination. Some of the parameters listed in the first column of this table are not further described in the remaining columns. Furthermore, it is not evident how these parameters were chosen for evaluation. The use of ten times a drinking water standard is not consistent with Ecology's dangerous waste closure regulations. Ecology Requirement: Table 11-1 should be completed or the absence of information justified. Total organic carbon, sodium, aluminum, and potassium should be added as parameters for evaluation. References within the table to U.S. Testing Company should be deleted. Units for the "Sample Size" column should be included. Clean closure standards must be consistent with dangerous waste regulations which require background levels for listed and characteristic wastes and designation levels for other wastes. WAC 173-303-610(2)(b) **DOE-RL/WHC Response No. 3: Table 11-1 has been modified to address the absence of information, including additional parameters for evaluation if required. In addition, the reference to U.S. Testing has been deleted, and sample size units have been included. Justification for selection of parameters for evaluation have been provided in the text. Closure was made consistent with dangerous waste regulations for listed and characteristic wastes per WAC 173-303-610(2)(b). [p T11-1]**	08/30/90

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129.	Page 11-10. The closure cover design was not submitted in April 1988. Please amend this date. **DOE-RL/WHC Response: Design reports have been incorporated in the revised permit application and the referenced date has been deleted. [p 11-14, ln 24-25]**	01/23/90
130.	Page 11-11. What is the angle of repose for the GTF's grout mixture? **DOE-RL/WHC Response: The angle of repose for the GTF grout has been measured at 1.5% for the PSW grout surface. Text has been modified. [p 11-15, ln 9]**	01/23/90
131.	Page 11-12. The term "coefficient of permeability" should be replaced with "hydraulic conductivity". **DOE-RL/WHC Response: Text has been modified. [p 11-17, ln 9]**	01/23/90
132.	Page 11-17. The desiccation effects upon a clay layer in a semi-arid environment should be discussed. **DOE-RL/WHC Response No. 1: A discussion has been provided in the text. [p 11-20, ln 39-41; and APP 11C]** Ecology Response: Although sodium bentonite is most often used as an admixture with local soils, calcium bentonite is sometimes used with increased performance. The use of both sodium bentonite and calcium bentonite must be evaluated. **DOE-RL/WHC Response No. 2: The following discussion has been provided in the text: "Blended soils can consist of mixtures of imported calcium or sodium bentonite, local clays, or other materials with local soils. Calcium bentonite was initially considered for use in the grout cover design. However, a review of existing literature on the physical characteristics of clays and blended soils for application in Hanford covers indicated that sodium bentonite possessed better characteristics than calcium bentonite. The literature indicated that more calcium bentonite would be required to achieve the 10-7 cm/s permeability than sodium bentonite. This larger quantity, which is likely greater than two times that of sodium bentonite, also leads to increased costs. Use of the higher quantities of calcium bentonite could lead to larger potential shrink/swell problems than the sodium bentonite. Literature was reviewed that provided strong positive evidence that silty-sand soils blended with small quantities of sodium bentonite could achieve the desired permeability and low shrinkage**	08/30/90

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properties. Therefore, sodium bentonite was selected, blended with local silty sand and tested by a geotechnical testing firm for the grout project. The results of the test data were positive indicating that an acceptable blended soil mixture had been identified. In addition, the geotechnical consulting firm also tested a clay from Idaho that has similar characteristics to calcium bentonite in its permeability and activity. These test results indicated a low permeability soil, but a soil with numerous small desiccation cracks and several large cracks. Therefore, because the silty sand/bentonite blended soil was found to be an acceptable material based on laboratory results, it is not required that additional materials be tested." [p App 11C-4, ln 18-41]

133. Page 11-17. The last line on this page is repeated on page 11-18 and should therefore be deleted.
DOE-RL/WHC Response: One of the repeated lines has been eliminated. 01/23/90

134. Page 11-29. If the operational scheduling as described in this section exceeds the requirements of WAC 173-303-610, a request for extension, with justification, must be submitted to our office for approval. [173-303-610(4)]
DOE-RL/WHC Response No. 1: This section is the justification and request for extension. Further clarification has been provided in the revised permit application. [p 11-44, ln 27-36]

Ecology Response: Any requests for deviation from the regulations should be highlighted in a separate section of the application. This issue will be addressed in Ecology's forthcoming response to a January 3, 1990, letter from Messrs. Lerch and Izatt regarding closure plan format.
DOE-RL/WHC Response No. 2: A section has been added to Chapter 1.0 of the permit application to discuss deviations from the regulations. [p 1-6, ln 43-52; p 1-7, ln 1-4] 01/10/91

135. Page 11-29. Congressional approval of funding is not an adequate reason for the delay of treatment and closure activities. This factor must be deleted throughout the text.
DOE-RL/WHC Modified Response: Sentence has been deleted; however, this issue will be resolved in the Hanford Facility-wide Permit. 04/29/91

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136.	Page 11-39. The Hanford Reservation is composed of a number of deeds. The required notification should address the plurality of deeds. Each deed affected by the GTF should be annotated. [173-303-610(10)] **DOE-RL/WHC Response: Deed notations have been discussed with Ecology concerning the 300 Area Solvent Evaporator Closure Plan. The text has been modified according to the outcome of this discussion. [p 11-33, ln 1-48]**	01/23/90
137.	Page 12-6. The first sentence in Section 12.3 is incorrect. The Hanford Site does ship dangerous waste offsite. Please amend this section accordingly. **DOE-RL/WHC Response: The sentence is correct; this section is describing transporter requirements. The Hanford Facility uses a private contractor to ship waste offsite, and the contractor will meet the transporter requirements. The text has been modified to clarify. [p 12-2, ln 27-30]**	01/23/90
138.	Page 12-7. If a discrepancy is unresolved after 15 days, the Department of Ecology must also be notified. [173-303-370(4)] **DOE-RL/WHC Response: The text has been modified to include Ecology. [p 12-3, ln 39-42]**	01/23/90
139.	Page 12-11. The DOE-RL report should also include actions already taken to mitigate the situation [173-303-145(3)] **DOE-RL/WHC Response: Text has been modified accordingly. [p 12-7, ln 3]**	01/23/90
140.	Page 12-12. WAC 173-303-082 is not applicable for spill notification. WAC 173-303-145 should be appropriately addressed in this section. **DOE-RL/WHC Response: Exclusion limits have been deleted and notification conducted in accordance with WAC 173-303-145. [p 12-8, ln 17-18]**	01/23/90
141.	Page 12-13. The Hanford Reservation is composed of a number of deeds. The required notification should address the plurality of deeds. Each deed affected by the GTF should be annotated. [173-303-610(10)]	

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DOE-RL/WHC Response: Deed notations have been discussed with Ecology concerning the 300 Area Solvent Evaporator Closure Plan. The text has been modified according to the outcome of this discussion. [p 12-9, ln 16-18] 01/23/90

142. Page 3C-1. The heat of hydration that will develop in the vault may raise the curing temperature above 90 degrees centigrade. These higher temperatures may have adverse effects on the solidification process. A discussion of how to mitigate this effect along with supporting justification must be provided before a permit can be issued.
DOE-RL/WHC Response No. 1: The adiabatic calorimetry data discussed in the response to comment number 29 will replace the short term transient thermal modeling of the grout vault to determine peak grout temperatures.

The adiabatic calorimetry data will result in conservative (high) values for the maximum grout temperature as it measures the grout temperature that would result if no heat was lost during the hydration process. Since some heat will be transferred out of the vault (conduction through walls, floor, and convection off surface), this will be a conservative (high) value for the maximum grout temperature. Text will remain unmodified.

Ecology Response: Have the adiabatic calorimetry tests been completed? The response indicates that it is not, but the application provides some results from 'adiabatic testing.' If the testing is complete, please provide the test procedures and results; if not, the procedures alone should be provided until the results are complete. Temperature effects on the vault, liners, and grouting process are still under review.
DOE-RL/WHC Response No. 2: The adiabatic calorimetry tests have not been completed. The procedure for this testing will be provided to Ecology in a separate transmittal.

Ecology Response No. 3: Comment 29 also applies here.
DOE-RL/WHC Response No. 3: See response to Comment 29.

143. Page 3C-2. The GTF design and operations have changed significantly since this model was run. Therefore, the assumptions and parameters used should be reevaluated and the program rerun.
DOE-RL/WHC Response No. 1: The assumptions used have been reviewed (except for those regarding heat of hydration) and were found to be conservative (resulting prediction of

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temperatures greater than expected). The heat of hydration portion of the modeling will be replaced by adiabatic calorimetry data. [p 3-26 through 3-29]

Ecology Response: Have the adiabatic calorimetry tests been completed? The response indicates that it is not, but the application provides some results from 'adiabatic testing.' If the testing is complete, please provide the test procedures and results; if not, the procedures alone should be provided until the results are complete. Temperature effects on the vault, liners, and grouting process are still under review.
DOE-RL/WHC Response No. 2: The adiabatic calorimetry tests have not been completed. The procedure for this testing will be provided to Ecology in a separate transmittal.

Ecology Response No. 3: Comment 29 also applies here.
DOE-RL/WHC Response No. 3: See response to Comment 29.

144. Page 4G-i. This information was not provided in April 1989. Please amend this date.
DOE-RL/WHC Response: The design reports have been incorporated in the revised permit application and the referenced date has been deleted. [APP 4G] — 01/23/90

145. Page 4H-3. Figure 4H-2 is missing. Please provide this figure.
DOE-RL/WHC Response: Figure 4H-2 should not have been referenced. Reference to Figure 4H-2 has been deleted. [APP 4H, p 4H-3] — 01/23/90

146. Page 4I-i. This information was not provided in April 1989. Please amend this date.
DOE-RL/WHC Response: The design reports have been incorporated in the revised permit application and the referenced date has been deleted. [APP 4I] — 01/23/90

147. Page 4J-i. This information was not provided in April 1989. Please amend this date.
DOE-RL/WHC Response: The design reports have been incorporated in the revised permit application and the referenced date has been deleted. [APP 4J] — 01/23/90

148. Page 5A2-4. How recent are these procedures? Is there a newer method available to analyze for nitrates other than the phenyldisulfonic method?

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	DOE-RL/WHC Response: The procedures described in 5A2-4 were used in analyzing the sediments for the listed wells. The current method for analyzing nitrates in sampled sediments is by ion chromatography on soil extract. Text will remain unmodified.	02/26/90
149.	Page 5B3-2. The water level in this well is averaged over 30 ft of screen. It is not satisfactory to compare these water levels to those of other wells with lesser screened intervals. Please address this issue. **DOE-RL/WHC Response: The screen length was incorrectly listed as 30 ft and is only 20 ft in length. Other screens also are 20 ft. Text has been modified accordingly. [p 5-25, ln 44-50; and p 5-26, ln 1-30]**	01/23/90
150.	Page 5B3-9. The use of military time precludes the need for AM and PM designations. Please correct. **DOE-RL/WHC Response: The am/pm designation has been deleted and Figures 5B-3.3 and 5B-3.5 have been modified. [p 5B3-10 and 5B3-14]**	01/23/90
151.	Page 5B3-9. What was the discharge rate after 400 minutes? Did this discharge rate change drastically? **DOE-RL/WHC Response: The discharge rate varied during the test and affected the drawdown data. A plot of the variation in discharge and a brief discussion has been included in the text. [p 5B3-9, ln 4-18; and p 5B3-10 through 5B3-11]**	01/23/90
152.	Page 5B3-14. The date of pumping as listed in Figure 5B-3.4 should be from August 31 to September 1, 1987, and not 1978. Please correct. **DOE-RL/WHC Response: Text has been modified. [p 5B3-8]**	01/23/90
153.	Page 5B3-14. It appears there is a possibility of delayed yield. A discussion of partial penetration effects should be included in the appendix text. **DOE-RL/WHC Response: A discussion of these effects has been included in the text. [p 5B3-2 through 5B3-9]**	01/23/90

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154.	Page 5C1-8. Typo. "Well 299-E25-32 is a single completion well." Should be "Well 299-E25-33 is a single completion well." **DOE-RL/WHC Response: Text has been modified. [APP 5C, p 5C1-7, ln 42-43]**	01/23/90
155.	Page 5C1-13. The statement "The water is not turbid." is relative. What criteria is used to determine whether the water is turbid? **DOE-RL/WHC Response: The turbidity determination for this well at that time, as indicated in the geologic logs, was a qualitative evaluation. The current criteria for turbidity are ≤ 5 NTUs. To clarify the text, the sentence has been changed to read, "The water was visually determined to be non-turbid. Currently, wells are quantitatively considered to be non-turbid when they have been developed to ≤ 5 NTUs." [APP 5C, p 5C1-14, ln 27-29]**	03/16/90
156.	Page 5C1-14. Organic sampling will be conducted in the future. Therefore, wells must be constructed of materials agreeable to organic sampling. **DOE-RL/WHC Response: Sentence has been modified and will state that the well construction material will be compatible with the sampled constituents. The current standard material used in well construction is stainless steel. [APP 5C, p 5C1-22, ln 31-33]**	02/26/90
157.	Page 5C2-2. The assumptions are not very realistic assuming a conservative approach. Are you trying to match conditions to the model, when the model should match the conditions? **DOE-RL/WHC Response: The model has been rerun using a recharge rate to the vadose zone of 10 cm/yr as a more 'conservative' value. The results have been incorporated into the text. [APP 5C, p 5C2-1 through 5C2-21]**	02/26/90
158.	Page 5C2-3. There is a general breakdown in editing and checking the text in this section. The exponents are improperly written. Please correct. **DOE-RL/WHC Response: Text has been modified accordingly. [APP 5C2 has been edited]**	02/26/90
159.	Page 5C2-17. Units for the "Waste Concentration" column must be provided. **DOE-RL/WHC Modified Response: The entire section was revised and the units have been included where appropriate. [APP 5C2, p 5C2-14 and p 5C2-15]**	02/26/90

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160.	Page 5D1-1. If your sampling pumps are dedicated piston and submersible pumps, why do you use equipment for bladder pumps? **DOE-RL/WHC Response: The bladder equipment was used as backup at one time. Since bladder pumps are no longer used, it has been deleted from the equipment list.**	02/26/90
161.	Page 5D1-4. Which wells have bladder pumps? **DOE-RL/WHC Response: None. Text will remain unmodified.**	02/26/90
162.	Page 5D1-8. The accuracy should be listed as "+/- 0.01 ft" not just to "+ 0.01 ft". **DOE-RL/WHC Response No. 1: Appendix 5D1 was completely rewritten. This comment is no longer applicable.** Ecology Response: The response cites the wrong page and/or line number. Please correct. **DOE-RL/WHC Response No. 2: Appendix 5D1 was completely rewritten. This comment is no longer applicable.**	04/29/91
163.	Page 5D1-9. The first line repeats the last line of page 5D1-8. Please delete. **DOE-RL/WHC Response: Appendix 5D1 was completely rewritten. This comment is no longer applicable.**	04/29/91
164.	Page 5D1-9. Steel tape method procedures should be repeated until two tape measurements agree within +/- 0.02 ft. In addition, the serial number or other identifying number of the measuring device should be recorded. **DOE-RL/WHC Response No. 1: Appendix 5D1 was completely rewritten. This comment is no longer applicable.** Ecology Response: The response cites the wrong page and/or line number. Please correct. **DOE-RL/WHC Response No. 2: Appendix 5D1 was completely rewritten. This comment is no longer applicable.**	04/29/91
165.	Page 5D1-12. The serial number or other identifying number of the conductivity meter should	

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	be recorded every time it is used. **DOE-RL/WHC Response No. 1: Appendix 5D1 was completely rewritten. This comment is no longer applicable.** Ecology Response: The response cites the wrong page and/or line number. Please correct. **DOE-RL WHC Response No. 2: Appendix 5D1 was completely rewritten. This comment is no longer applicable.**	04/29/91
166.	Page 5D1-13. Typo. "Jingle" should be "Single". "calibration" should be "calibrated". **DOE-RL/WHC Response No. 1: Appendix 5D1 was completely rewritten. This comment is no longer applicable.** Ecology Response: The response cites the wrong page and/or line number. Also, the typo was not corrected. Please correct. **DOE-RL/WHC Response No. 2: Appendix 5D1 was completely rewritten. This comment is no longer applicable.**	04/29/91
167.	Page 5D1-14. Typo. "braking" should be "breaking". **DOE-RL/WHC Response: Appendix 5D1 was completely rewritten. This comment is no longer applicable.**	04/29/91
168.	Page 5D1-17. Is U.S. Testing Co. the only laboratory planned to be used for analyzing these samples? **DOE-RL/WHC Response: U.S. Testing Company is no longer being used. All laboratories used to perform sample analyses will be approved by Westinghouse Hanford and Pacific Northwest Laboratory.**	04/29/91
169.	Page 5D1-22. Typo. "TcO4-" should be "TcO_4^-" and "HNO^3" should be "HNO_3". **DOE-RL/WHC Response: Appendix 5D1 was completely rewritten. This comment is no longer applicable.**	04/29/91

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170.	Page 5D2-5. The summation signs were left off of the equations. Please amend. **DOE-RL/WHC Response: Text has been modified. [APP 5D, p 5D2-4]**	01/23/90
171.	Page 5D2-8. The first two lines of the page are repeats of the last two lines of the previous page. Please delete. **DOE-RL/WHC Response: The repeated lines have been eliminated.**	01/23/90
172.	Page 5D3-8. The conservative approach would be to control the false negatives rather than the false positives. It is more conservative to err on the side of the false positives. The statistical methods should be changed to accommodate this fact: **DOE-RL/WHC Response: The overall false positive rate should be controlled on a facility-wide basis, rather than on a well or parameter basis (McNichols and Davis 1988). One of the concerns associated with the use of CABF t-test method is that it does not adequately consider the number of comparisons that must be made (see Federal Register, Volume 53,** **No. 196, page 39720, October 11, 1988). The proposed CABF t-test procedure considers the number of comparisons that must be made [by replacing $(1 - \alpha/2)$ by $(1 - \alpha/\tau)$ in a 'two-tailed' test and by replacing $(1 - \alpha)$ by $(1 - \alpha/\tau)$ in a 'one-tailed' test where τ = the total number of individual comparisons] in determining whether there is a statistically significant exceedance of background levels of specified chemical parameters and hazardous waste constituents.** **It should be noted that for a given number of sample observations, Type I error (false positive) and Type II error (false negative) cannot be reduced at the same time. To address the concern that the CABF t-test may result in 'false negatives,' the following are implemented for the GTF.** • **Currently two upgradient wells, 299-E25-25 and 299-E25-32, are in place. Another upgradient well, 299-E25-39, will be installed in 1990. These multiple upgradient wells will be used to estimate the spatial variability in the background levels.** • **Proper analytical, quality control, and quality assurance procedures are established to reduce and control the measurement variability.** • **Proper sampling equipment and techniques are used to control the errors due to sampling.**	

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- **The upgradient wells will be monitored for more than 1 year to establish background concentration levels which may need to be seasonally adjusted.**

Reference:

1) **McNichols, R.J. and C.B. Davis, "Statistical Issues and Problems in Groundwater Detection Monitoring at Hazardous Waste Facilities," Fall 1988 Groundwater Monitoring Review, pages 135-150, 1988.**

Text will remain unmodified.

173. Page 8E-1. Which of these courses, or which combination of courses, satisfies OSHA requirements requiring 40 hours of training for hazardous waste workers? (29 CFR 1910)
DOE-RL/WHC Response No. 1: Tables have been modified to show OSHA requirements. [p T8-5 and p T8-7.1]

Ecology Response: The response is satisfactory but the reference is incorrect. The correct reference is Appendix 8D, not 8E. Please correct.
DOE-RL/WHC Response No. 2: Chapter 8.0 has been completely rewritten. This comment is no longer applicable. 04/29/91

174. Page 11A-i. This information was not provided in April 1989. Please amend this date.
DOE-RL/WHC Response: The design reports have been incorporated in the revised permit application and the referenced date has been deleted. [APP 11A] 01/23/90

175. The QA/QC documentation will be required for all sampling and analysis activities. Please include a QA/QC plan.
DOE-RL/WHC Response: The QA/QC plans covering all sampling and analytical work have been provided to Ecology and EPA. The current QA/QC plans are located at the Hanford Facility and are available for inspection by the regulators. *

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	The following comments were received from Ecology in the NOD dated March 16, 1990	
176.	General. In order to monitor the progress of grout construction and development activities, the DOE-RL and Westinghouse Hanford must submit a brief monthly report to our office. This report should be submitted on the tenth of the month and should list activities begun, continued and/or completed during the previous calendar month. A list of activities that will be conducted in the following calendar month should also be included to allow sufficient time to schedule oversight activities. Any difficulty or new information which arises should be included along with the corrective measures taken. A description of the contracts and research being pursued must also be provided. The first such report must be submitted April 10, 1990. The above information may be provided at a unit managers meeting, if held that month. [WAC 173-303-390(3] **DOE-RL/WHC Response: A monthly report will be provided to Ecology at the end of each month or at the GTF Unit Managers' Meetings. The first monthly report will be given to Ecology starting in May 1990.**	08/30/90
177.	General. A number of computer codes have been used in the design of the GTF. In order to evaluate the applicability and accuracy of these programs, a list of all the programs used in the development of this facility must be provided to our office. The list should include the program name, author's name, address, and telephone number, the version and date of the program, and vendor literature describing the program. Evaluation of this information may result in a request to review the input data along with the generated results. **DOE-RL/WHC Response: A listing of computer codes and vendors was provided to Ecology at the May 1990 Unit Managers' Meeting. The DOE-RL/WHC will supply or take the steps necessary to obtain vendor literature information specifically requested by Ecology from this list.**	08/30/90
178.	Page iii, ln 17. Mixed wastes are regulated by both RCRA and Washington State Dangerous Waste Regulations, not just RCRA as indicated here. The text should be modified as such. **DOE-RL/WHC Response: Text has been modified. [p iii, ln 15-16]**	08/30/90

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179.	Part A. The Part A permit application must be updated to include the new design drawing and new date on which mixed waste will first be processed. In addition, the first page of the Part A permit application must be reproduced so the entire EPA/State Identification Number is printed. **DOE-RL/WHC Response: The Part A permit application has been revised to include new and updated information. [Part A, p 1-16]**	08/30/90
180.	Page 2-3, ln 14. Replace 'north' with 'northwest'. **DOE-RL/WHC Response: Text has been modified. [p 2-2, ln 11]**	08/30/90
181.	Page 2-3, ln 18. Are the miscellaneous areas referred to as the 600 Areas? If so, this should be stated. **DOE-RL/WHC Response: The 600 Area covers all locations not specifically given an area designator. Text has been modified. [p 2-2, ln 15-16]**	08/30/90
182.	Page 2-3, lns 29 and 30. Replace 'U.S. Ecology' with 'US Ecology'. **DOE-RL/WHC Response: Text has been modified. [p 2-2, ln 26]**	08/30/90
183.	Page 2-3, ln 25. Delete "to encourage...industry." Replace with "between the 200 East and 200 West Areas from the federal government." **DOE-RL/WHC Response: Text has been modified. [p 2-2, ln 22-23]**	08/30/90
184.	Page 2-3, ln 31. Delete "within the 1,000 acre tract". Replace with "5 miles south southeast of the 200 East Area". **DOE-RL/WHC Response: Text has been modified. [p 2-2, ln 27-30]**	08/30/90
185.	Page 2-3, ln 43. Add "Only WNP No. 2 is in operation. The other two were never completely constructed." **DOE-RL/WHC Response: Text has been modified. [p 2-2, ln 40-41]**	08/30/90

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186.	Page 2-3, ln 48. Replace 'game' with 'wildlife'. This correction should also be made on Figure 2-1. **DOE-RL/WHC Response: Text has been modified. [p 2-2, ln 43]**	08/30/90
187.	Page 2-4, ln 25. Edit to read "and, if necessary, chemical liquid additives." **DOE-RL/WHC Response: Text has been modified. [p 2-3, ln 17]**	08/30/90
188.	Page 2-4, ln 26. Construction of the vaults, which are considered part of the GTF, has not been completed. The statement indicating that construction was completed in January 1988 should be modified or deleted. **DOE-RL/WHC Response: The statement was be deleted.**	08/30/90
189.	Page 2-5, ln 33. Replace 'radiation' with 'mixed waste'. See comment number 6. **DOE-RL/WHC Response: All facilities used for treating, storing, and disposing of dangerous waste will comply with the sign requirements per WAC 173-303-310(2a). All aboveground tank systems used for the treatment, storage, and disposal of dangerous waste will be marked with the appropriate radiation and/or dangerous waste labels/signs per WAC 173-303-640(5d). Tank systems within buildings used for the treatment, storage, and disposal of dangerous waste will be marked with the appropriate radiation and/or dangerous waste labels/signs per WAC 173-303-640(5d). Underground piping will not routinely be labeled. Protection of underground piping is accomplished by requiring an excavation permit prior to digging a hole. During the preparation of an excavation permit, an engineer identifies the location of pipelines near the proposed excavation site. Petitions for modification of inspection and labeling requirements were submitted to Ecology in September 1989 (Milestone M-21-01). Milestone M-23-00 of the Calendar Year 1990 Update of the Tri-Party Agreement states that "pending resolution, inspections, and labeling will be performed per existing operations procedures." Text has been modified. [p 2-4, ln 33-37]** Ecology Response No. 2: This comment addresses the same issue in the same section of the application as Comment 6. Therefore, this comment is retracted and requires no further response. **DOE-RL/WHC Response No. 2: No response required.**	01/10/91

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190.	Page 2-6, ln 48. Add a statement indicating where in the application regulatory deviations are identified. See comment number 134. **DOE-RL/WHC Response: A section has been added to Chapter 1.0 of the permit application to discuss deviations from the regulations. [p 1-6, ln 43-52; p 1-7, ln 1-4]**	01/10/91
191.	Page 2-7, ln 39. What volume of liquid is expected to be unpumpable due to pump location, pump efficiency, and pump design? **DOE-RL/WHC Response: The grout will have numerous surface irregularities with a maximum peak at the center of the vault sloping downward towards the four pump pits. The expected volume is unknown at this time. The pumps are specified to pump the liquid to within 1 inch of the grout surface. Text has been modified. [p 2-6, ln 40-44]**	*
192.	Page 2-27. Replace 'Department of Game' with 'Department of Wildlife'. **DOE-RL/WHC Response: Text has been modified. [p F2-12]**	08/30/90
193.	Page 3-7, ln 49. Edit to read "greater than 0.01%". **DOE-RL/WHC Response: Text has been modified. [p 3-4, ln 27]**	08/30/90
194.	Page 3-9, ln 17. Both acetone and hexone have been identified as listed wastes in the tanks farms. Analysis of candidate tanks and the feed tank must include these substances. **DOE-RL/WHC Response: Analysis for both acetone and hexone fall within current sampling and analysis criteria for waste feed candidates. The text has been revised to indicate that the waste feed candidate tank samples will be analyzed for acetone and hexone. [p 3-4, ln 45-49]**	01/10/91
195.	Page 3-9, ln 26. Typo. 'bases' should be 'basis'. **DOE-RL/WHC Response: The text has been modified. [p 3-5, ln 6]**	08/30/90
196.	Page 3-12, ln 11. The Washington State Department of Ecology accepts TCLP testing in lieu of EP Toxicity testing. Therefore, it is not necessary to conduct both tests. Once Ecology officially adopts TCLP, the EP Toxicity test results will no longer be accepted.	08/30/90

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	DOE-RL/WHC Response: The text has been modified to reflect the use of TCLP testing in lieu of EP Toxicity testing. [p 3-8, ln 25 through p 3-9, ln 11]	
197.	Page 3-13, lns 36 and 37. Edit these lines to indicate concentrations are in percent. **DOE-RL/WHC Response: The text has been modified. [p 3-10, ln 5-6]**	08/30/90
198.	Page 3-14, Table 3-6. See comment number 18 for cyanide designation. **DOE-RL/WHC Response: Table 3-7 (formerly Table 3-6) has been modified to correct "Sodium ferrocyanide" to "Sodium ferricyanide" and the toxicity category of that substance. [p T3-7, ln 6]**	08/30/90
199.	Page 3-28, ln 47. Replace '173-303-090' with '173-303-101'. **DOE-RL/WHC Response: The text has been modified. [p T3-12, ln 10]**	08/30/90
200.	Page 3-31, ln 28. Typo. 'emperic' should be 'empirical'. **DOE-RL/WHC Response: The text has been modified. [p 3-32, ln 41]**	08/30/90
201.	Page 3-41. As per your response to comment number 51, the use of tributyl phosphate is not anticipated. Therefore, delete line number 41. **DOE-RL/WHC Response: The reference to the use of tributyl phosphate was removed from the text.**	08/30/90
202.	Page 3-42. The permit application states that the waste analyses are from EPA (1986) or (1984). The analytical procedures used should be from the most recent version of EPA procedures. The text and procedures should be modified in all applicable instances to comply with this requirement. **DOE-RL/WHC Response: Applicable and current test methods of SW-846 or Chromatography Method 300.0 will be followed. Section 3.6.1 discusses only those procedures and protocols of SW-846 which must be modified to obtain the information required for this waste analysis plan. Pertinent portions of this discussion dealing with SW-846 procedures and protocols, which have been revised, have been included in the permit application. [p 3-40, ln 37-39]**	09/05/90

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203. Page 3-44. A number of modifications to the analytical procedures are discussed here and on the following pages. There are two significant factors influencing whether a procedural modification will be allowed: 1) the effect it will have on the test results, and 2) what the test results will be used for (designation or process). In order to allow modifications to the required analytical tests, it must be demonstrated how these modifications will affect the results of the tests. For example, it would not be anticipated that changes of the sample size or the use of Teflon beakers instead of glass would have a large effect on the results obtained from a given sample. However, using a different leach procedure could have a significant effect on results and would essentially be the same as not performing the EPA procedure. Ecology will evaluate whether a modification will be acceptable based on the effect on the final results. Acceptability is dependent on whether the test is conducted for performance evaluation or as a regulatory requirement, this should be noted within the text. Note also that a number of proposed modifications are currently being evaluated as part of the Single-Shell Tank Waste Characterization Plan. It would prevent duplication of some efforts if collaboration on these efforts occurred.
DOE-RL/WHC Response: Regulatory procedure modifications are developed to provide the best possible analytical results under the constraints of the radioactive and chemical matrices regardless of data use. It is the intent of the DOE-RL/WHC to comply with the EPA analytical procedures. Deviations to the analytical procedures will be submitted to Ecology for approval. Text will remain unmodified.

Ecology Response No. 2: The application must be modified to incorporate the response.
DOE-RL/WHC Response No. 2: Text has been incorporated. [p 3-40, ln 41-46] 04/29/91

204. Page 3-45. A reference is made to protocols and procedures contained in the DOE EIS (DOE 1987). These protocols and procedures should be stated in this document.
DOE-RL/WHC Response: The DOE EIS (DOE 1987) is a publicly available document; reference to the EIS with regard to radionuclide analysis requires no further clarification of the text. Text will remain unmodified. 08/30/90

205. Page 3-45. The use of 1:20 dilution ratio instead of 1:1 is proposed for measuring corrosivity. This is not acceptable, the established ratios must be adhered to. Use of smaller sample sizes is preferable, if necessary.

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	DOE-RL/WHC Response: The text does provide for a smaller sample size as recommended by Ecology; however, there exists no inherent basis for unsuitability of a proposed dilution ratio of 1:20. Text has been modified to denote the use of a smaller sample size. [p 3-43, ln 1-5]	08/30/90
206.	Page 3-46, ln 9. Ecology does not recognize the toxicity results from the nonradioactive compositionally representative concoctions proposed here. Only book designations or bioassay testing with actual materials are acceptable. **DOE-RL/WHC Response: Response number 38 in this NOD Response Table, discussed at the February 26, 1990, Unit Managers Meeting, explained that the federal authority, granted by the Atomic Energy Act to regulate radionuclides including uranium, has not been waived by the United States Congress. Since Congress has specifically excluded source, special nuclear, and byproduct materials from the types of materials which can be regulated as solid wastes, a state may not exert regulatory authority over such materials as solid wastes. In October 1989, the EPA and NRC, in a joint guidance document, affirmed that sovereign immunity has not been waived for regulation of source material, special nuclear material, or byproduct material. Text will remain unmodified.** Ecology Response No. 2: The regulation of radionuclides is currently under investigation. **DOE-RL/WHC Response No. 2: This issue will be resolved in the Hanford Facility Permit meeting discussions. Text will be modified in accordance with the outcome of these discussions.**	04/29/91
207.	Page 3-48. Procedures changed as a result of problem resolution should be submitted to Ecology. It will then be determined if the change should be treated as a minor or major modification to the permit. **DOE-RL/WHC Response: It is assumed that the procedures being referred to are laboratory analytical procedures. Changes to laboratory analytical procedures affecting the GTF will be submitted to Ecology for approval.** Ecology Response No. 2: Changes to analytical procedures must be addressed per WAC 173-303-910(2), not as a permit modification under WAC 173-303-830. Delete the statement "Any requested changes will be considered a minor permit modification". Any analytical procedure changes not identified in the application must be submitted to Ecology in writing. Ecology will then determine if it is necessary to initiate the procedures of WAC 173-303-910.	

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	DOE-RL/WHC Response No. 2: The response provided was correct if not complete. The text has been modified to state that the analytical procedure changes will also be submitted as petitions under WAC 173-303-910(2) for demonstration of equivalency under WAC 173-303-110. [p 3-46, ln 6-9]	04/29/91
208.	Page 3-53. Comment number 62 also applies here. DOE-RL/WHC Response: Satellite accumulation area(s) will be established as needed in compliance with WAC 173-303-200. The text has been modified. [p 4-23, ln 44-48; and APP 4L]	08/30/90
209.	Page 4-1, ln 36. Edit to read "and, if necessary, liquid additives". DOE-RL/WHC Response: The text has been modified. [p 4-1, ln 35]	08/30/90
210.	Page 4-5. Tank RO2 should be labeled 'Air Deentrainer Tank' and the input to this tank should be 'Air Deentrainer'. As per your response to comment number 51, the use of tributyl phosphate is not anticipated. DOE-RL/WHC Response: Although the use of an air deentraining agent is not anticipated, tributyl phosphate is the only agent identified for future use. It is considered to be premature to relabel all field equipment (tank, piping, pumps, connections, and computer display) and change all associated documentation (drawings, manuals, and computer software) at this time. Should a different air deentraining agent become necessary for use in the future, the equipment and documentation labeling shall be changed at that time. Section 4.2.2.1 of the permit application states that Ecology will be notified if additives are required. Tributyl phosphate has been changed to air deentrainer. [p F4-1]	01/10/91
211.	Page 4-20, ln 32. Edit to read "progressing cavity-style pump". DOE-RL/WHC Response: The text has been modified. [p 4-18, ln 23]	08/30/90
212.	Page 4-22. Is this air filtration system separate from the relocatable vault exhauster? Discuss the reasoning for not monitoring volatile organic emissions from the LCT/mixer module or the vaults.	

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	DOE-RL/WHC Response: A minimum of two air filtration systems are in operation when wastes are processed. The first is a continuous filtration system for containment of the LCT/Mixer module. The second, the exhauster and filter system for the vaults, is not individually separable. Volatile organic emissions (VOCs) are not monitored from these two systems as potential release of VOCs are well below state or federal requirements. Text will remain unmodified.	08/30/90
213.	Page 4-28. Please provide the most current vault construction schedule. DOE-RL/WHC Response: A current construction schedule has been included in the permit application. [APP 2B, Plate 2-3]	08/30/90
214.	Page 4-37, ln 4. Washington's Dangerous Waste Regulations specify that the liner must withstand physical contact with the waste or leachate, not just the leachate. Determine if EPA 9090 testing assessed compatibility with the waste or just the expected leachate. Provide a discussion on how the EPA 9090 testing was conducted to ensure the liner could withstand prolonged contact with the grout slurry in the event of a primary liner failure. [173-303-650(2)] DOE-RL/WHC Response: The EPA 9090 test of the HDPE liners was conducted using simulated double-shell slurry feed waste. To demonstrate that the liners could withstand prolonged contact, testing was conducted at 90°C for time periods of up to 120 days. Radiation exposures for some samples exceeded that expected for 30 years of exposure. The use of waste rather than leachate for the immersion testing is more aggressive because the pH drops from approximately 14 to approximately 12 when the waste is grouted. Also, the leachate is expected to have lower concentrations of waste species than the waste. The text has been modified to indicate that the synthetic liners are chemically resistant to the waste and the expected leachate. [p 4-32, ln 35]	01/10/91
215.	Page 4-37, ln 6. Is the compatibility testing for the asphalt coating in Appendix 4K? If not, what is the status of the report described on this page? DOE-RL/WHC Response: Compatibility testing of Nokorode 705M with simulated double-shell slurry feed is described in Appendix 4K. The text has been modified in the permit application. [p 4-32, ln 36-38]	01/10/91

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216.	Page 4-38, ln 23. It is stated here that the leachate sump has a 4,000-gal capacity. Page 4-33, line 31 indicates it is 3,000 gal. Page 7A-11 lists the capacity as 2,900 gal. Please clarify and correct. **DOE-RL/WHC Response: The 4,000-gal capacity stated referred to the actual volume of the sump; however, due to the elevation of the sump inlet pipe, an operating capacity of 2,920 gal is more realistic. The text has been revised to state a capacity of 2,900 gal and has been used consistently in all three sections quoted in the comment. [p 4-29, ln 22; and p 4-34, ln 6]**	01/10/91
217.	Page 4-39, ln 10. In order to properly evaluate the design and construction of the vaults, Ecology must receive a copy of all engineering change notices as they are issued. This requirement is effective immediately. All engineering change notices which have been issued since the last submittal of this application should be forwarded to our office immediately. **DOE-RL/WHC Response: Ecology will be provided with a copy of all engineering change notices generated between text revisions. The engineering change notices will be delivered to Ecology via the monthly status reports (see comment number 176) or at the GTF Unit Managers Meetings.**	01/10/91
218.	Page 4-39, ln 22. Based on the maximum leachate head, pump capacity, flow characteristics, etc., what is the maximum flow of leachate which the LDCRS can handle? **DOE-RL/WHC Response: A preliminary design analysis of the LDCRS determined that the maximum infiltrating precipitation that could reach the LDCRS of any one vault is 9.5 gal/min. This value was derived from the worst case expected precipitation, based on a 100-year rainstorm with a 24-hour duration. The value is conservative and assumes that there is no evaporation of the precipitation, the RCRA closure cover is not installed, and that all the precipitation reaches the LDCRS. The actual flow rate reaching the LDCRS will probably be smaller due to the installation of the drainage path and skirt along the sides of the vault which will direct most of the precipitation away from the catch basin.** **The 9.5 gal/min value was used to determine the size and number of drainage holes required in the drain pipe which routes any liquid collected in the catch basin to the leachate sump. The current design utilizes four 1/4-inch holes per foot of drainage pipe which will accommodate a flow rate into the pipe equal to 143.6 gal/min, yielding a safety factor of 15.**	01/10/91

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This design analysis can be located in Appendix 4I, "Vault Design", page 4I-503 (Appendix G of the Vault Engineering Report).

Preliminary pump criteria identify a short-term leachate pump capacity of 20 to 50 gal/min. The development of this capacity accounts for the capability to process liquid through the existing GPF liquid collection tank system. The range of 20 to 50 gal/min allows the selection of a single pump which can accommodate the additional head and distances associated with the vault located farthest from the GPF. The pump criteria and final pump selection is not complete at this time; however, even at the worst case capacity of 20 gal/min, the system yields a safety factor of 2:1. The text has been modified to indicate that the LDCRS can handle a liquid source of at least 20 gal/min. [p 4-34, ln 40-41]

219. Page 4-39, ln 30. The LDCRS must be constructed of materials chemically resistent to the waste and expected leachate. Provide a discussion of the compatibility of the LDCRS with the waste assuming a primary liner failure. [173-303-665(2)]
DOE-RL/WHC Response: The catch-basin gravel was completely immersed for 90 days in simulated double-shell slurry feed at 90°C. The compressive strength of the gravel bed, the weight of gravel, and size distribution were monitored. The HDPE pipe has undergone testing similar to EPA 9090 testing of liners in simulated DSSF at 75°C and 90°C, including the effects of radiation. The leachate collection tank is made of carbon steel for which substantial corrosion data are available from corrosion rates in double-shell tanks. The text has been modified to indicate that the system is compatible with the waste and expected leachate. [p 4-35, ln 19-21] — 01/10/91

220. Page 4-41, ln 19. What part of the definitive design is not complete?
DOE-RL/WHC Response: Specifications for synthetic liners are complete and have been added to the permit application. In addition, the text has been revised to reflect design completion. [APP 4I, Construction Specifications, Sections 2753 through 2755] — 09/05/90

221. Page 4-21, ln 27. Comment number 220 also applies here.
DOE-RL/WHC Response: The construction specification for the LDCRS is complete and has been added to the permit application. In addition, the text has been revised to reflect design completion. [APP 4I, Construction Specifications, Section 2756] — 09/05/90

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222.	Page 5-49, ln 5. This section states that analysis of drawdown data collected from wells 299-E25-32 and 299-E25-33 is "still in progress." Why has it taken 2 years to analyze aquifer test data from these two wells? **DOE-RL/WHC Response: Tests were conducted at wells 299-E25-32 and 299-E25-33 in February and April 1988, respectively. While discharging an average of 370 gal/min during a 24 hour pumping test of the aquifer, the measured drawdown was on the order of 0.1 ft. This drawdown is not sufficient to perform an analysis, especially when diurnal fluctuations of several hundredths of a foot are observed in these wells. To perform a meaningful test, the aquifer wells need to be stressed (pumped) to a greater degree. The available information does suggest that the transmissivity is large, probably on the order of 100,000 ft^2 per day. Text will remain unmodified.**	08/30/90
223.	Page 5-50, ln 33. This section states that three piezometers (299-E25-30A and B, 299-E25-30A and B, 299-E25-32A and B) with dual completion have been completed to measure vertical hydraulic gradients at specific discrete locations near the grout facility. Numerous cases have been reported within the technical literature citing failure to isolate monitored zones within nested piezometers. Please provide data demonstrating that isolation has been provided within these boreholes. **DOE-RL/WHC Response: A demonstration of isolation between piezometers in the dual piezometer wells can be supported by the construction materials and methods used to install the piezometers, and possibly by comparing the response of water levels in the piezometers to barometric fluctuations. A discussion on piezometer isolation with applicable data has been added to the permit application. [p 5-17, ln 40-41 and APP 5C-3]**	01/10/91
224.	Page 5-60, ln 20. Although the detection monitoring system is outlined, no explanation is given describing the reasoning used in determining where individual monitoring wells were placed. Provide a detailed explanation describing the process used to determine where individual monitoring wells would be located. **DOE-RL/WHC Response: The text has been modified in Section 5.3.1, "Summary of the Detection Monitoring System," and in Section 5.3.2, "Detection Monitoring Program," to include the results of the Golder MEMO Model (Monitoring Efficiency Model). This model was used to determine the positioning of individual monitoring wells. The modeling results have been placed in Appendix 5C-4 and a summary of the conclusions has been included in the text. [p 5-22, ln 18-27: and p 5-27, ln 16-18]**	08/30/90

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225.	Page 5-60, ln 8. This section references 40 CFR 265.91 Groundwater monitoring system, although it is not properly referenced in Section 5.6. The regulation states, "...(2) Monitoring wells (at least three) installed hydraulically downgradient (i.e., in the direction of decreasing static head) at the limit of the waste management area. Their number, locations, and depth must ensure that they immediately detect any statistically significant amounts of hazardous waste or hazardous waste constituents that migrate from the waste management area to the uppermost aquifer." Emphasis added. The operable term immediately detected is interpreted to mean detection within one sampling period of the time waste constituents have entered the groundwater. Whether this interpretation is correct is now being considered and will be further addressed during Ecology's next response. **DOE-RL/WHC Response: Ecology concurred with the interpretation of 'immediately detect', included in Revision 1 of the permit application, at the August 17, 1990, Unit Managers Meeting.**	08/30/90
226.	Page 6-6, ln 20. If the single pump used during filling operations fails, how long will it take to replace the pump considering it may be radioactively and chemically contaminated? Is a spare pump maintained at the GTF? **DOE-RL/WHC Response: With sufficient priority and favorable weather, the leachate pump could be replaced in whole within 16 hours. Certain seasons provide unfavorable weather (wind speeds in excess of 15 mile/hour restrict open pit maintenance) in which the pump replacement could take up to two weeks. Once the leachate pump has been selected, a spare parts review will be conducted and any spare parts deemed necessary will be provided for. This review will consider the availability of the parts along with the probability of failure. All spare parts are maintained within easy access, but not specifically at the GTF.** **Analysis has been performed based on a rapid and large leak rate of 800 gal/day into the LDCRS, which shows that after 3.6 days the 2,900-gal sump will be full and after a total of 24.8 days the catch basin will be full. This analysis assumes a drainage gravel void ratio of .20 and accounts for the displaced volume of the gravel and the vault within the catch basin. Based on this analysis, the LDCRS can accommodate the large leak rate without spilling liquid over to the environment.** **In addition, the leachate sump is currently being redesigned to incorporate an additional 8-inch riser outside the bounds of the leachate pump pit. This additional riser will allow liquid sampling and installation of an emergency back up pump without the removal of the leachate pump pit cover blocks or pump. Text will remain unmodified.**	08/30/90

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227. Page 6-8, ln 8. The GTF transfer piping must be appropriately marked to identify mixed waste hazards. A sample mixed waste sign was provided to Westinghouse Hanford personnel during the February 26, 1990, GTF unit managers meeting. This type of identification is consistent with discussions between Westinghouse Hanford's Facility Compliance personnel and Ecology concerning the integration of mixed waste signs at the Hanford Site. Replace "radiation" with "mixed waste". [173-303-310]
DOE-RL/WHC Response: All facilities used for treating, storing, and disposing of dangerous waste will comply with the sign requirements per WAC 173-303-310(2a). All aboveground tank systems used for the treatment, storage, and disposal of dangerous waste will be marked with the appropriate radiation and/or dangerous waste labels/signs per WAC 173-303-640(5d). Tank systems within buildings used for the treatment, storage, and disposal of dangerous waste will be marked with the appropriate radiation and/or hazardous waste labels/signs per WAC 173-303-640(5d). Underground piping will not routinely be labeled. Protection of underground piping is accomplished by requiring an excavation permit prior to digging a hole. During the preparation of an excavation permit, an engineer identifies the location of pipelines near the proposed excavation site. Petitions for modification of inspection and labeling requirements were submitted to Ecology in September 1989 (Milestone M-21-01). Milestone M-23-00 of the Calendar Year 1990 Update of the Tri-Party Agreement states that "pending resolution, inspections, and labeling will be performed per existing operations procedures." The text has been modified. [p 6-9, ln 9-25]

Ecology Response No. 2: A statement must be made in this section that containers and tank systems containing dangerous waste will be labeled pursuant to WAC 173-303-630(4) and WAC 173-303-640(5)(d), respectively.
DOE-RL/WHC Response No. 2: These statements have been added to the text with the exception of WAC 173-303-630(4) which was changed to WAC 173-303-630(3). Exceptions to this will be in accordance with the petitions for modification of inspection and labeling requirements that were submitted to Ecology in September 1989 (Milestone M-21-01). Milestone M-23-00 of the Calendar Year 1990 Update of the Tri-Party Agreement states that "pending resolution, inspections, and labeling will be performed per existing operations procedures."
[6-9, ln 9-30]

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228.	Page 6-9, ln 40. Current Ecology policy designates 3 ft as acceptable aisle space. Please document that this criterion has been met? **DOE-RL/WHC Response: Aisle space will comply fully with National Fire Protection Association and Life Safety Code requirements. The minimum aisle space required under the National Fire Protection Association and Life Safety Code is 28 inches. It is anticipated that the GPF will have an aisle space greater than 36 inches. Text will remain unmodified.** Ecology Response No. 2: It is not clear why aisle space can only be "anticipated" since the GPF has already been constructed. Three feet of aisle space is required per WAC 173-303-630 (October 16, 1990) for dangerous waste containers. This distance is required to allow unhindered access to inspect and move equipment around the containers. Ecology Requirement: The application must state that all dangerous waste containers will have three feet of aisle space. **DOE-RL/WHC Response: Aisle space will comply fully with National Fire Protection Association and Life Safety Code requirements and WAC 173-303-630(5C). Text has been modified. [p 6-10, ln 11-14]**	04/29/91
229.	Page 7-3, ln 14. Ecology must be provided with a copy of the building emergency plan for the GTF. **DOE-RL/WHC Response: The WAC 173-303 requirements for contingency plans are satisfied in the following documents: the DOE-RL emergency plan and procedures manuals, the *Westinghouse Hanford Company Emergency Plan* (WHC 1989), and the *Westinghouse Hanford Company Building Emergency Plan - Grout Treatment Facility*. The DOE-RL emergency plan and procedures manuals. and the *Westinghouse Hanford Company Emergency Plan* are available for review upon request. The *Westinghouse Hanford Company Building Emergency Plan - Grout Treatment Facility* will be provided as Appendix 7B. [APP 7B]** **The cited contingency plan documents also serve to satisfy a broad range of other requirements (e.g., Occupational Safety and Health Administration and U.S. Department of Energy orders). Therefore, revisions made to portions of the contingency plan documents that are not governed by the requirements of WAC 173-303 will not be considered as a modification subject to review of approval by Ecology.**	08/30/90

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Changes made to the GTF building emergency plan that are governed by WAC 173-303 will be sent to Ecology for a permit modification.

230. Page 7-14, ln 5. Delete "in Section 7.3.4". Replace with "below".
DOE-RL/WHC Response: Chapter 7.0 was completely rewritten to be replaced by the GTF building emergency plan (APP 7B). This comment is no longer applicable. 04/29/91

231. Page 9-2, ln 23. Replace 'Game' with 'Wildlife'.
DOE-RL/WHC Response: The text has been modified. [p 9-2, ln 17] 08/30/90

232. Page 9-5, ln 29. When will the release information be available?
DOE-RL/WHC Response: The latest quarterly report, *RCRA Groundwater Monitoring Projects for Hanford Facilities*, was released in March 1990. A copy of this report was given to Mr. T. L. Nord of Ecology. All future quarterly reports will continue to be sent to Ecology. The text has been modified. [p 9-4, ln 12-14] 01/10/91

233. Page 12-12, ln 19. Edit to read: "will telephonically notify Ecology immediately after detecting the leak. A written report will be provided within 7 days after detecting the leak."
DOE-RL/WHC Response: The DOE-RL will comply with reporting requirements of WAC 173-303-145 and will notify Ecology in writing within 7 days after detecting the leak. Text has been modified. [p 12-8, ln 26-27]

Ecology Response No. 2: Due to the magnitude of the grout facility and the environmental impacts which may result due to the failure of the primary liner system, it is insufficient to only notify Ecology in writing within seven days of a leak. Although a certain amount of leakage into the LDCRS will be permitted, Ecology reserves the right to take samples of any liquid reaching the sump. Without 24 hour notification, Ecology's ability to take samples and assess the situation would be limited. It should also be noted that since the LDCRS is a totally enclosed secondary containment system, spill reporting under WAC 173-303-145 is not applicable.

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Ecology Requirement: The application must be modified to incorporate the following text. The notification of liquids in the LDCRS is required when: 1) liquid is first detected in the LDCRS, 2) the liquid flow rate exceeds the ALR, and 3) the liquid flow rate exceeds the RLL. The level of notification for each of these scenarios is slightly different. The first detection of liquids in the LDCRS must be reported telephonically to Ecology within 24 hours of detection and does not require a written notification. Flow rates into the sump exceeding the ALR must be reported telephonically to Ecology within 24 hours and followed by a written notification within 7 days. The written notification should identify the source of the liquid or provide the date by which the source will be identified to Ecology. Flow rates exceeding the RLL must be immediately reported to Ecology telephonically and followed up with a response plan to be submitted to Ecology within 60 days of the exceedance. This response plan may be incorporated into the preliminary recovery plan (as identified in comment 25) if a recovery plan is also required. The notifications are required per WAC 173-303-390(3), Facility Reporting, which states "...the owner or operator shall submit any other reports required by the department."

These notification requirements must be listed in the Response Action Plan (Appendix 7A). It is sufficient to simply reference the Response Action Plan under Section 12.4.1.6.2.
DOE-RL/WHC Response No. 2: The permit has been revised to include the information provided above with the exception of item number one. Ecology will be notified within 24 hours or the next regular business day (if on a weekend or holiday) after detecting a confirmed liquid rise in the LDCRS which occurs after the start of a grout campaign for a particular vault. This is necessary because the LDCRS will probably contain a heel of liquid attributed to construction and the testing of process equipment and level detecting instrumentation before ever starting a grout campaign. Liquid rises in the sump, even if continuous, that are below the ALR for the one day limit of 20 gallons, would at the most, produce just under 60 gallons of liquid in the LDCRS. If a leak rate were to occur at the 30 day average of 4 gallons per day, 12 gallons of liquid would accumulate in the in the LDCRS over a weekend. Under either scenario, the volume of liquid that would have accumulated is insignificant for a 2900 gallon tank. Ecology would have approximately 142 days and 722 days respectively, (based on filling the LDCRS with 2900 gallons of liquid) to access the situation and/or take samples.

234. Page 12-12, ln 45. Typo. 'survey-or' should be 'surveyor'.
DOE-RL/WHC Response: The text has been modified. [p 12-9, ln 2] 08/30/90

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235.	Page APP 3I-ii. The permit application states that, "The procedures are only representative of those to be maintained..." The actual procedures which will be used must be provided. [173-303-806(4)]. **DOE-RL/WHC Response: The procedures will be removed and replaced with 'descriptions of procedures' in accordance with WAC 173-303-806(4). This approach is consistent with that being used to revise the 616 Nonradioactive Dangerous Waste Storage Facility in response to an NOD received March 23, 1990, and discussions held at Unit Managers Meetings on April 17, 1990, and May 23, 1990. [App 3I]**	08/30/90
236.	Page APP 4I-3. It is difficult to find the Dames and Moore appendices within Appendix 4I. Please provide a means of quickly finding a particular Dames and Moore appendix. Since each page is numbered with a DOE-RL page number, we suggest identifying the first page of each Dames and Moore appendix with a DOE-RL number in the Dames and Moore table of contents. **DOE-RL/WHC Response: Tabs have been inserted within Appendix 4I for easier identification of the various Dames and Moore appendixes. [App 4I]**	08/30/90
237.	Page APP 4I-34. In response to our November 21, 1989, letter concerning the GTF, Westinghouse Hanford has verbally agreed not to use a 6 mil polyethylene sheet between the drainage gravel and the vault. It appears this agreement has not been incorporated into the application. Please correct and identify the material to be used as a substitute for the polyethylene sheet. **DOE-RL/WHC Response: The 6 mil plastic sheet has been removed from the design. It has been replaced with a geotextile material as described in Engineering Change Notice B-714-22, which was previously submitted to Ecology.**	09/05/90
238.	Page APP 7A-3. The proper abbreviation for the Washington Department of Ecology is 'Ecology' not 'USDOE'. **DOE-RL/WHC Response: The text has been modified. [p 7A-1]**	08/30/90
239.	Page APP 7A-3. Does the 'break' and 'barrier' provide the same function? The difference between the two, or even the fact that there are no two distinct parts to this barrier, is not provided in the application. A discussion regarding this issue must be presented. Is liquid diffusion or radiation protection the primary purpose of the barrier? When will the	

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	asphalt diffusion barrier report be complete? This document must be provided immediately upon completion. **DOE-RL/WHC Response: The terms 'diffusion break' and 'diffusion barrier' are used to differentiate the different types of asphaltic construction materials. The basic difference between the two types is the gradation of the aggregate materials and oil content. Both the diffusion barrier and diffusion break serve a common purpose, to minimize the rate of diffusion of ionic constituents out of the vault; see Chapter 9.0 for additional discussion. The diffusion break has an additional purpose, to minimize water vapor return to the vaults once the vaults and the surrounding soil become isothermal. A complete asphalt diffusion barrier report will be produced as part of the long-term performance assessment for the grout disposal program and will be provided to Ecology upon completion. The text has been modified to discuss the asphalt barrier. [p 7A-1]**	01/10/91
240.	Page APP 7A-5. Define "other appropriate receiver tanks". **DOE-RL/WHC Response: Other appropriate receiver tanks include feed tanks 241-AP-102, 241-AP-104, and other 200 East Area double-shell tanks. The text has been revised to state tank farm double-shell tanks. [p 7A-1]**	08/30/90
241.	Page APP 7A-5. Detail the testing to be conducted on the asphalt coating after it is emplaced? **DOE-RL/WHC Response: Coating testing and inspection requirements are described in Sections 2.3.6.2 and 2.3.6.3 of the Construction Quality Assurance Plan (Appendix 4G). Text will remain unmodified.**	08/30/90
242.	Page APP 7A-5. Page 7A-11 states the detection precision of the LDCRS is 20 GPD. How is the criterion of 0.10 GPD for hydrostatic testing measured? **DOE-RL/WHC Response: During the hydrostatic testing of the vault, a small bottle or container is attached to the inlet of the LDCRS sump to verify that the 0.10 GPD leakage criteria is met. Text will remain unmodified.**	08/30/90
243.	Page APP 7A-9. Edit to read: "greater than 0.01%". **DOE-RL/WHC Response: The text has been modified. [APP 7A-4]**	08/30/90

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244.	Page APP 7A-11. The calculations in Appendix A indicate 33 gallons, not 31 gallons as reported here. Please edit. **DOE-RL/WHC Response: The calculation was reperformed. The text has been modified to read 'Negligible.' [p 7A-5]**	08/30/90
245.	Page APP 7A-11. Should '20 GPD' be '20 gallons'? **DOE-RL/WHC Response: The text has been modified to read '20 gallons'. [p 7A-6]**	08/30/90
246.	Page APP 7A-13. EPA's *Draft Minimum Technology Guidance on Double Liner Systems for Landfills and Surface Impoundments - Design, Construction, and Operation* recommends a minimum leak rate of 1 GPD per acre. Provide a specific reference for the "EPA recommendation of 20 GPD per acre". The ALR is still under review. **DOE-RL/WHC Response: The reference is: EPA 1987, *Liners and Leak Detection for Hazardous Waste Land Disposal Units, Notice of Proposed Rule Making*, Title 40, Code of Federal Regulations, Parts 260, 264, 265, 270, and 271, Federal Register 52 FR 20218 et seq., May 29, 1987, U.S. Environmental Protection Agency, Washington D.C. Text will remain unmodified.** Ecology Response No. 2: An ALR of 20 gallon per day per acre (GPDA) is not acceptable. The EPA reference cited identifies a range of ALR's from 5 to 20 GPDA. This range is based on surface impoundment conditions with a constant liquid head on the top liner. This document also states that lower ALR's may be considered for landfills because there is no head on the liner. In light of the fact that the grout slurry in the vault should remain liquid for a relatively short period of time and the fact that the vault will be hydrostatically tested to insure leakage of less than 0.1 GPD, the ALR must be set at the lowest end of the range cited. Ecology Requirement: A 5 GPDA flow rate must be used as the ALR. (173-303-283) **DOE-RL/WHC Response No. 2: The text has been modified to change the ALR to 10 GPDA based on a 30 day average. This will result in an average daily rate of 4 gallons per day. The 20 gallons in one day ALR will remain in effect. The ALR of 20 gallons in one day is necessary based on the of the level detectors in the sump which are expected to have an accuracy of (+/-) .5 inches. A change of .5 inches corresponds to approximately 16 gallons.**	
247.	Page APP 7A-13. What is the regulatory or technical basis for allowing a leakage rate of	

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20 GPD or the averaging of leak rates over 30 days. The ALR is still under review.
DOE-RL/WHC Response: See reference in response to comment number 246; specifically note the discussion beginning on 52 FR 20235. Text will remain unmodified.

Ecology Response No. 2: Although it is acceptable to average leak rates over 30 days with a 20 GPD maximum and conduct sump level monitoring daily prior to closure, it is not acceptable to reduce sump level monitoring to quarterly.
Ecology Requirement: Sump monitoring will be reduced from daily to weekly when post-closure status begins. Any further reductions in sump monitoring cannot be determined until after the sump data generated prior to post-closure status has been reviewed. (173-303-283)
DOE-RL/WHC Response No. 2: Commencing with post-closure, weekly data for a complete quarter will be submitted to Ecology in order to obtain approval for reducing the monitoring frequency from weekly to quarterly. Text has been modified (Rev. 2).

248. Page APP 7A-13. The calculations in Appendix A indicate 33 gallons, not 31 gallons as reported here. Please edit.
DOE-RL/WHC Response: The calculation was reperformed. The text has been modified to read 'Negligible.' [APP 7A-7] 08/30/90

249. Page APP 7A-14. Edit "monitoring will continue on a quarterly basis" to read "monitoring frequency will gradually be reduced to a quarterly basis dependent upon Ecology approval".
DOE-RL/WHC Response: The text has been modified. [APP 7A-7] 08/30/90

250. Page APP 7A-14. What analyses will be conducted on the samples taken from the sump? How often will these samples be taken?
DOE-RL/WHC Response: Samples taken from the sump will be analyzed for gamma emitters to determine if the liquid leaked from inside the vault. In addition, sufficient analyses will be conducted to designate the sump liquid in accordance with WAC 173-303. Samples will be taken quarterly or prior to removal of the liquid from the sump as long as the leak rate does not exceed the ALR. Samples will be taken within 24 hours of the leak rate exceeding the ALR and continue to be taken on a weekly frequency until no significant change in radionuclide composition is detected for three consecutive sampling periods. At that time, the sampling frequency will be reduced to monthly as long as the leak rate remains above the ALR and analyses indicate that the sump liquid composition has not changed. Significant increases in

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the leak rates or changes in the sump liquid composition will increase the sampling frequency to weekly. Additional samples will be taken as needed to help define response actions and mitigation measures. The text has been modified. [APP 7A-7]

Ecology Response No. 2: It is unacceptable to say "...sufficient analysis will be conducted to designate the sump liquid in accordance with WAC 173-303". In addition, although analysis for gamma emitters can be used as a screen in assessing the source of the leachate, the results of this analysis cannot be used as justification for not conducting a more thorough chemical analysis. The frequency of these chemical assessments must also be increased.

Ecology Requirement: A list must be included in the application which specifies the chemical constituents to be analyzed. A complete analysis must be conducted on the first retrievable amount of liquid to enter the sump and continue weekly thereafter irregardless of the ALR. If three consecutive samples indicate no significant change in radionuclide or chemical composition, the frequency can be reduced to monthly. The frequency must return to weekly if a significant change is detected during a monthly sampling event. Describe the method which will be used to determine "significant change". (173-303-300)
DOE-RL/WHC Response No. 2: A detailed grout sampling plan is currently being prepared and is scheduled to be completed in FY 1991. As a minimum analytical testing of sump leachate will include pH, GEA and OH-, unless significant differences from expected values are found. The expected composition of vault leachate should be similar to DST feed or construction bleed water. The time between samples will depend upon the leachate collection rate and the ability to withdraw solution from the sump. A mandatory one week sampling interval may not be achievable if the vault and liner system works as designed. Sampling is expected to occur on a batch basis when sufficient solution has collected for retrieval and sampling. The sump level will be monitored continuously through the pouring and hydration period. The minimum volume accumulated or time expired between sampling/transfer occurrences will be discussed in the sampling plan. The sampling plan will be provided to Ecology in a separate transmittal.

251. Page APP 7A-14. The recycling of liquids back to the vault is under investigation. See comment number 56.
DOE-RL/WHC Response: Text will be modified in accordance with the resolution of comment number 56.

Ecology Response: Based upon a WHC presentation on November 28, 1990, liquids from the leachate sump will only be returned directly to the vault during emergency conditions. This

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contradicts item 2 in Section 6.1 of the RAP which indicates that leachate from the sump in quantities less than the ALR will be returned to the vault.
Ecology Requirement: Replace "return liquids to the disposal vault" with "transfer liquids to the LCT". Define the "emergency conditions" during which leachate will be returned directly to the vault.
DOE-RL/WHC Response No. 2: The RAP has been revised to show the emergency condition for recycling of leachate sump contents to the vault. [App 7A, p 7A-2]

252. Page APP 7A-14. The proper abbreviation for the Washington Department of Ecology is 'Ecology' not 'USDOE'.
DOE-RL/WHC Response: The text has been modified. [p 7A-7] 08/30/90

253. Page APP 7A-15. The proper abbreviation for the Washington Department of Ecology is 'Ecology' not 'USDOE'.
DOE-RL/WHC Response: The text has been modified. [p 7A-8] 08/30/90

The following comments were received from Ecology in the NOD dated June 19, 1990

254. Part A Application, Page 1, Part IIB. Information presented at the bottom of page 1 of the Part A application presents information on the processing and storage of wastes as shown in this NOD's Table 1. It is not mentioned that the landfill capacity actually consists of 43 individual vaults of 4.3 acre-ft storage capacity each of 1,400,000 gallons per vault.
Ecology Requirement: The Part A permit application should reflect the above mentioned fact.
DOE-RL/WHC Response: The information presented has been included in the Part A permit application. [Part A, p 2] 09/05/90

255. Part A Permit Application, Page 2, Part IIIB: The description at the top of the page states that the system has the capacity to treat 101,000 gallons of waste per day with a total capacity of 185 acre-ft. It does not state whether those quantities are for waste only or waste plus cement. It does not say whether or not these figures are for a 24-hour day.
Ecology Requirement: It should be stated that the total production capacity of 101,000 gallons per day is based on 24 hours of continuous operation. This maximum production

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	capacity is based on approximately 79,000 gallons per day of liquid wastes and 22,000 gallons per day of equivalent dry grout material. The final grouted waste mixture of 185 acre-ft will consist of approximately 145 acre-ft of waste and 40 acre-ft of dry grout material equivalent contained in 43 individual vaults of 4.3 acre-ft each. **DOE-RL/WHC Response: The information presented has been included in the Part A permit application. [Part A, p 2]**	09/05/90
256.	Part A Permit Application, Page 4. The values reported on page 3 are not sufficiently supported by the text. Ecology Requirement: It should be noted that the waste identified as D002, D006, D007, D008, D011, and WT01 for solidification is the same as the WT02 waste in the storage vaults. The quantity of 100 million pounds per year is equivalent to 8.45 million gallons, or to approximately 6 equivalent vault volumes. The total filling time interval is approximately 84 days per year at the maximum pouring rate of 101,000 gallons per day. **DOE-RL/WHC Response: The information presented has been included in the Part A permit application. [Part A, p 4]**	09/05/90
257.	Part A Permit Application, Page 7. There is no simplified overall process flow diagram of the GTF showing how each of its components relate to the others. Ecology Requirement: A process flow diagram should be added to the illustrations already presented in the Part A of the text, such as shown in this NOD's Figure 1. **DOE-RL/WHC Response: The Part A permit application has been revised to include any new and updated information. [Part A, p 8]**	09/05/90
258.	Page 2-5, Section 2.2, Grout Treatment Facility. There is no simplified process flow diagram of the GTF showing the overall treatment units. Ecology Requirement: A process flow diagram should be provided at this location in Section 2, shown in this NOD's Figure 2, or reference made to the previous diagram required in comment number 257. **DOE-RL/WHC Response: A process flow diagram has been referenced. [p 2-4, ln 14]**	09/05/90
259.	Page 2-7, Section 2.2.3.1, Vaults. The overall dimensions of each vault are not listed. The breakdown of vault capacity is also not listed.	

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	Ecology Requirement: The overall dimensions of the vaults need to be mentioned as a length of 120 ft, a width of 50 ft, and a depth of 35 ft (38.10 m by 15.24 m by 10.40 m). The vault capacity is utilized in this NOD's Table 3. **DOE-RL/WHC Response: The inside dimensions of the vault are 123 ft 6 in., 50 ft 6 in. (H-2-77580 sheet 1), and 34 ft deep (sheet 2). The total capacity of the vault, full to the top, is 212,000 cu ft or 1.59 million gal. It is anticipated that the vault will be filled with radioactive grout, equaling approximately 1.4 million gal. The text has been modified. [p 2-6, ln 17-18]**	09/05/90
260.	Page 2-10, Section 2.2.4, Dry Materials Facility. The units in the table of pounds per campaign are somewhat confusing, as is the description in the text. Ecology Requirements: The material in this section should be rewritten to state the facts noted as follows. The nominal maximum feed rate of the DMF is 30,000 lb/hr (15 tons/hour) or a total of 720,000 lb/day (360 tons/day) assuming 24 hours per day of continuous operation. The amount of dry solids which will be added to a "campaign" of one million gallons of waste is presented in this NOD's Table 4. **DOE-RL/WHC Response: Operation of the DMF is a batch process rather than a continuous process. Discrete amounts of each separate material are mixed together to make batches of dry blend. In addition, the transfer of dry blend to GPF is a batch process (approximately two truckloads of dry blend per shift are transferred to the GPF). The proposed feed-rate column would give the impression that the DMF is a continuous process. Text will remain unmodified.**	01/10/91
261.	Page 2-33, Section 2.8, Waste Generating Facilities. There is useful information presented on waste stream generation for supplying the GTF, but no specific inventory is provided. Ecology Requirement: An inventory of the types and amounts of wastes present which may require grouting should be presented similar to this NOD's Table 5. There needs to be an estimate made of the proportions of wastes which would be amenable to grouting. **DOE-RL/WHC Response: Table 3-10 currently contains a projection of the type requested by Ecology. The proportion that will be grouted will be specifically determined by chemical and**	09/10/90

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radiological analysis of candidate tanks. As such, the forecast of 'groutable waste' will continue to be developed throughout the life of the facility. Likewise, characterization of the grout feed will continue. Text will remain unmodified.

262. Page 3-1, Section 3.1.1, Waste Description. Although chlorine is listed in Table 3-5 as a specie in the tank waste, it is not listed in Table 3-1 as a chemical constituent.
Ecology Requirement: Chlorine must be added to Table 3-1 or a justification for its omission provided.
DOE-RL/WHC Response: An editorial error resulted in the failure to transfer chlorine data from Table 3-1 of the original submittal to the current submittal. Chlorine is present in the waste stream and has been added to Table 3-1 in the permit application. [p T3-5] 09/05/90

263. Page 3-1, Section 3.1.1, Waste Description. The tables in the text present the average or typical concentrations of the respective organic, inorganic, and radioactive constituents as composites of tanks 241-AN-103, 241-AN-106, and 241-AW-101, respectively. The concentrations of organic and inorganic constituents are presented in milligrams per gram of sample, while the radionuclide levels are presented in curies per liter. There are no ranges listed and the total loadings per tank are not presented. There is no interpretation of the data in terms of the significance of the waste concentrations.
Ecology Requirement: Concentrations of organic and inorganic constituents should be presented in the more common units of milligrams per liter. The total loadings of materials should be presented in pounds per million gallons or curies per million gallons, respectively. The total loadings need to be indicated as well as the individual values. Revised tables incorporating these changes are included in this NOD's Table 6, for inorganic; Table 7, for organic; and Table 8, for radionuclides.

The following observations should be made about the reported waste concentrations using the three tanks' contents as being representative of the waste materials to be grouted:

1. The predominant inorganic cations in the waste are aluminum, potassium, and sodium;

2. The predominant inorganic anions are nitrate, nitrite, and hydroxide;

3. The waste material has a very high total solids level of 290,000 mg/liter and an overall density of 1.30 gm/ml or 10.82 lb/gallon;

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4. The total organic content of the liquid is less that 7,000 mg/liter when measured as the sum of the individual constituents;

5. The organic content of the waste liquid comprises less than 3 percent of the total constituent solids present in the waste, and is not sufficient to support its own combustion;

6. The primary organic constituents in the waste liquid are citric acid, ethanedioic acid, heptaethylenediamine tetraocetic acid, hydroxyacetic acid, and MAIDA, all organic acids, which together comprise 94 percent by weight of the total organic present;

7. The major radionuclides present in the waste are strontium-90, ruthenium-106, cesium-134, and cesium-137; and

8. The major isotope of concern in terms of heat release potential is cesium-137, with a radioactivity level of 0.310 Ci/liters.

DOE-RL/WHC Response No. 1: No disagreement is found with the intent of Ecology's comment; however, calculational deficiencies have been found with regard to Ecology's finding.

In identification of waste density, overall concentration and loading, standard deviations reported have been neglected in the presentation of Tables 6, 7, and 8. Application of known variances between waste samples is required to adequately identify waste density, constituent concentrations, and loading with reasonable assurance that these variables would not be exceeded. Reasonable assurance is interpreted by the DOE-RL/WHC, in agreement with EPA recommendations, as a 95% certainty that the constituent concentrations of each waste tank will not exceed a specified value. This value is defined as the 95% Confidence Mean Concentration. It is agreed that compositions and loading may well be represented by mean values; however, the 95% Confidence Mean compositions and loading are used by the DOE-RL/WHC for normal operating design bases.

Tables presenting comparison of 95% Confidence Mean concentrations and loading to corrected calculations of loading based solely upon mean values have been provided in the permit application. [p T3-1.1-T3-6]

Tables 3B-1 through 3B-9 and Appendix 3J have been corrected to address updated information. In addition, the suggested units have been used in Appendix 3J. [APP 3B and APP 3J]

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Ecology Response No. 2: The response does not address Ecology's requirement to list the 8 observations listed in our original comment. Furthermore, it is insufficient to only change the units of concentration in Appendix 3J.
Ecology Requirement: The 8 observations listed in Ecology's original comment must be listed in the text. Any discrepancies in our observations should be corrected. Tables 3-1 and 3-2 must list concentrations in milligrams per liter or micrograms per liter and must also provide total loadings per campaign.
DOE-RL/WHC Response No. 2: Ecology's concerns regarding the content of these tables had been incorporated under the last DOE-RL/WHC response. The text has been modified to include general observations about expected wastes. [p 3-1, ln 44-52; p 3-2, ln 1-18]

264. Page 3-1, Section 3.1.2, Expected Waste Concentration. There are significant discrepancies between the values reported as being representative average concentrations for the respective constituents reported in Chapter 3.0 as compared to the actual tank concentration measurements reported in Appendix 3A. The specific comparisons of the total concentration levels of total organic, total inorganic, and total radionuclides are in this NOD's Table 9. These differences in concentrations are significant in terms of total loadings for the respective constituents and are recognized in this application. The measured three-tank average for organic value is less than the reported representative value for the total organic by 17 percent. The disparity in the organic concentrations is minor by comparison to disparity noted in the inorganic concentrations. The reported representative value for the total inorganic is less than the actual measured three-tank average by 132 percent, which apparently contain much higher solids loadings than previously anticipated.

The total measured radionuclide levels, as represented by the average of the three tanks were 63 percent higher than the reported representative value. This difference indicated a considerably higher radioactivity level in the waste stream than previously estimated. The measured cesium-137 concentration, from the three-tank average, was 63 percent greater than the reported representative value. The cesium-137 isotope comprises 96 percent of the total radioactivity of the wastes when measured in curies, and is the primary constituent of concern in terms of heat release potential in the grouted waste.

The above results translate into generally significantly higher waste loadings to the grouted waste vaults when expressed in pounds per million gallons of waste for organic or inorganic, or in curies per million gallons for radionuclides, as shown in this NOD's Table 10.
Ecology Requirement: If these three tanks are representative, then it appears that a

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significant number of tanks (two-thirds) must be diluted to a significant degree (dilution factors of 0.45 to 0.64). Furthermore, the dilution conducted for generating the average composition does not take into account that, depending on the diluent used, some chemical constituents will be added and possibly increase certain loadings. Discuss the impact of this amount of dilution on the total volume of tank waste to be grouted and the appropriateness of the current grout formulation.
DOE-RL/WHC Response No. 1: Discrepancies between data of Appendix 3B and Tables 3-1 through 3-3 have been corrected. Section 3.1.2 of the permit application details the use of adjustment factors for radiolytic heat generation. Evaluation of the mean concentrations between tanks, each adjusted by the heat factor for that tank, and standard deviation between tanks yields the concentrations presented in Tables 3-1 through 3-3.

The 95% confidence mean concentrations discussed under NOD comment number 263 provide for anticipated loading increases due to waste blending. Total waste volumes to be grouted and grout formulation impacts due to waste blending have been considered to be integral to the preparation of the permit application. [p T3-1.1 through T3-3 and APP 3B]

Ecology Response No. 2: The response does not indicate whether the dilution anticipated for the first three tanks is indicative of future vault dilution.
Ecology Requirement: Discuss anticipated dilution factors for campaigns beyond the first three tanks.
DOE-RL/WHC Response No. 2: As discussed in Section 3.1.2, each tank will be independently evaluated for blending ratio. Blending ratios presented in Section 3.1.2 are anticipated to range from 0 to 50 percent for DSSF waste. The blending material is planned to come from less concentrated waste within the Hanford tank farm complex. This DSSF waste material is anticipated to fill 14 to 18 vaults. Pretreatment flowsheets for other waste streams (NCRW, DSS, NCAW, etc.) and plans for blending, if needed, are still under development. Text will remain unmodified. 04/29/91

265. Page 3-6, Section 3.1.2, Expected Waste Composition. The reported average concentration of cesium-137 in the waste is 0.301 Ci/liter, which is 19 percent above the maximum heat release-based level of 0.260 Ci/liter (260 Ci/cubic meter) prescribed for grouted waste. When the correction for addition of dry bulk materials to promote the grouting reactions is included, the reported average cesium-137 level is still between 0.244 and 0.258 Ci/liter, or just slightly below the allowable level. However, when the actual three-tank measured

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average value of cesium-137 of 0.507 Ci/liter is utilized, the final concentration ranges from 0.400 to 0.422 Ci/liter is in the grouted mixture, which exceeds the allowable level of 0.260 Ci/liter by 54 to 62 percent. These differences are illustrated in this NOD's Figure 3.

Ecology Requirement: It appears that cesium-137 is the constituent which generally drives the need for dilution. A discussion should be presented on the provisions for extraction of cesium-137 through ion exchange, demineralization, or other means, to reduce the potential inlet heat loading to the grout vaults as opposed to diluting the entire tank.

DOE-RL/WHC Response: Concentrations of cesium-137, developed under NOD comment number 263 as operational design criteria at 95% certainty, are more appropriately evaluated to be 0.37 Ci/l (370 Ci/cubic meter). Diluent correction due to dry materials addition is anticipated to result in a 43% volume increase with a resultant 95% certainty cesium-137 concentration of 258 Ci/cubic meter of grout. Additional processing of anticipated wastes to reduce cesium-137 loading through ion exchange, demineralization, or other means, although considered, has not been determined to be acceptable with regard to subsequent waste generation and disposal for this low-level waste stream. Existent waste sludges scheduled for retrieval from waste tanks are anticipated to be processed for cesium-137 removal prior to consideration as grout candidate wastes. Text will remain unmodified. 01/10/91

266. Page 3-7, Section 3.1.2, Expected Waste Concentrations. As indicated in this NOD's Table 11, there appears to be a considerable molarity and normality imbalance between the major anionic and cationic constituents in the representative concentration values reported in Section 3.1, with a cation deficiency of as much as 63 percent. Based on the average values measured from the three tanks, there appears to be a cationic surplus of 13 percent. There is also no mention in the text of the considerable ionic imbalance in the reported value case, which would otherwise lead to a significantly acidic solution, an event not through to be possible.

Ecology Requirement: A discussion needs to be presented discussing the effects of diluting or not diluting on ionic balances. The difference between acidic as compared to alkaline wastes should also be addressed.

DOE-RL/WHC Response: Calculational errors forwarded from the preparation of Table 6 of NOD comment number 263 resulted in sodium concentrations being misrepresented by greater than one magnitude. An expanded ionic balance, based upon 95% Confidence Mean concentrations yields a slight cation deficiency (0.6 gmole equivalents/l) due to measurement and statistical inaccuracies and potentially varying oxidation states of some components of the feed. 01/10/91

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A balance based upon the major constituents identified by the comment yields the same, relatively good, balance. Text will remain unmodified.

267. Page 3-7, Section 3.2.1, Summary. Table 3-5 fails to list all the constituents in the tank waste (as identified in Tables 3-1, 3-2, and 3-3) which would factor into the waste's equivalent concentration such as chromium and other metals. Furthermore, nitrite is listed in the NIOSH Registry (under nitrous acid, sodium salt) as having a rat inhalation LC50 of 0.0055 mg/l. This would make nitrite a toxic category "X" component of the waste, not "B" as reported.
Ecology Requirement: A reevaluation of the tank constituents should be conducted to determine the equivalent concentration of the tank waste. The toxicity class for nitrite should be changed in Table 3-5 to "X". The impact of these changes on the grouted waste's designation should also be evaluated.
DOE-RL/WHC Response: A reevaluation of the tank constituents has been conducted and was provided in the permit application. The reevaluation includes all organic materials of Table 3-2 found under 40 CFR 302.4 and the NIOSH Registry (January 1990). Due to concentration and toxicity considerations, this evaluation reaffirms that NO_2 as a toxicity class 'X' remains nearly the sole cause of Toxicity EHW designation. Total equivalent concentration has been evaluated to 4.97 percent. Table 3-5 has been revised to include toxicity data and resultant equivalent concentration calculations for compounds identified on the new table. [p T3-5 and T3-6] 01/10/91

268. Page 3-16, Section 3.3.1, General Physical Principles. There is no description of the chemical reactions taking place in the grout solidification process or of how the grout actually hardens with time.
Ecology Requirement: The overall chemical reactions taking place during the grout solidification process should be described as well as the grout-hardening process. The reactions of Portland cement, fly ash, and blast furnace slag should be included.
DOE-RL/WHC Response: A discussion on process chemistry and physical chemical principles has been included in the permit application. [p 3-12, ln 1 through p 3-20, ln 51]

Ecology Response No. 2: The grout process chemistry and physical chemical principles must be provided to Ecology as soon as possible as well as included in the application. This information is critical for our overall review of the application.

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DOE-RL/WHC Response No. 2: This information was provided at the February 21, 1991, GTF Unit Managers Meeting.

269. Page 3-17, Section 3.3.2, Grout Process Effectiveness. This section does not provide material balances for the liquid waste and dry blend entering the grouting facility or for the product entering the grouting vaults.

Ecology Requirement: A table needs to be constructed to present a material balance of the GTF similar to the preliminary balance constructed from available information as shown in this NOD's Table 13. A listing of total material inputs to the grouting process should also be presented, such as shown in Table 14. A reference needs to be made to the appropriate material balances and flow diagrams presented in Appendices 2A and 4A. Ensure that the information provided here as well as in the appendices depict the grout formulation for double-shell tank waste and not the PSW campaign.
DOE-RL/WHC Response: A table providing a material balance of the GTF has been provided with the check sheet located in Appendix 3J (reference NOD response to comment number 17). This will be done upon finalization of the characterization and formulation of the waste. The table has been included in Appendix 3J. [APP 3J]

Ecology Response No. 2: Although it is agreed that actual material balances should be included in the Appendix 3J submittal, estimated material balances and flow rates for the liquid waste and dry blend entering the grouting facility and for the product entering the grouting vaults should be included in the grout chemistry information to be provided to Ecology per comment 268.

Ecology Requirement: Appendix 3J of the application should indicate the format in which the material balances, flow rates and total material inputs will be provided. Include estimated material balances in the grout chemistry information to be provided to Ecology per comment 268.
DOE-RL/WHC Response No. 2: Flow rates have been discussed within Sections 3.4.2 and 4.2.3 and are not pertinent to the waste composition verification contained within Appendix 3J. Waste feed rate is anticipated to remain fairly constant at the high end of the 30 to 70 gallons per minute range. Text modifications pertinent to expected mass balances have been provided in Appendix 3J.

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270.	Page 3-18, Section 3.3.1, Material Flow Diagram. There are no material quantities indicated on the material flow diagram. Ecology Requirement: The material flow rates should be listed in lb/min or lb/hr on the process flow diagram. **DOE-RL/WHC Response: The table to be provided in accordance with the response to NOD comment 269 will provide the material balance not shown on this diagram. The diagram will remain unmodified. [APP 3J]**	01/10/91
271.	Page 3-23, Section 3.4.1, Waste Criteria. There is no mention of the differentiation between low-level as compared to high-level radioactive wastes in terms of what wastes will go to the GTF as compared to the vitrification plant. Ecology Requirement: A discussion must be included explaining how the DOE-RL will ensure that no high-level wastes will be grouted. **DOE-RL/WHC Response: Section 3.4.1 regards candidate waste feed. Candidate waste feed for grout disposal, defined as low-level (Class C and lower, NRC) waste, contains less than 100 nanoCuries of transuranic material per gram. Text has been revised to state that only low-level waste will be processed. [p 3-26, ln 22-24]**	09/05/90
272.	Page 3-24, Section 3.4.1.1, Formulation Compatibility. There is no overall inventory of wastes which are, or are expected to be, present and may require grouting. The percentages of each waste type which may require grout processing is not listed. It is known that there are three tanks which contain wastes originating from the 100 Area as phosphate wastes, sulfate wastes, and deionizer washings, totaling approximately 3 million gallons. This is a small percentage of the total existing waste volume for single-shell tanks and double-shell tanks. The concentration values used as the basis for the design of the grouting facility are based on the contents of tanks coming from the 100 Area only. These values may not be representative of the waste concentrations for the 200 Area. Ecology Requirement: An overall inventory of possible wastes for grouting needs to be listed (see comment number 261). The inventory needs to list the existing waste volumes as well as volumes which will be generated in the future. The fraction of the waste that will or may require grouting also needs to be listed. An example of this type of waste inventory is shown in this NOD's Table 15. Particular emphasis needs to be placed on those tanks with wastes from the 200 Area. It will then be possible to have a more comprehensive inventory of	

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	wastes to be processed in the GTF. This list should be consistent with Section 2.8 of the permit application. **DOE-RL/WHC Response: Table 3-11 currently contains a projection of the type requested by Ecology. The proportion that will be grouted will be specifically determined by chemical and radiological analysis of candidate tanks. As such, the forecast of 'groutable waste' will continue to be developed throughout the life of the facility. Likewise, characterization of the grout feed will continue. Text will remain unmodified.**	09/10/90
273.	Page 3-25, Section 3.4.1.2, Heat Limits. The operating limit for the grout waste is 90°C (194°F). The maximum assumed heat input as heat of hydration use is 38°C (68°F) when based on a grout specific gravity of 1.20. For higher grout specific gravities of up to 1.50, higher grout temperatures resulting from cement hydration of up to 45°C (81°F) may be observed. These temperature increases are based on increased heats of hydration of 126 calories per gram of cement or 227 Btu per pound of cement. Ecology Requirement: Heats of hydration are not specified in the text of this chapter but need to be. The heat sources for the grout are from cement hydration, pozzolan hydration and radioactive decay. The radioactive decay heat contributions include both the shorter-lived (less than 5-year half-life) and the longer-lived (greater than 5-year half-life) isotopes. This NOD's Figure 4 shows approximate effects of these contributions to the grouted waste heat loadings in terms of time. There also needs to be a tabulation of the contributions to the temperature increase in the grout from the different processes. These respective contributions are summarized in this NOD's Table 16. **DOE-RL/WHC Response No. 1: Modeling results using maximum expected values for the heat of hydration and radioactive decay heat will be provided in a separate transmittal. Text has been updated to reflect laboratory and modeling results. [p 3-28, ln 14-34]** Ecology Response No. 2: The "separate transmittal" which is referenced should be defined. Concurrence with this comment will be based upon Ecology's receipt and review of this submittal. In order to satisfy Ecology's concern, this report must discuss the relationship between heats of hydration and specific gravity and this relationship's effect on current and future grouting operations. The cumulative effects of each heat-generating process should be discussed. **DOE-RL/WHC Response No. 2: The separate transmittal identified in the WHC response is the "Grout Vault Heat Transfer Results for M-106 Grout Formulation," by G. K. Allen. This work**	

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was discussed with Ecology at the July 26, 1990, Unit Managers Meeting. The report was provided to Ecology at the April 29, 1991, Unit Managers Meeting.

The references to specific gravity and relative heat demonstrate the proportionality of reactive dry materials and waste solution. For example, 7 lbs of dry materials per gallon of waste yields a lower specific gravity and heat of hydration than 9 lbs of dry material per gallon of waste. The vault and grout temperatures will be controlled through limiting the heat of hydration. The hydration heat will be measured by calorimetry and the radiolytic heat can be controlled by limiting the total heat producing isotopes in the waste. The discussion of this phenomena is outside the scope of the completed vault thermal modeling report. The modeling report accounts for the thermal impacts on the grout and vault system as a function of hydration and radionuclide heat input.

274. Page 3-28, Section 3.4.1.2, Heat Limits. The models used show a temperature increase of 17°C to 24°C under theoretical adiabatic conditions but increases of up to 38°C to 41°C were determined based on the heat of hydration only. The actual pilot-scale tests show that the maximum temperature increase was greater with maximum temperatures of 60°C to 65°C, as shown on this NOD's Figures 5, 6, and 7. The detailed model prepared has not been calibrated or applied under actual conditions.

Ecology Requirement: Alternative operational modes must be considered to minimize the effect of hydration heating. As an alternative to an uninterrupted pour, the grout might be poured in thin layers consecutively alternating between parallel vaults. In this mode of operation or with periodic planned interruptions in pouring, the heat of hydration initially released from the grout could be controlled and dissipated into the atmosphere much more rapidly. The possibility of excessive temperature buildup initially in the grout can be alleviated to a large extent without process upset. The "TEMPEST" model used to determine the temperature increases in the grout needs to be run and calibrated under actual field conditions (Report PNL-4348, Vol. 1, Rev. 2, January 1989).
DOE-RL/WHC Response: Modeling has been done using worst case conditions; therefore, actual results will be lower than the modeled results (see response to NOD comment number 273). Intermittent grout pouring, alternative grout formulations and additional vault ventilation are being considered to reduce grout temperatures. Text will remain unmodified. *

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275. Page 4-1, Section 4.0, Process Information. There are no time frames presented in the paragraph which describes the grouting process.

Ecology Requirement: It should state in the text that the pouring of waste into the grouting vault can take 12 to 15 days, if at the maximum flow rate, and longer if at a lower flow rate. The initial curing is then expected to take approximately 30 days. Provide an estimate of how long until the vaults are closed.

DOE-RL/WHC Response: Information on vault closure is available in the schedule for vault filling and closure located in Appendix 11B. The time frame estimates for filling the vault and the curing time of the grout has been added. [APP 11B] — 01/10/91

276. Page 4-4, Section 4.2, Transportable Grout Equipment. The process flow diagram of the transportable grout equipment is excellent, but there is no material balance of inputs and outputs to the grouting process.

Ecology Requirement: A second, but similar, diagram depicting an overall material balance of inputs and outputs to the GTF should be provided.

DOE-RL/WHC Response: In accordance with the response to NOD comment 269, a table will be provided to Ecology upon finalization of the characterization and formulation of the waste for each campaign. Text will remain unmodified. — 01/10/91

277. Page 4-9, Section 4.2.1, Dry Blend System. There is no mention of gas flow rates or particle loadings entering the dust collection units, or of any specifications regarding the filter bags.

Ecology Requirement: The gas flow rate and the inlet particle loadings to the particle collection system needs to be given in the text. The pressure drops, bag characteristics, and expected removal efficiencies of the two series filtration system should also be given.

DOE-RL/WHC Response: The NOD comment 277 addresses two separate systems. The first is the filtration system for the dry-blend day bin and the second is the filtration system for the surge tank vent. — 01/10/91

The filtration system for the dry-blend day bin is a vent filter, which captures particles entrained in the aeration of the dry blend. The dry blend in the day bin does not have the potential of contamination from the grout process. Page 8, Section 4.2.1, gives the flow rate through the vent filter as approximately 1,100 ft^3/min. Filter discharge air has a dust content of less than 0.1 grain/ft^3. This complies with General Regulation 80-7 of the

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Benton-Franklin-Walla Walla APCA, Sections 400-040 and 400-060 for visible emissions and particulate matter emissions. This also complies with the Washington Air Pollution Control Regulations, WAC 173-400-040 and 173-400-060 for visible emissions and particulate matter emissions. Text will remain unmodified.

The filtration system for the surge tank vent is a vent filter that captures potentially contaminated particles of dry blend entrained in the air space above the slurry level in the surge tank and recycles them into the dry-blend feed to the surge tank. After passing through the vent filter, the surge tank ventilation stream enters the GPF exhaust ventilation stream where it passes through a two stage HEPA filter. Section 4.2.1, page 4-9, estimates the dust collected by this filter as 30 lb/hr. In addition, filter differential pressure limits are provided by description of operating procedure "Response To Alarms" located in Appendix 4B. The text has been modified to discuss pressure drops and filter removal efficiency. System flowrates for the PSW run are in drawing H-2-95890 located in Appendices 2A and 4A. Drawing H-2-95890 will be updated in the revised permit application (Rev. 2). [p 4-7, ln 40-42; p 4-47, ln 30-50; and p 4-48, ln 1-4]

278. Page 4-22, Section 4.2.4, Air-Filtration Module. There is no diagram of the air-filtration module presented. There is no mention of expected removal efficiencies or pressure drops for the high-efficiency particulate air (HEPA) filters, or of alarm limits. Two of the three referenced drawings are not included in Appendix 4A.
Ecology Requirement: A suitable flow diagram of the air-filtration module with potential flow rates should be provided. The minimum and maximum pressure drops for the HEPA filters need to be specified in the text. Collection efficiencies and filter lifetimes should also be mentioned. Drawings H-2-95884 and H-2-95885 must be provided.
DOE-RL/WHC Response: Drawings H-2-95884 and H-2-95885 are provided in appendix 4A of the permit application. These two drawings diagram the air-filtration module. The alarms and set points associated with the air-filtration module are listed by description of operation procedure TO-390-152 located in Appendix 4B. The HEPA filters are tested to remove 99.97 percent of particulates with a diameter of 0.5 microns or greater. Text will remain unmodified. 01/10/91

279. Page 4-37, Section 4.4.3, Liner Leachate System. There is no flow diagram of the LDCRS presented.

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	Ecology Requirement: A suitable flow diagram with potential flow rates should be included. **DOE-RL/WHC Response: A flow diagram of the LDCRS does not appear appropriate because the leachate collected is batch pumped back to the GPF or recycled to the vault (collection rates permitting). There is no process or reaction to depict on a flow diagram; however, the flow that was used in a preliminary analysis, to determine the maximum leachate head was stated in Section 4.4.3.4.**	01/10/91
280.	Page 4-38, Section 4.4.3.1.2, LDCRS. The text states that crushed rock will be used as the drainage media. This is not consistent with the construction specifications on Page 4I-440. Furthermore, the drawings on page H-2-77576 do not distinguish between the drainage gravel and the diffusion barrier. Ecology Requirement: The text should be edited to be consistent with the construction specifications which disallow crushed rock. The drawings should indicate where the drainage gravel ends and where the diffusion barrier begins. **DOE-RL/WHC Response: The text and drawings have been modified and the designation of drainage rock has been revised to the rock requirements called out in the B-714-C2 specifications. [p 4-33, ln 42]**	01/10/91
281.	Page 4-39, Section 4.4.3.5, Systems Compatibility. The stability of the carbon steel leachate sump and pipe in the presence of a caustic oxidizing environment has been partially answered in the DOE-RL's response to EPA's comment number 7 (January 17, 1990). Although the stability of carbon steel in the presence of saturated NaOH solutions has been explained, the corrosive rates for carbon steel in the presence of various concentrations of corrosive salts must also be considered. Ecology Requirement: An evaluation of the resistivity of carbon steel and other potential liner materials such as fiberglass should be provided in the form of corrosion rates at varying temperatures, NaOH concentrations, NaCl concentrations, and NaNO3 concentrations. This information should be compiled from literature sources where possible. In addition, provide references 1 and 2 from the DOE-RL's response to grout NOD comment number 19. **DOE-RL/WHC Response: The corrosion rates of numerous combinations of waste feed on carbon steel have been evaluated over the years at the Hanford Facility. SD-340-DC-001, "Functional Design Criteria for 241-AP Tank Farm Project B-340," contains the design criteria for the carbon steel liquid waste storage tanks from which the grout feed stream originates. The tank solution was maintained as a basic solution and tested at a temperature of up to 300°F with a resulting corrosion rate of 0.001 inch/year. In calculating this rate, it was assumed**	09/07/90

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that the tanks would be full and that the tank walls would be in constant contact with the waste solution. The leachate sump and piping will only be in contact with the waste solution for a short period of time after the vaults are filled and will be pumped out once leachate is detected. Therefore the tank will not be continuously subjected to corrosion and the 0.001 inch/year corrosion rate would be very conservative applied to the leachate piping. This is also conservative because the leachate will be at a lower temperature than the 300°F maximum corrosion test temperature for the tank steel. Engineering Change Notice B-714-32 changes the steel requirement for the leachate piping to ASTM A516 which was the same type of steel analyzed for the waste storage tanks. An evaluation of other liner materials, such as fiberglass, will not be conducted because the materials detailed in the permit fulfill all design criteria requirements. Text will remain unmodified.

282. Page 4-49, Section 4.6.2, Relocatable Vault Exhauster. There is no flow diagram of the ventilation system for the vaults. There is no discussion of the continuous stack monitoring system on the vent gas.
Ecology Requirement: A suitable flow diagram with estimated flow rates should be included The location of the continuous stack monitoring device needs to be described here or elsewhere in the document in terms of what is being measured and by what means.
DOE-RL/WHC Response: A flow diagram and discussion on the continuous stack monitoring device has been included in the permit application. [p 4-45, ln 31-37; and p F4-4] 01/10/91

283. Page 4-49, Section 4.6.2.6, Exhaust High-Efficiency Particulate Air Filters. There is no mention of expected removal efficiencies or pressure drops for the HEPA filters, or of alarm limits.
Ecology Response. The minimum and maximum pressure drops for the HEPA filters need to be specified in the text. Flow rates, collection efficiencies, and filter lifetimes should also be mentioned.
DOE-RL/WHC Response: Design flowrates, pressure drops, and collection efficiencies has been included in the permit application. Filter lifetimes will vary based on actual operating conditions. [p 4-7, ln 41-42; p 4-47, ln 43-49; and p 48, ln 1-2] 01/10/91

284. Page 4-50, Section 4.6.2.8, Exhaust Stack. There is no flow diagram or detailed description of the respective continuous monitoring instruments, nor a discussion of the isokinetic stack monitoring sampling system.

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Ecology Requirement: A flow diagram needs to be included which shows the beta-gamma monitor, the record sampler, the tritium sampler, and the exhaust flowmeter. Discuss what the record sampler measures. The flow rates and equipment specifications for each exhaust gas monitoring system also needs to be presented.

DOE-RL/WHC Response: The information requested in NOD comment number 282 has been provided. Equipment specifications will be finalized after approval of the PSD permit application. A brief discussion of the record sampler has been included in the permit application. [p 4-44, ln 47-50; and p 4-45, ln 31-37] 01/10/91

285. Page 6-5, Section 6.1.4.2, Equipment Failure. The limits to the alarm detectors for the gas ventilation system are not described. There is also no description of the stack sampling systems.

Ecology Requirement: The limitations of the ventilation system alarms need to be stated. The monitoring systems for the filters and for the stack also need to be described.

DOE-RL/WHC Response: The ventilation system alarm set points are provided in description of operation procedure "Response To Alarms" located in Appendix 4B. The stack monitoring procedure with alarm limits will be developed prior to operation. The monitoring system has been addressed in the response to NOD comment number 282. Text will remain unmodified. 01/10/91

286. Page 9-2, Section 9.1.4, Waste Analysis Information. There is no mention of the composition or of the quantities of either liquid, solid, or gaseous wastes generated from the grout treatment facility.

Ecology Requirement: There needs to be an estimate provided of the waste generation from the respective process sources within the grout treatment facility as listed in the NOD's Table 18.

DOE-RL/WHC Response: The nonroutine wastes generated at the GTF (liquid and solid) are identified in Section 3.9. This section has been expanded to discuss the estimated composition and quantity of the gaseous wastes which will be discharged and the excess liquid which will be removed from the disposal unit upon initiation of closure activities. [p 9-3, ln 6-14] 09/05/90

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287. Page 9-7, Section 9.2.2, Surface Water Pathway. There is no listing of radionuclide or organic discharges in the contaminant streams, or of their relationship to existing water quality standards, or of the actual quantities discharged.

Ecology Requirement: The expected radionuclide and organic liquid effluent discharges from the grout treatment facility need to be listed in terms of both concentrations and quantities. The quantities of inorganic materials present in the discharges also need to be listed along with the concentration values presented.
DOE-RL/WHC Response: Table 9-2 addresses groundwater concentrations and is not pertinent to surface water pathway releases. As discussed within Section 9.2.2, and as evident from facility design, no surface water pathway releases exist. The response to NOD Comment #263 and observations 4 and 6, mobile organic constituents comprise an extremely small fraction of the grouted waste. Furthermore, as discussed in NOD comment #38, radionuclides are not subject to regulation under RCRA or the Washington Dangerous Waste Act. Thus, no text modifications to address surface water pathway inorganic, organic and radionuclide constituent releases are required. Text will remain unmodified. *

288. Page 9-8, Section 9.2.3, Air Pathway. There is mention of airborne releases from the GTF, but there are no gas flow rates, pollutant concentrations, or emission rates presented. There is no listing of potential radionuclide, inorganic, or organic releases to the atmosphere from the GTF, or from what sources they might occur. There are no estimates of downwind ambient air quality levels under the worst case and average meteorological conditions for the respective air pollutants.
Ecology Requirement. Estimates of the potential atmospheric emissions of particulate and gaseous materials as radionuclides, inorganic, and organic constituents from the GTF need to be provided. Specific factors to be included in the estimate are gas flow rates, contaminant concentrations, and source emission rates. Ambient air concentrations of specific contaminants also need to be presented as estimates under worst case and average source and meteorological conditions. An example format for such information is presented in this NOD's Table 19.
DOE-RL/WHC Response No. 1: Estimates of airborne radionuclide emissions were included in the GTF PSD permit modification request and NESHAP modification application. These documents have been transmitted to Ecology, the Department of Health, Benton-Franklin-Walla Walla Air Pollution Control Authority, and EPA for review and approval. Documentation of airborne radionuclide and organic emissions is in preparation for public release and will be provided in a separate transmittal. Estimates of organic and particulate emissions fall below PSD

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significance levels and have not been modeled for significance level offsite. Text will remain unmodified.

Ecology Response No. 2: Although it is adequate to address airborne emissions in the PSD permit modification request, this request must be included as an appendix of the dangerous waste application. Please identify the "separate transmittal" referenced in this response. Concurrence with this response will be contingent upon Ecology's receipt and review of this document.
DOE-RL/WHC Response No. 2: The reference was provided at the January 29, 1991, GTF Unit Managers Meeting. The reference provided was "Grout Treatment Facility Airborne Emissions Projections," WHC-SD-WM-TI-427. Airborne emissions will only be addressed in the PSD Permit. This approach was agreed on during the Hanford Facility Permit meetings.

289. Page 10-2, Section 10.3.1, Waste Generated at Other Locations. A considerable potential may exist for materials recycling and recovery from the waste liquids being fed to the grouting process because of the large amounts of material involved. Potential recovery processes or techniques are not discussed in the text.
Ecology Requirement: An inventory should be made of the materials recycling and recovery potential from the liquid wastes to include both inorganic chemicals and radioactive isotopes. A sample inventory of major inorganic constituents is shown in this NOD's Table 12, which includes both reported and measured values from the three tanks previously mentioned. The discussion of recovery potential should address the process technologies or techniques applicable to recovery activities and the rate or amount of chemical or material recoveries, if any.
DOE-RL/WHC Response: The GTF process is designed to dispose of the liquid waste generated from other facilities; however, the GTF has no control over the quantities or toxicity of this waste, because the GTF is not the waste generator of this waste. The recovery/recycle of this waste prior to disposal is a subject for the permit applications of the waste generators. Text will remain unmodified. 01/10/91

290. Page 10-2, Section 10.3.2, Wastes generated at the GTF. There is a listing of wastes generated from the grouting process, but there is no expected waste inventory presented. There is a good discussion of the methods for reducing this waste generation in Section 10.4.2 for the respective waste streams, but no mention of the percentage reductions which may be possible.

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	Ecology Requirement: An inventory of the expected waste generation from the grouting process needs to be presented by quantities and characteristics. An estimate of percent reduction also needs to be made. **DOE-RL/WHC Response: The waste generated has been included in Section 3.9 as indicated in the response to NOD comment number 286. Waste reduction is an ongoing process which is considered during the development of the operating procedures. The GTF process is new and a waste generation baseline has not been developed to provide this type of estimate. The reduction methods stated will be considered on a case-by-case basis to minimize waste generated during maintenance and routing operations. However, because a significant history of waste generation at the GTF does not exist, most of the reduction will be in the form of never being generated to start with. That is by considering the reduction techniques during the development of maintenance and operating procedures and process parameters, the waste which could be reduced in the future will not be generated to start with. Therefore, an estimate of percent reduction will not be made. Text will remain unmodified.**	09/05/90
291.	Page 11-4, Section 11.1.2, Partial Closure Activities. Figures 11-2 and 11-3 indicate the use of the "Hanford Barrier" but there is no text discussing its design, function, or schedule for installation. Ecology Requirements: Although the "Hanford Barrier" is not a RCRA or state requirement, some degree of information should be included in the application since it appears on the drawings. **DOE-RL/WHC Response: The text in Section 11.1.2 has been modified to refer the reader to Section 11.1.5.2.1, which provides a brief description of the long-term barrier research work being performed at the Hanford Facility. The reference to Adams and Wing 1987, called out in Section 11.1.5.2.1, describes the barrier development program in detail.**	*
292.	Page 11-6, Section 11.1.4, Inventory Removal or Disposal and Decontamination of Equipment. The sampling plans outlined in this section are based on random sampling only and do not discuss biased sampling for stained or suspicious areas. Ecology Requirement: A general statement should be made that each area under consideration in this section will be visually inspected for cracks, stains, and other abnormalities which may warrant biased sampling. Areas which are obviously contaminated or present a potential contamination pathway will be sampled in addition to the scheduled random sampling.	09/05/90

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DOE-RL/WHC Response: The text has been modified to indicate that biased sampling will occur if required based on visual inspections that identify potential for contamination including cracks, stains, and other abnormalities. [p 11-8, ln 22-25]

293. Page 11-11, Section 11.1.4, Inventory Removal. The air ventilation system for the grouting vaults is not discussed nor the piping for the liquid drain system.
Ecology Requirement: The air ventilation system and liquid drain system in the closure process need to be described.
DOE-RL/WHC Response: The ventilation system and all other portable equipment will be decontaminated and prepared for solid waste disposal at the end of its useful life. The text has been modified. [p 11-7, ln 4-6] 01/10/91

294. Page 11-28, Section 11.1.4.4.2.1.3, Background Soil Samples. It is not apparent that the location to be used for obtaining background soil samples is "upgradient of the GTF". Furthermore, Figure 11-16 indicates that this location is in a NE-SW direction, but Figure 11-15 shows it in a NW-SE direction. Page 11-33 indicates that the parameters to be analyzed for background are listed in Table 11-5, but this table does not list parameters.
Ecology Requirement: The background samples will be taken from an area 500 ft away from the GTF and 2 ft below the surface. Whether this location is upgradient or downgradient of groundwater that is hundreds of feed below this location is irrelevant. Delete the words "and upgradient" from the text on page 11-28. Re-assess the location of this area and ensure Figures 11-15 and 11-16, as well as the text, support the location. Determine the correct cite for the list of parameters to be analyzed and make this correction on page 11-33.
A site-wide permit is currently being discussed and may include the establishment of soil background levels for the entire 200 Area. A statement should be made that the method for determining soil background in the permit will be used unless the site-wide permit determines otherwise.
DOE-RL/WHC Response: The background sampling location have been reassessed and moved. The figures have been corrected to be complementary. The term "upgradient" has been removed from the text and the correct table for parameters to be analyzed have been cited.
A statement has been added discussing that the 'Grout' background methodology will be utilized until a Hanford Facility-Wide background methodology is approved by the regulators. [p 11-12, ln 30-42] 09/05/90

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295. Page 11-35, Section 11.1.5.1.1, Removal of Free Liquids. Ecology has not approved the recycle of LCT liquids into the vaults.
Ecology Requirement: Delete line 9 on page 11-35.
DOE-RL/WHC Response No. 1: The statement made on line 9 of page 11-35 was intended to show that the capability exists to return excess water directly into the grouting process. The statement will read "to the GPF LCT. This liquid can then be transferred back to the 241-AP Tank Farm or processed into grout." Text will remain unmodified.

Ecology Response No. 2: Describe the scenario when excess liquids will be returned to the vaults versus when the liquids will be transferred back to the tank farms. Discuss the details of how this liquid would be processed into grout. It should be noted that the recycle of excess liquids to the vault is not approved.
DOE-RL/WHC Response No. 2: This section has been revised to remove wording that excess water may be returned to the vault as grout. No vault excess water will be recycled back to the vault from the GPF.

296. Page 11-35, Section 11.1.5.1.2, Waste Stabilization. As specified in Section 3.4.3.1, the minimum unconfined compressive strength which the grout must reach is 60 PSI. The text here states 50 PSI.
Ecology Requirement: Line 12 should be edited to read '60' PSI.
DOE-RL/WHC Response: The text has been modified to read 200 psi. [p 11-14, ln 50] 01/10/91

297. Page 11-38, Section 11.1.1.2.1.7, Topsoil Layer. There is no assurance that the herbicides and fertilizers will be chemically compatible with the HDPE liner.
Ecology Requirement: Add a statement to the text indicating that any chemicals applied to a cover layer above the FML drainage liner will be assessed for compatibility with the HDPE liner.
DOE-RL/WHC Response: The grout vault will be protected by the asphalt pavement cocoon. The text will remain unmodified.

Ecology Response No. 2: Ecology's concern here is in the protection of the HDPE liner. It would not be prudent to apply chemicals to the topsoil which could degrade this liner.
Ecology Requirement: A statement must be made in the text that any chemicals applied to the topsoil cover will be assessed for compatibility with the HDPE liner. This assessment may be satisfactorily completed through literature review. However, laboratory testing may be

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required by Ecology if the literature review does not sufficiently support the use of any intended chemicals. 04/29/91
DOE-RL/WHC Response No. 2: A statement to this effect has been added to the text.
[p 11-18, ln 48-52]

298. Page 11-54, Section 11.1.10, Closure Cost Estimate. There no cost estimates for closure.
Ecology Requirement: The appropriate closure costs need to be presented in some degree of detail. Exemptions from closure cost estimates do not apply to operators of facilities under contract with the federal government. WAC 173-303-620(1)(c)
DOE-RL/WHC Modified Response: It is the view of DOE-RL/WHC that the financial requirements of WAC 173-303-620 do not apply to WHC. Insofar as the legal operating status of the facility includes both the DOE-RL and WHC (as co-operator), and does not expressly recognize WHC as the sole operator of any RCRA waste facility, the government exemption applies. This view is consistent with 40 CFR 264.140(c), which exempts states and the federal government from the financial requirements of 40 CFR 264, Subpart H. The text will remain unmodified.

Ecology Response No. 2: There are no cost estimates for closure.
Ecology Requirement: The application must state that closure cost estimates will be provided by October 1, 1991 and will be updated annually thereafter. These estimates are being required under the facility reporting requirements of WAC 173-303-390. At this time, Ecology is not requiring that these estimates be provided as part of the financial requirements under WAC 173-303-620. However, the estimates must be provided in the same level of detail that is required for the purposes of the financial requirements.
DOE-RL/WHC Response No. 2: It is DOE-RL's understanding that federal facilities are not required to comply with WAC 173-303-620. However, projections of anticipated closure costs will be provided annually starting in October of the year following issuance of the permit application. Text has been modified. *

299. Page 11-54, Section 11.2, Postclosure Plan. The text indicates a postclosure period of 30 years. This duration will actually be determined by Ecology based upon the results of ongoing postclosure activities.
Ecology Requirement: The text must be edited to indicate that Ecology will determine the length of the postclosure period based upon postclosure monitoring results. This duration will be assessed at each permit renewal every 5 to 10 years. WAC 173-303-610(7)(b).

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	DOE-RL/WHC Response: The first paragraph in Section 11.2 has been revised to read: "Grouted-waste disposal facilities will be closed as landfills with waste remaining in place. Partial closure of the grout vault pairs will occur in steps by constructing a cover over each grout vault following waste filling. Postclosure activities are initiated for each grout vault pair upon completion of cover construction for that vault pair. The time for postclosure care varies depending on the results of postclosure monitoring. The duration of monitoring will be assessed at each permit review and renewal." [p 11-27, ln 4-9]	01/10/91
300.	Page 11-55, Section 11.2.1, Inspection Plan. There is no specific instruction on the quarterly inspection log to check the LDCRS. Ecology Requirement: Inspection of the LDCRS must be specified on the quarterly inspection log to be consistent with Table 11-6 and the text. **DOE-RL/WHC Response: The quarterly inspection log has been revised to verify that the LDCRS liquid level has remained stable. [p F11-20]**	09/05/90
301.	Page 11-63, Section 11.2.8, Postclosure Cost Estimate. There are no cost estimates for postclosure. Ecology Requirement: The appropriate postclosure costs need to be provided in some degree of detail. Exemptions from postclosure cost estimates do not apply to operators of facilities under contract to the federal government. WAC 173-303-620(1)(c) **DOE-RL/WHC Response No. 1: It is the view of DOE-RL/WHC that the financial requirements of WAC 173-303-620 do not apply to WHC. Insofar as the legal operating status of the facility includes both the DOE-RL and WHC (as co-operator), and does not expressly recognize WHC as the sole operator of any RCRA waste facility, the government exemption applies. This view is consistent with 40 CFR 264.140(c), which exempts states and the federal government from the financial requirements of 40 CFR 264, Subpart H. The text will remain unmodified.** Ecology Response No. 2: Comment 298 is also applicable to post-closure estimates. **DOE-RL/WHC Response No. 2: It is DOE-RL's understanding that federal facilities are not required to comply with WAC 173-303-620. However, projections of anticipated closure costs will be provided annually starting in October of the year following issuance of the permit application. Text has been modified.**	*
302.	Appendix 4G, Construction Quality Assurance Plan. In the case of poured-in-place concrete,	

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the actual 28-day strength cannot be determined nor predicted for at least 7 to 10 days when the first batch of concrete cylinders is tested.
Ecology Requirement: The quality assurance plan needs to identify what procedures will be taken to correct defects where the concrete strength is below the design strength. One needs to establish whether the vault design will be rechecked for strength adequacy or whether the contractor will be required to break out and replace the defective concrete.
DOE-RL/WHC Response: The concrete is tested for design strength at 7 and 28 days. If the concrete does not meet specifications, a Nonconformance Report is issued. The nonconforming condition is dispositioned by the Engineering group and the CQA Officer. Refer to Grout Disposal Facilities Construction Quality Assurance Plan, Paragraph 2.5.1.3.1 and B-714-C2, Construction Specifications, Section 03301; 3.3. The disposition will vary depending upon a number of factors including the location of the concrete, the volume of concrete poured around it, and the actual amount of nonconformance. Contractor requirements will vary depending upon the disposition. Text will remain unmodified.

Ecology Response No. 2: Although there are provisions in the CQA plan to handle out-of-specification materials and test data, Ecology is not currently included in these provisions.
Ecology Requirement: As discussed in the unit manager meetings, Ecology must be provided a copy of all draft nonconformance reports. This requirement may be met by either providing the draft NCR to the on-site Ecology construction inspector or by faxing a copy to Ecology's Olympia office. This type of immediate notification provides Ecology the opportunity to assess a potential problem before further work precludes the situation from being handled in a manner most protective of the environment. The CQA plan needs to specify that Ecology will be provided a copy of all draft NCR's.
DOE-RL/WHC Response No. 2: The CQA plan has been updated to state that draft copies of NCRs will be forwarded directly to Ecology. [App 4G, p 88] 04/29/91

303. Appendix 4G, Construction Quality Assurance Plan. Concrete is generally tested at 28 days because this is a breakpoint in the strength gain curve. Mixes with significant Class F fly ash content can exhibit this breakpoint some time past 28 days. The Corps of Engineers test fly ash concretes at 56 days to be more realistic. The Construction Quality Assurance Plan does not address this issue, nor the fact that fly ash content is often increased to offset strength decreases during hot weather.

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	Ecology Requirement: The Construction Quality Assurance Plan should discuss the effects of fly ash content on curing times. Furthermore, the plan should identify steps necessary to mitigate reduced concrete strengths during hot weather pours. **DOE-RL/WHC Response: Besides the 7 and 28 day tests, the concrete is also tested for strength at 90 days (construction specification B-714-C2, 03301, 3.3.1). Fly ash and Pozzolon are additives to reduce the heat of hydration and to reduce cracks due to shrinkage. The hot weather placement procedures are also addressed in B-714-C2. Refer to Section 3301, Subparagraph 3.2.9.5 (b) which discusses placement of concrete in hot weather. Text will remain unmodified.**	01/10/91
304.	Appendix 7A, Response Actin Plan. The estimate of the moisture that may reach the catch basin includes moisture used to adjust backfill soil moisture around the vault. Not only should this practice be avoided to reduce this source, adjusting moisture on the fill is poor practice because it is almost impossible to blend it into the soil properly and it is much more costly. A better and cheaper construction practice is to irrigate the borrow area and haul the soil to the fill slightly above optimum moisture content. Ecology Requirement: All moisture content adjustments to the backfill material need to be made prior to placement at the site. **DOE-RL/WHC Response: Adjustments to the moisture content of backfill will be done at placement of fill to obtain the compaction requirements stated in Paragraph 3.3.1.2 of B-714-C2, Construction Specification. As stated in Paragraph 3.3.1.1 of the Construction Specifications, wetting of the soil to the point of saturation is not permitted. The methods of moisture control will ensure that no water accumulates to cause saturation of backfill and will avoid leaks into the catch basin. This practice has been successful in the past and has been a standard Hanford practice for similar types of projects such as the Tank Farms where backfill with similar large quantities of soil were placed to the same compaction requirements. Irrigation at the borrow area or stockpile would be a more expensive method as it would require handling of the soil twice. Text will remain unmodified.**	01/10/91
305.	Appendix 11A, Cover Design Engineering Report. Field control of moisture density for all materials where WSDOT M41-10 is specified should be verified by a new moisture-density curve for each 2,000 cubic yards placed. Nuclear density gauges should be recalibrated for each new curve. **DOE-RL/WHC Response: Moisture density testing for field density measurements of backfill are done at a minimum of once per every 500 cubic yards or as a change in composition of backfill**	01/10/91

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is noticed. Testing and calibration are done according to ASTM D 2922, "Test Methods for Density of Soil and Soil-Aggregate in Place By Nuclear Methods (Shallow Depth)" and ASTM D 3017, "Test Method for Moisture Content of Soil and Soil-Aggregate in Place By Nuclear Methods (Shallow Depth)." Refer to Grout Disposal Facilities Construction Quality Assurance Plan Paragraph 2.3.8.7. Calibration of nuclear gauges are done once per year at the factory in accordance with manufacturers' recommendations. Moisture and density standard calibrations are also done according to the manufacturers' recommendations. These are required once per month. Text will remain unmodified.

306. Appendix 11A, Cover Design Engineering Report. Soil moisture adjustment should not be done on the fill site, but should be done on the borrow pit, on the stockpile, or at the pugmill. Material should be prewetted to slightly over optimum moisture and hauled to the site.
DOE-RL/WHC Response: Soil moisture will be measured and controlled at the placement to ensure the moisture content is per specifications and adequate to activate the bentonite additives. Not withstanding the control measures, losses in moisture occur during handling and transportation and due to weather conditions. To compensate for the loss, it is often necessary to adjust moisture content in the field to achieve desired compaction and permeability. However, these adjustments will be done in small increments through fine spray nozzles. Text will remain unmodified. — 01/10/91

307. Appendix 11A, Cover Design Engineering Report. Ecology believes it to be good practice that devegetated construction or mined areas be restored to a non-erosive or revegetated state. What steps will be taken to restore topsoil borrow pits?
DOE-RL/WHC Response: The construction sites are to be restored to a non-erosive state as soon as all construction operations are complete. Except those borrow areas which remain active, all other locations will be restored to a non-erosive state. This contract requirement can be found in the B-714-C2 and C5 Construction Specifications, 01019, 1.4.5.1. Grout Disposal Facilities Construction Quality Assurance Plan, Paragraph 2.3.8.8 describes one revegetation method. Text will remain unmodified. — 09/05/90

308. Appendix 11A, Cover Design Engineering Report. What is the reason for the dry of optimum moisture specification for the clay layer?
DOE-RL/WHC Response: Based on the recommendations of Design, Construction and Evaluation of Clay Liners for Waste Management Facilities, EPA/530/SW-86/007F, the specifications of — 09/05/90

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	moisture content has been revised to wet of optimum (2% higher than optimum) for compaction of the bentonite liners. The B-714-C5 Specifications and Engineering Report have been changed to permit a higher moisture content. Kneading compaction will be accomplished by the deployment of sheep foot rollers to disperse the soil layer and reach the design permeability requirement. [APP 11A, Section 2200, p 8]	
309.	Appendix 11A, Cover Design Engineering Report. What steps will be taken to prevent the clay layer from drying out and cracking until it can be covered with geomembrane? If possible, fine grading on the fill should be done immediately, followed with geomembrane covering. DOE-RL/WHC Response: The clay liner will be protected between successive lifts by ensuring that seal rolling (fine grading) is done promptly and uniformly over the site. A temporary plastic cover material will be placed over the liner to retain moisture and avoid desiccation. Appropriate clarification have been added to the B-714-C5 Specifications. [APP 11A, Section 2200, p 8]	09/05/90
310.	Appendix 4I, Vault Design. A number of engineering change notices have been issued since the last set of full-scale drawings were provided. It is imperative that these changes are tracked carefully in the field. Ecology Requirement: An explanation should be provided of the quality assurance methods used to ensure change notices are promptly incorporated into the site's working drawings. The locations of record drawings should also be provided. DOE-RL/WHC Response: Kaiser Engineers Hanford (Kaiser) controls the preparation, approval, and release of Engineering Change Notices per Kaiser procedures. Kaiser Administrative Procedure 3.2, Rev. 3 describes the process for initiating, processing, and approving engineering change notices. Construction Procedure 6, Rev. 0 describes the control system for construction documents. Construction Management 7, Rev. 2 describes the method for Kaiser to provide and/or contract changes to a contractor in the field. Contract Administration 4, Revision 2, describes the method for modifying fixed-price contracts. Copies of all Kaiser procedures are available on request. Contract KEH-5162 for "Vault Concrete Basin, Shell and Leachate Sump for Grout Waste Disposal Facilities, 200-East Area, Hanford Site, Richland, Washington; Specification B-714-C2, Section 01400, Quality Assurance," requires contractors to include document control as a part of an approved Quality Assurance Plan. Section 01400 1.3.1.5 requires that the contractor	01/10/91

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maintain procedures to ensure that the latest, approved issue of contract documents are used for procurement, fabrication, assembly/installation, inspection, and testing. KEH-5162 Contractor Approved QAP, Rev. 1, May 3, 1990, Section 5 addresses Document Control. Kaiser Quality Services has performed documented surveillances to ensure compliance to KEH-5162 Contractor Approved QAP.

Working drawings are located as follows:

1. KEH Design - Tri Cities Professional Center, 3rd floor, Civil Engineering
2. KEH Contract Management - Grout Site, trailer
3. KEH-5162 General Contractor - D. A. Mowat trailers, Grout project site
   4 sets: 1 in field and 3 sets in the office.

Text will remain unmodified.

311. Appendices 4A and 4I, Engineer Drawings and Vault Design. Some drawings and specifications have not been provided to Ecology.
Ecology Requirement: The following construction specification sections and full-size drawings must be submitted to our office as soon as possible: Sections 01019, 01100, and 01500 and Drawings H-2-77604, H-2-90161, H-2-57331-2, and H-2-77607 as well as all the drawings after H-2-77648 in Appendix 4A.
DOE-RL/WHC Response: All requested media, with exception of H-2-77604, were provided to Ecology at the GTF June and July Unit Manager Meetings. Drawing H-2-77604 has not been used. See disposition to NOD comment number 318 for clarification. — 09/05/90

312. Appendix 4A, Engineer Drawings, Page H-2-77582-1. This drawing shows a splash pad for the grout being pumped into the vaults. Was this sheeting used only for the PSW campaign, or will it also be used for the double-shell tank vaults? Is there any evidence from the PSW campaign that the sandbags shown are sufficient to hold the sheeting?
DOE-RL/WHC Response: The splash pad will be used for the DST campaigns, as noted on Drawing H-2-77582-1. The splash pad for the PSW vault (101) worked very well. The sand bags had no trouble holding down the pad. This process was verified by watching the grout pour through the use of video cameras. Text will remain unmodified. — 01/10/91

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313.	Appendix 4A, Engineer Drawings, Page H-2-77581-1. Some penetrations are shown with the note (TYPE XX PLACES), while other repeated penetrations are not called out this way. Uniformity is desirable. **DOE-RL/WHC Response: All penetrations which do not have the note (TYPE XX PLACES) are called out individually because they are located in only one or two places. Drawing will remain unmodified.**	09/05/90
314.	Appendix 4A, Engineer Drawings. Some drawings reference details using the standard practice of a horizontally divided circle with the detail number in the top semicircle and the page number of the detail shown below. Other sheets simply reference the page where the detail is shown with the note "see drawing number XX". On some sheets the two conventions are mixed. Please use one convention, preferably the divided circle. **DOE-RL/WHC Response: Project drawings will be reviewed and an Engineering Change Notice will be generated to provide the requested clarification. [APP 4A]**	09/05/90
315.	Appendix 4A, Engineer Drawings. Drawing number H-2-77586 PLAN erroneously shows a dimension of 1' - 4 15/16". Ecology Requirement: This dimension should be corrected to read 1' - 4 13/16". **DOE-RL/WHC Response: Drawing number H-2-77586 has been corrected to indicate a change in dimension to 1'-5". At N40492.75 - N40491.17 = 1.58' (3'-0" - 1.58' = 1.42' = 1'-5 1/16"). [APP 4A]**	09/05/90
316.	Appendix 4A, Engineer Drawings. Page H-2-77584 does not indicate which vault is shown. Ecology Requirement: This drawing must indicate which vault is being referred to. **DOE-RL/WHC Response: It is not necessary to indicate on Page H-2-77584 which vault is shown because identical pits are used for both vaults. Drawing will remain unmodified.**	09/05/90
317.	Appendix 4A, Engineer Drawings. A reference elevation should be shown on Table B of page H-2-77593-1. The reinforcing steel around the sump should be shown on the reinforcing sheet, not on the plan sheet.	

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	DOE-RL/WHC Response: Note 1 of Page H-2-77593-1 refers to the General Notes which provide a top of the wall elevation for reference. Additional reinforcing steel for the sump is best shown on the plan so that it can be clearly called out. It is also shown in Section A of sheet 2 (H-2-77593-2). Drawings will remain unmodified.	09/05/90
318.	Appendix 4A, Engineer Drawings. Why are details 8 and 9 on page H-2-77604 oriented upside-down in relation to page H-2-77601? **DOE-RL/WHC Response: Drawing number H-2-77604 has not been used. Clarification as to which drawing is being referenced will be provided in a future engineering change notices. [APP 4A]**	09/05/90
319.	Appendix 4A, Engineer Drawings. Details 6 and 10 on page H-2-77597 reference page H-2-77602-1, but there are no references to these details on page H-2-77602-1. Ecology Requirement: Provide the appropriate reference for these details. **DOE-RL/WHC Response: Detail 6 is called out on Sheet 1 as Item 10 of the List of Materials. The plug is inserted into the penetration when the excess water removal pump or jumper is not in place.** **Detail 10 is only called out on Sheet 2. The reference to Sheet 1 will be deleted by future engineering change notices. [APP 4A]**	09/05/90
320.	Appendix 4A, Engineer Drawings, Page H-2-77599. Why is Detail 1 called an anchor? Shouldn't the carrier pipe be restrained? Is there a substantive difference between Details 1 and 2? **DOE-RL/WHC Response: Detail 1 calls for the inner pipe to be anchored to the outer pipe. The outer pipe is direct-buried and treated differently in stress analysis. The inner pipe is analyzed as a supported pipe using commercially available computer analysis. The outer pipe is analyzed using direct-buried pipe analysis techniques which do not need the same anchor application.** **Detail 1 is the inner to outer pipe anchor. Detail 2 is a guide. The inner pipe is allowed to slide laterally in the outer pipe. That is, Detail 2 does not have a weld attaching the guide to the outer pipe.** **Drawing will remain unmodified.**	09/05/90

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321.	Appendix 4I, Vault Design. ACI 349, which is quoted in Section 03301, calls for reinforcing steel to be subject to ASTM A 615, Supplement 1. Based on a site visit, it appears that bars being delivered to the site are not in conformance with Supplement 1 since they are stamped with an N, not an S. Ecology Requirement: Provide justification for the presence of the N-stamped bars. **DOE-RL/WHC Response: ASTM A615, Supplement 1 is applicable only for supplementary requirements for bar sizes 14 and 18, which are larger than the rebar observed during the site visit. Drawing will remain unmodified.**	09/05/90
322.	Appendix 4I, Vault Design. Section 03301, paragraph 2.2.6.2 sets a maximum time limit on the Mixing time for transit mixed concrete based on air temperature. This is not sufficient, particularly in hot weather. Ecology Requirement: This specification should address concrete temperature. **DOE-RL/WHC Response: Concrete temperature is addressed in Section 3301, Subparagraph 3.2.9.5 (b) of B-714-C2, Construction Specification for Vault Concrete Basin, Shell, and Leachate Sump. This specification states that the temperature of concrete placed during hot weather shall not exceed 70°F. Drawing will remain unmodified.**	09/05/90
323.	Appendix 4I, Vault Design. Engineering Change Notice B-714-22 shows the 4-inch chamfer at the base of the side wall to be replaced with a 9-inch chamfer. While this is a good idea, how will it be possible to feather edge the chamfer? **DOE-RL/WHC Response: There is no feather edge on the chamfer. This will be cast with the wall concrete. Drawing will remain unmodified.**	01/10/91
324.	Appendix 4I, Vault Design. For all practical purposes, the FLUSH model for analysis of soil/structure interaction is the best compromise for obtaining reasonable accurate results without the high cost of expensive computer time associated with a more sophisticated 3-D analysis. The main problem associated with this model is that it performs its analysis based on in situ soil conditions. In actual practice, the vault will be surrounded by backfilled material, possibly from the original excavation. The seismic behavior of this backfilled material, although compacted to the density of the original ground, could be completely different from that of undisturbed material.	

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Ecology Requirement: Soil tests and geophysical tests must be performed on the adjacent compacted backfill after the first vault is completed to determine the soil characteristics of the backfill and compare these characteristics to those of the original investigation.
DOE-RL/WHC Response: The properties of soil for vault backfill are found in Appendix 4I, page 4I-66, in the Dames and Moore Geotechnical Report. These values were used in the Kaiser analysis and should accurately represent the back-filled soil. Text will remain unmodified.

Ecology Response No. 2: The response fails to address Ecology's concern. We are fully aware of the location of soil properties in the application as well as the fact that the current proposal is to use these values in the FLUSH model. However, these values may or may not accurately represent the back-filled soil because in-situ conditions do not always represent remolded soil. In addition, the design now calls for an asphalt cocoon around the vault which was not factored into the analysis.
Ecology Requirement: Provide a defendable response to this concern.
DOE-RL/WHC Response No. 2: For earthquake loads, the Soil-Structure Interaction (SSI) analysis of the vault was performed by using the FLUSH computer program. The program has been used in the nuclear industry since 1975. The analytical requirements of soil-structure interaction modeling and analysis, given in ASCE Seismic Standard (Reference), have been implemented in the KEH updated SSI analysis. The nonlinear behavior of soil, soil uncertainties, and asphalt cocoon around the vault have been also taken into consideration in the KEH updated SSI analysis. The in situ soil properties and backfilled soil properties, given in the Dames and Moore Geotechnical Report (Appendix 4I), were considered in the KEH updated SSI analysis.

05/30/91

Reference: ASCE Standard "Seismic Analysis of Safety-related Nuclear Structures," September 1986.

325. Appendix 4I, Vault Design. In current construction practice, material used for water stops is either rubber or PVC which is cemented together to form a continuous seepage barrier. The vault design utilizes steel strips embedded at the joints which will be resistant to deterioration from radiation or chemical action. However, the drawings do not indicate whether the steel strips are continuous or lapped at the ends. The method used for joining these strips could be a potential source for seepage problems.
Ecology Requirement: A description of the methods used for joining water stops must be provided along with an explanation how the particular type of joining prevents seepage.

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DOE-RL/WHC Response: Metal water stops are welded with full penetration butt welds or two sided lap fillet welds, which provide continuous metal stops (reference construction specification B-714-C2, 03301, 3.2.8.1). Text will remain unmodified. 09/05/90

326. Appendix 4I, Vault Design. The loads applied to the basin HDPE liner are calculated at about 6,545 lbs/ft^2, or about 46 psi. Such values are well within the range used for landfill liners and are not excessive if they can be considered as a uniformly spread load. The design, however, does not seem to allow this interpretation and the direct bearing of the gravel onto the HDPE liner represents a multiplicity of point loads. Drawing H-2-77583, included in Appendix 4A of the permit application, shows a thick nonwoven polypropylene geotextile overlaying the HDPE liner. This geotextile does not appear in the specifications, however, and it is our understanding that it is not now included in the design. The argument for noninclusion is apparently based on concerns about the geotextile retarding leachate flow. The worst consequence of such retardation is likely to be merely the delay in detection of leachate flow by a matter of hours or days. This is of little significance by comparison with the physical consequence for liner service of not including the protective geotextile.
Ecology Requirements: A high-strength geotextile is an essential part of the design and must be included. The alternative consequence is to have the gravel grains slowly and inexorably pressed into the liner. The lack of any separating and confining barrier between the gravel and the liner will allow unrestricted creep of the liner material into the adjacent small pore spaces over the long years of constant load. This creep will occur at accelerating rates as the temperature of the liner begins to rise. With an included polypropylene geotextile, the liner is more uniformly loaded, is protected from penetration by individual gravel grains, and is largely confined. Since the loading is compressive, the effect of confinement at least partially offsets the loss of strength due to elevated temperature, and the extent of movement (creep) is restricted.
DOE-RL/WHC Response: The live and dead loads from the vault are transmitted through compacted gravel. Due to the high degree of compaction, the load is transferred through "numerous" points which approach infinity. Such distribution of loads in a confined space can be considered equivalent to a uniformly distributed load. 09/05/90

Preliminary Testing has been conducted by PNL which indicates that the gravel, when compressed into the liner, does not cause liner failure. Refer to Letter dated November 21, 1989, from J. H. Westik Jr. to J. A. Voogd regarding Completion of Milestone GTP-90-05-01 (Letter Report on Creep of HDPE Catch Basin Liner). The gravel is rounded river

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rock. Preliminary reports indicate that changes to the liner due to creep will not result in breakthrough of the liner and will ensure a residual thickness greater than EPA's Minimum Technological Guidance of 30 mils. A 'Placement Procedure for Catch Basin Drainage Gravel' is required of the contractor to reflect the appropriate handling and placement procedure for gravel. This is Submittal #225 from the contractor and is requested in Engineering Change Notice B-714-49. Until the time these tests are completed and Ecology approves the test results, a geotextile will be placed on top of the liner to provide protection of the liner and as a construction aid. Engineering Change Notice B-714-52 has been issued to require this installation.

NOTE: EPA comments 1 through 9 will be closed out with resolution of Ecology's comments 254 through 326.

1. EPA - Appendix 1, Section 4.4.4.2. The concrete composition for vault construction is not specified.
EPA Recommendations: This section should specify Type II cement with tricalcium aluminate (C_3Al) as indicated in Appendix 4E. This section should also specify concrete composition.

Air entrainment of 6 percent (more or less) should be considered in the concrete mix design to increase durability and moisture resistance. The proper amount should be verified through proper testing.

All aggregate used in the concrete should be alkali resistant. The following tests should be completed for aggregates to verify alkali resistance and chemical stability:

- *ASTM C 227 (mortar bar test)
- *ASTM C 289 (quick chemical test)
- *ASTM C 586 (rock cylinder test)

*ASTM C 150 - 84

DOE-RL/WHC Response: The concrete composition has been specified in the vault design report and construction specifications provided in Appendix 4I. [APP 4I]

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The composition does specify Type II cement, but does not specify tricalcium aluminate content. When tricalcium aluminate is not specified, typical Type II cement contains between 4 and 10 percent tricalcium aluminate. The only time it is necessary to specify tricalcium aluminate is if the sulfate concentration of either the makeup water or a solution that would normally come into contact with the concrete exceeds approximately 3,000 ppm. The typical waste to be processed at the GTF contains approximately 1-2 ppm sulfate. As a result, specification of sulfate-resistant Type II cement is not necessary.

The construction specification requires air entrainment of 5% ± 1%. The construction specification identifies American Concrete Institute (ACI) Standard 301 84-3 for all concrete construction activities. This standard specifies ASTM C 33 for identification and testing of aggregate materials which include the use of ASTM C 227, 289, and 586, as appropriate. Text will remain unmodified.

2. EPA - Appendix 4E. The specification for concrete composition is incomplete.
EPA Recommendation: The concrete composition for vault construction should be specified completely as shown in Appendix 1, Section 4.4.4.2.
DOE-RL/WHC Response: The concrete composition has been provided in the vault design report and construction specification. [APP 4I]

3. EPA - Appendix 4E. The test report is not adequate. No basis is presented for using a simulated double-shell tank solution as a test solution rather than free liquid after grout reaction with actual waste material. 40 CFR 270.21(b)(1) and 264.301(a)(1)(i) require that liner-waste compatibility testing demonstrate that liner strength and performance are still adequate after exposure to waste leachates and to the waste.
EPA Recommendations: The concrete and reinforcing steel should be testing for compatibility with actual grouted waste and free liquid after the grout reacts with the mixed waste. After the grout reaction, free liquid will probably constitute the highest salt solution in contact with the concrete.

Compatibility tests should demonstrate that the concrete and reinforcing steel are not adversely affected by exposure to test samples under maximum design load and with maximum expected temperature, including heat generated by hydration of the grout matrix.

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Compatibility tests should include a margin of safety for the maximum expected temperature in case 90°C is exceeded during hydration or afterward.

The impacts of surface drying and wetting of concrete and reinforcing steel should be evaluated.

The effects of the introduction of chemical impurities into the grout matrix from the addition of fly ash, blast furnace slag, or clays should be evaluated. These effects will be taken into account with test solutions consisting of free liquid after grout reaction.

Total organic carbon was not addressed in previous compatibility tests. The actual waste solution contains 3g/liter of total organic carbon and a number of inorganic constituents. Test solutions consisting of free liquid after grout reaction will take into account the effects of these constituents.
DOE-RL/WHC Response: A discussion of compatibility of the concrete and reinforcing steel has been included in the vault design report. [APP 4I]

The concrete must have at least short term compatibility with the tank waste, since the grout slurry properties are similar to the tank waste. The waste represents the worst case of chemical concentrations that could affect the concrete. The concrete should be compatible with the worst-case fluid that the vault might contain and in the case of process upsets, it is possible that waste might enter the vault.

The addition of grout formers to the waste buffers the pH from 12 to 14 down to 12 to 13. Therefore, the simulated tank waste is very representative of the grout slurry.

The grout formulation has been developed so there is no free liquid after several days of grout reaction, therefore, a representative free liquid is undefined.

If excess liquid is present during processing, it would be from water flushes of the process equipment and piping. It would be more diluted than the grout slurry and less aggressive to the concrete.

The disposal system is designed over the long-term to prevent percolating water from reaching the exterior of the vault or contacting the grouted waste. Therefore, the generation of waste leachates is unlikely, and such leachates would be less aggressive to the concrete than the simulated tank waste. If leachate were generated from the grout, it would likely be near

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equilibrium with calcium hydroxide in the grout and concrete at a pH of around 12 which would keep reinforced steel in the concrete passivated so it would not corrode. Text will remain unmodified.

4. EPA - Appendix 1, Section 4.4.2.7. The compatibility of grouted waste and free liquid after the grout reaction with the proposed asphalt liner have not been addressed. The Part B indicates that these tests are ongoing, and results of these tests will be presented in the revised Part B at a later date.
EPA Recommendations: Compatibility tests for the proposed asphalt liner should be completed in accordance with 40 CFR 270.21(b)(1) and 264.301(a)(1)(i).

The asphalt liner (at a specified thickness) on a concrete surface should be tested for compatibility with the grouted waste and free liquid after the grout reacts with the mixed waste. Any effects of total organic carbon and inorganic constituents should be addressed in the test results.
Compatibility tests should demonstrate that the asphalt liner on concrete is not adversely affected by exposure to test samples under maximum and minimum hydraulic design conditions and with maximum expected temperature, including heat generated by hydration of the grout matrix. Compatibility tests should include a margin of safety for the maximum expected temperature in case 90°C is exceeded during hydration or afterward.

Compatibility tests should demonstrate that the asphalt liner on concrete is not adversely affected by abrasion, which is expected to occur along the interior walls of the vault as the grout is flowing into and filling the vault. These tests should be conducted at the maximum expected temperature of the grouted waste, including some margin of safety greater than 90°C.

Commercially available asphalt materials used for surface protection include at least two different products. Review of the properties of these two products indicates that both will soften and flow in the range of 85 to 120°C and would not be suitable for use under a design condition of 90 to 100°C. It may be possible that chemical additives can be added to the asphalt to prevent softening and flowing from occurring at maximum design temperatures.

Alternatives to the asphalt liner should be investigated. Alternate materials such as HDPE may be viable options for the interior of the disposal vault. Alternate lining systems will require careful consideration and pilot testing to overcome potential problems. One such

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potential problem is the high viscosity of the grout flow which could cause tearing of the liner system. Expansion and contraction of the liner material with a change in temperature is also a potential problem. In the case of HDPE which has a high coefficient of expansion, a change in temperature from 0°C to 100°C will expand the material 1 ft. in 100 ft. An liner or other synthetic liner will require an anchor system for support along the 34-ft. high vertical walls of the vault. In some cases, a batten anchor system can be used to anchor liner material to concrete. The batten anchor system consists of a series of stainless steel strips and bolts with neoprene washers. Compatibility testing of alternate liners with the grout-waste matrix and free liquid after grout reaction will be necessary. Pilot testing of the anchor system to a vertical concrete wall with grout flow at maximum design temperature should also be performed to guard against possible tearing of the liner material.

DOE-RL/WHC Response: Compatibility tests with the proposed asphalt-based liner have been conducted. The report has been included in the permit application. The tests were conducted with simulated waste. Simulated waste represents the most severe case for the liner, as free liquid and leachate would have a pH lower than the waste itself. See additional discussion in the response to comment 3. For data on leachate composition and results of EP toxicity tests refer to Serne (1989 - Leach and EP Toxicity Tests on Grouted Waste from Tank 106-AN).

If tests are conducted to determine the compatibility of the asphalt liner while attached to the concrete, the strength of the concrete would mask any property changes of the asphalt-based liner. Therefore, tests were conducted so that changes in the asphalt properties could be measured.

The simulated waste included organics in the compatibility testing that was performed. The total organic carbon was not monitored during the testing. Because the purpose of the liner is to reduce the possibility of drainage over several months before any excess liquid is removed from a vault, it was concluded that estimation of long-term impacts due to organics was not critical.

The compatibility tests on asphalt-based liners were to demonstrate that no severe degradation occurred over the 120 day duration of the test. They showed that significant changes do not occur with the selected material at up to 90°C, which is greater than the liner should reach. (The maximum specification for the grout is 90°C and if this temperature is reached, it would be at the center of the vault. The liner is expected to be several degrees lower than the peak grout temperature, so there is some margin of safety.) Separate

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engineering tests were conducted with the selected liner to demonstrate that the material did not flow at the proposed temperature and that it could span small cracks that might form in the concrete due to thermal stresses. These data are included in the engineering report. [APP 4K]

There is no credible mechanism for abrasion of the asphalt-based liner. There is a splash pad located where the grout slurry will hit the base of the vault. As the first grout enters the vault it will hit the splash pad and flow to the corners of the vault. The grout is very fluid (not like concrete), and at the low velocities it will not abrade the exposed liner on the floor. Further, because the grout gels rather rapidly, after approximately 30 minutes, the flow will occur on the grout surface instead of on the liner. There is no mechanism for shear at the walls.

The asphalt-based liner that was selected does have chemical additives that prevent it from softening and flowing at the expected temperatures in the vault. Tests were conducted to confirm that there was not a flow problem.

Three types of asphalt liner were tested. In addition, alternative materials were tested for the catch basin liner. The grout is not 'high viscosity;' therefore, there is not a tearing problem due to the grout. Internal liners such as HDPE were considered, and were actually used in the vault that was used for unregulated waste. Due to construction difficulties, expansion/contraction problems and requirements to have the vault under slight vacuum, the internal plastic liner approach was abandoned. Secondly, from a failure standpoint, it is desirable to have different materials for primary and secondary containment. Text will remain unmodified.

5. EPA - Appendix 1, Section 4.4.3.1.2. This section, which describes the leachate detection/ and collection and removal system does not clearly describe the HDPE and secondary liner system.
EPA Recommendation: The revised Part B application should provide greater detail regarding the lower liner system. The information available does not clearly describe how the HDPE liner will be protected from high point loading imposed by the gravel drainage media. A number of options should be considered to minimize point loading. For example, a layer of abraded rock smaller in size than the gravel drainage media could be placed on top of the

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HDPE liner to reduce point loading. A geotextile cushion fabric under the HDPE would also reduce point loading. All gravel materials used for the lower liner system must be sized to prevent plugging of the 4-in. perforated collection pipe.
DOE-RL/WHC Response: A detailed description of the liner and the leachate detection/collection and removal system has been provided in the vault design report.

Test results showing the minimal impact caused by the point loading of the gravel drainage media on the HDPE have been provided. [APP 4H]

6. EPA - Appendix 4H. The flexible membrane liner-waste compatibility test report is inadequate. No basis is presented for using a simulated double-shell tank solution as a test solution rather than free liquid after the grout reaction with the mixed waste material. 40 CFR 270.21(b)(1) and 264.301(a)(1)(i) require that liner-waste compatibility tests demonstrate that liner strength and performance are still adequate after exposure to waste leachates.

The test solutions used had a greater concentration of inorganic salts than the actual double-shell tank solution. The test solutions also had no concentration of total organic carbon. However, the actual double-shell tank solution has 3g/liter of total organic carbon. Therefore, the data base is not adequate for evaluating the suitability of this liner material. The effects of radiation exposure on the liner as reported is incomplete. Test results of the effects of radiation exposure on the liner were reported only on the dimensional measurements.
EPA Recommendations: The 60-mil HDPE liner should be tested for compatibility with free liquid after grout reaction with actual mixed waste. EPA Method 9090 compatibility test for wastes and membrane liners should be used in completing the tests. The test results also should address the effects of radiation pertaining to visual, tensile, and hardness aspects of the liner.

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Compatibility tests should demonstrate that the 60-mil HDPE liner is not adversely affected by exposure to test samples under maximum design load and actual design conditions and with maximum expected temperature including heat generated by hydration of the grout matrix. Compatibility tests should include a margin of safety for the maximum expected temperature in case 90°C is exceeded during hydration or afterward.

The effects of the introduction of chemical impurities into the grout matrix from the addition of fly ash, blast furnace slag, or clays should be evaluated. These effects will be taken into account with test solutions consisting of free liquid after grout reaction.
DOE-RL/WHC Response: The report in the original permit application was not complete. A completed version is part of the permit application. The basis for using the simulated waste is given in the report, and is described in the response to comment number 3. [APP 4H]

The test solution was the same as the reference composition used for developing the grout formulation.

Organic carbon was included in the test solution and was monitored at the end of each testing period. Total organic carbon in the test solution remained relatively constant.

Effects of radiation impacts on the tensile strength and hardness are reported and are included in the revised permit application along with visual observations. The tests showed that the small doses that the liner will receive on the exterior of the vault and in the catch basin will not affect its performance. In fact, the material should also be satisfactory inside the vault from a compatibility standpoint.

**A summary of the results has been included in the permit application.
[APP 4H]**

The blast furnace slag, fly ash, and cement will lower the pH to the 12-13 range which is less aggressive to the HDPE. These components do not contain organics which may be detrimental to HDPE. Inorganics are not aggressive to HDPE, therefore, testing the less aggressive free liquid or leachate is not warranted.

7. EPA - Appendix 1, Section 4.4.3.5. This section on systems compatibility is not clear or complete concerning corrosion resistance of carbon steel components of the LDCRS system.

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Results of compatibility tests for carbon steel with this waste environment have not been provided.
EPA Recommendations: Carbon steel materials should be tested for compatibility with free liquid after grout reaction with actual mixed waste. The Chemical Engineering Handbook indicates that the usefulness of carbon steel in solutions containing NaOH, $NaNo_3$, or NaCl is limited due to expected corrosion rates.

With an NaOH solution greater than 50 percent, and with a temperature of 200°F, the expected corrosion rate is greater than 0.05 in. per year. With an NaOH solution less than 50 percent and with a temperature of 200°F, the expected corrosion rate is less than 0.02 in. per year. Proper test data should be provided to verify the stability of carbon steel in this environment.

Alternative materials to carbon steel should be considered for the leachate collection sump, pipe riser and connecting piping. Stainless steel and other materials should be considered and compatibility test data should be provided to verify its stability in this waste environment.

Corrosion protection for the LDCRS system should be verified. A cathodic protection system will require periodic maintenance that may be very difficult to perform and may not be adequate by itself for a long period of time. Protective coating materials should be considered. A section of the pipe riser above the high-liquid level of the sump also will be subject to a degree of both interior and exterior corrosion. Test data should be provided to verify the adequacy of all coating materials specified.
DOE-RL/WHC Response: Substantial research and testing of the compatibility of double-shell tank waste solutions and carbon steel tank components has been performed at the Hanford Facility. A report, "Prediction Equations for Corrosion Rates of A-537 and A-516 Steels in Double-Shell Slurry, Future PUREX, and Hanford Facilities Wastes" (PNL-5488), has been included in the permit application as an appendix. Further discussion is provided in the response to Ecology's comment 19.

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8. EPA General Comments - Regulations for landfills require that two or more liners and leachate collection systems be provided; one above the upper liner and one between such liners. If this double liner arrangement is not used then an alternate design must be employed that is at least as effective as the double liner arrangement. The liner system being designed for the grout waste disposal vaults includes an upper and lower liner but provides only one leachate collection system which is located between the liners. Should leachate leak through the vault walls or floor it will be contained and removed above the lower liner. However, the disposal system does not provide a backup leachate containment and collection system should the first one fail.

Using a buried concrete vault and catch basin as a disposal system for a grouted waste is a sound approach, and it is apparent that a substantial effort has gone into the conceptual design of the disposal system. At this time, however, the EPA has some concerns whether the current system meets the alternative design criteria stated in the regulations. Based on the information provided in the Part B permit application, an area of utmost concern and uncertainty is the asphalt liner on the inside surface of the vault. As pointed out in this report, a number of potential problems need to be addressed for any type of liner installed on the inside surface of the vault. The potential for free liquid inside the vault during the filling and curing periods is high. Also, filling of the vault could occur in stages due to disruption of grout mixing equipment, pumps, or piping. This could contribute to an increased amount of free liquid inside the vault. The behavior of a grouted waste can be complex and sometimes unpredictable for a waste mixture containing a substantial amount of organic constituents. This could also contribute to an increased amount of free liquid inside the vault.

Instead of trying to meet the alternative design criteria, another option would be to install another concrete catch basin and leachate collection system just below the catch basin presently being designed. This would fulfill the double liner requirement of the regulations.

DOE-RL/WHC Response: Because the grouted waste is in liquid form when placed in the vault, it is constructed and operated as a surface impoundment, which requires two liners and one leachate collection system. Because of the unique nature of the waste, the contents of the surface impoundment solidify; therefore, the system is closed as a landfill. A detailed description of the liners and leachate detection/collection and removal system has been provided in the vault design report. [APP 4I]

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9. One specific area for which we could not find a reference in the Part B is how EPA's requirement for a "Response Action Plan" will be addressed. The Response Action Plan describes how the owner/operator will respond to leaks that reach the liner system's secondary leak detection system. The Federal Register, (May 29, 1987, vol. 52, no. 103, p. 20218) contains a proposed rule on this subject. The procedure in this proposed rule is being followed nationwide, until the final rule is issued. EPA Headquarters estimates that the final rule will not be finished for at least another year, and that it will not contain substantive changes from the proposed rule.
DOE-RL/WHC Response: A 'Response Action Plan' has been provided in the permit application. [APP 7A]