This document was too large to scan as a single document. It has been divided into smaller sections.

Section 1

Document Information			
Document #	FOIA-2009-0054	Revision	
Title	FREEDOM OF INFORMATION ACT REQUEST (FOI 2009-0054)		
Date	09/02/2009		
Originator	RIEHLE DC	Originator Co.	DOE-RL
Recipient	JARVIS R	Recipient Co.	HEART OF AMERICA NW
References			
Keywords	OCE, FOIA, SENSITIVE, PRIVATE CITIZEN		
Projects			
Other Information			

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

September 2, 2009

CERTIFIED MAIL

Mr. Ryan Jarvis
Heart of America Northwest
1314 N.E. 56th Street Suite 100
Seattle, Washington 98105

Dear Mr. Jarvis:

FREEDOM OF INFORMATION ACT REQUEST (FOI 2009-0054)

This is a partial response to your letters dated June 22, 2009, and July 15, 2009. Enclosed is a listing of each document being provided. In response to items 4a – 4c, please see Enclosure I. Each document has been determined to be responsive to each item. In response to item 5, please see Enclosure II.

We continue to search and review documents responsive to your request. As you may know, the FOIA provides that an agency respond to requests within twenty working days. However, the FOIA permits an agency to extend the time limit to respond to a request in certain circumstances. These circumstances include the need to collect records from other locations, review large number of records, and consult with other offices. Due to the large amount of information requested, additional time will be needed to review the documents. We will notify you when our search and review is complete.

If you have any questions regarding your request, please contact me at our address above or on (509) 376-6288.

Sincerely,

Dorothy Riehle
Freedom of Information Act Officer
Office of Communications
and External Affairs

OCE:DCR

Enclosures

Heart of America Northwest (HOA) Freedom of Information Act (FOIA) Request for Low-Level Burial Grounds Trenches 31 and 34 Dated June 22, 2009 and Modification reply dated July 15, 2009 Item #4a-4c & 5

Identification Number	Title	Date
D194030815	Project Managers Meeting (PMM) Transmittal/Approval Unit Managers Meeting: Low-Level Burial Ground Richland, WA	May 21, 1990
D196129782	Quality Assurance Program Plan Project W-025, Radioactive Mixed Waste (RMW) Land Disposal Facility – Non Drag Off Rev. 2	June 6, 1990
D194030816	(PMM) Transmittal/ Approval Unit Mangers Meeting: LLW Burial Ground Richland, WA	June 29, 1990
D196085507	(PMM) Transmittal/Approval Unit Managers Meeting: Low-Level Burial Grounds (W-025 Mixed Waste Trench)	March 22, 1991
D196136755	Changes to WHC-SD-W025-QAPP-001 Rev. 0Pages 1-19,50-60, and 84-102 Project W025/RMW Land Disposal Facility	April 24, 1991
D196068021	Low-Level Burial Grounds Part B Permit Application (TSD: D-2-9)	July 28, 1991
D196085508	(PMM)Transmittal/ Approval Unit Managers Meeting: Low-Level Burial Grounds	August 9, 1991
D194030296	(PMM) Transmittal/ Approval Unit Managers Meeting: Low-Level Burial Grounds	September 11, 1991
D194030299	(PMM) Transmittal/Approval Unit Managers Meeting: Low-Level Burial Grounds	December 11, 1991
D194030290	(PMM) Transmittal Unit Managers Meeting Low-Level Burial Grounds Ecology Office 7601 West Clearwater, Suite #102 Kennewick, WA	May 28, 1992
D194030301	(PMM) Transmittal Unit Managers Meeting Low-Level Burial Grounds. The Energy Technology Center Building: ETC-2, Room 24 2920 George Washington Way Richland, WA	June 18, 1992
D196136668	Changes to WHC-SD-W025-QAPP-001, Rev 1, Pages 91-96 Project W025/RMW Land Disposal Facility	July 8, 1992
D194030333	Unit Managers Meeting Low-Level Burial Grounds HAPO Building, Room 319 Richland, WA	October 26, 1992

Heart of America Northwest (HOA) Freedom of Information Act (FOIA) Request for Low-Level Burial Grounds Trenches 31 and 34 Dated June 22, 2009 and Modification reply dated July 15, 2009 Item #4a-4c & 5

D196137530	Response Action Plan Project W-025 Landfill Hanford Site, Washington WHC-SD-W025-AP-001 Rev. 0	November 5, 1992
D196137517	Changes to WHC-SD-W025-AP-001 Rev. 0, Project W-025 Landfill	March 1, 1993
D194030370	Unit Managers Meeting Low-Level Burial Grounds 740 Stevens Center Room 2519 Richland, WA	March 2, 1993
D196137516	Response Action Plan Project W-025 Landfill Hanford Site, Washington	April 7, 1993
D196136666	Quality Assurance Program Plan for Project W-025, Radioactive Mixed Waste Land Disposal Facility- Non Drag Off	April 7, 1993
D196127798	Response to the Low-Level Burial Grounds Dangerous Waste Permit Application, Revision 0 Notice of Deficiency (TSD: D-2-9)	April 7, 1993
D194030821	Low-Level Burial Grounds Unit Managers Meeting (Videoconference) Federal Building, Room 784B Richland, Washington	May 12, 1993
D194030417	(PMM) Transmittal Low-Level Burial Grounds Unit Managers Meeting (Videoconference) Federal Building, Room 784B Richland Washington	June 14, 1993
D194030822	Low-Level Burial Grounds Unit Managers Meeting (Videoconference) Federal Building, Room 784B Richland, Washington	July 22, 1993
D196104229	Project W-025, Radioactive Mixed Waste Land Disposal Facility, Non-Drag-Off, Low-Level Burial Grounds Dangerous Waste Permit Application—Intent to Construct	July 28, 1993
D194031090	Low- Level Burial Grounds Unit Managers Meeting (Videoconference) Federal Building, Room 784B Richland, Washington	August 24, 1993
D196034005	Low- Level Burial Grounds Unit Managers Meeting (Videoconference) Federal Building, Room 784B Richland, Washington	December 7, 1994
D196027036	Low-Level Burial Grounds Unit Managers Meeting (Videoconference) Federal Building, Room 784B Richland,	January 26, 1995

Heart of America Northwest (HOA) Freedom of Information Act (FOIA) Request for Low-Level Burial Grounds Trenches 31 and 34 Dated June 22, 2009 and Modification reply dated July 15, 2009 Item #4a-4c & 5

	Washington	
D196027039	Low-Level Burial Grounds Unit Manager Meeting 2440 Stevens Center Place, Room 1600 Richland, Washington	February 28, 1995
D196029354	Transmittal of the Hanford Facility Low- Level Burial Grounds Construction Quality Assurance Report and W-025 AS-Built Drawings	March 28, 1995
D195063331	Low-Level Burial Grounds Unit Managers Meeting Federal Building, Room 784B Richland, Washington	March 29, 1995
D195063332	Low-Level Burial Grounds Unit Managers Meeting Federal Building, Room 784B Richland, Washington	April 27, 1995
D196137517	Changes to WHC-SD-W025-AP-001 Rev. 1, Project W-025 and W-025A Landfills	May 1, 1995
D195066646	Low-Level Burial Grounds Unit Managers Meeting Federal Building, Room, 784B Richland, Washington	May 24, 1995
D196007906	Revision to the Response Action Plan for the Low-Level Burial Grounds Mixed Waste Disposal Trenches	July 19, 1995
D195066666	Low- Level Burial Grounds Unit Managers Meeting Federal Building, Room 784B Richland, Washington	July 20, 1995
D195066563	Transmittal of the Hanford Facility Low-Level Burial Grounds Construction Quality Assurance Report for Trench 31	September 19, 1995
D195063330	Low-Level Burial Grounds Unit Managers Meeting Federal Building, Room, 784B Richland, Washington	October 4, 1995
D196003794	Low- Level Burial Grounds Notice of Deficiency Resolution Meeting 2440 Stevens Ctr., Room 2100 Richland, Washington	November 1, 1995
D196010898	Low- Level Burial Grounds Unit Managers Meeting 2440 Stevens Ctr., Room 2100 Richland, Washington	December 6, 1995
D197142727 or 96-SWT-333 WHC-SD-WM-TI-714 or D196189394, D1242849	A Final Report: Laboratory testing of Geomembrane for Waste Containment Environmental Protection Agency Method 9090	November 7, 1996

Heart of America Northwest (HOA) Freedom of Information Act (FOIA) Request for Low-Level Burial Grounds Trenches 31 and 34 Dated June 22, 2009 and Modification reply dated July 15, 2009 Item #4a-4c & 5

D196010889	Strategy Letter for the Disposal of Mixed Waste in the Low-Level Burial Grounds	January 11, 1996
D196245335	Low- Level Burial Grounds Project Managers Meeting/ Notice of Deficiency Resolution Meeting 2440 Stevens Ctr., Room 1200 Richland, Washington	April 3, 1996
DA06799113	Low- Level Burial Grounds Project Managers Meeting/Part B Workshop Federal Building, Room 554 Richland Washington	June 11, 1996
D197290869	Low-Level Burial Grounds Part B Workshop 2440 Stevens Center Place, Room 2519 Richland, Washington	February 19, 1997
D197129821	Approval of Low-Level Burial Ground (LLBG) Part A, Revision 9	March 6, 1997
D2658486	PMM Transmittal LLBG Project Manager Meeting 825 Jadwin/340/700 Area Hanford, Washington	August 28,2003
Item # 5		
D8532666	Closure Plan for Active Low-Level Burial Grounds	December 7, 2000

ENCLOSURE I

Enclosure

SUBMITTED IN RESPONSE TO FOIA REQUEST NO. 2009-0054, ITEM #4a-4c as Modified in July 15, 2009, Letter from Heart of America Northwest

Final

Meeting Minutes Transmittal/Approval
Unit Mangers Meeting: Low-Level Burial Ground
Richland, Wa.

Meeting Held May 21, 1990

Appvl. NOT PRESENT Date:
Daniel L. Duncan, EPA Region X Unit Manager

Appvl. Date: 1/22/92
Clifford E. Clark, Environmental Policy and Permitting, DOE-RL

Appvl. Date:
Randall J. Roberts, Unit Manager, WHC

Appvl. Date: 2/4/92
Susan M. Price, RCRA Permitting, WHC

Appvl. JOSEPH S. WHITEBAK Date: 1/22/92
for Russ Brown, Unit Manger, Washington State Department of Ecology

PURPOSE: Kick-off meeting to discuss forthcoming NOD and identify potential issues.

Meeting Minutes are attached. Minutes are comprised of the following:
Attachment #1 - Summary of Meeting Discussion and Commitments
Attachment #2 - Attendance List

NRDWSF UNIT MANAGERS MEETING
April 17, 1990

Attachment #1
Unit Managers Meeting: Low-Level Burial Grounds
Summary of Discussion and Commitments

General

This meeting was an introductory meeting which allowed Ecology (Russ Brown) to become familiar with the persons involved in permitting the Low Level Waste ((LLW) Burial Ground faciltiy. DOE (Cliff Clark) asked that he be the central point of contact for scheduling future meetings and for document transmittals. Ecology expressed a desire to be informed of potential issues associated with permitting the facility as far in advance as possible. The 90/90 Test Plan for the trench liner was cited as an example where information was requested.

Waiver on NAVY Submarine Trench

a. WHC (Randy Roberts) informed Ecology that a waiver request for disposal of NAVY submarine components is being prepared by WHC and will be sent to Ecology by July 31, 1990. A joint concurrence review by DOE and the NAVY will be done in June.

b. DOE (Cliff Clark) pointed out that a commitment has been made by the DOE-RL Field Manager, Mike Lawrence, that permitting related documents submitted for Ecology approval will be sent to DOE-HQ Director for Environmental Restoration, Leo Duffy, two weeks prior to transmittal to Ecology. Therefore, ~~a~~ the final request must be through concurrence before July 15, 1990. SMP 11/24/92

NOD Issues

a. WHC (Charlie Wilson) requested clarification of issues in several NOD comments about transverse dispersivity in relation to hydraulic conductivity. The NOD comments seemed to indicate that Ecology believes that there may be less dispersivity in high conductivity areas. Clarification and references supporting this view were requested. 11/24/92

b. WHC (George Evans) requested Ecology to clarify the definition of "existing portion" of the burial grounds. Ecology seemed to desire a waiver request covering disposal of LLW in open trenches with waste already in them, whereas WHC has understood from previous communications that this practice posed no regulatory problem. WHC requested clarification of Ecology interpretation of specific regulatory requirements.

RMW Disposal Trench Liner

a. WHC (Randy Roberts) discussed schedule for the 90/90 test of the trench liner. Early approval of the test plan is requested so that the tests can be performed to support a construction start in May 1991. Ecology (Russ Brown) stated that the key component of test plan approval would be demonstrating that the waste tested is representative of actual waste.

b. WHC confirmed with Ecology that the test data would be part of the permit.

c. WHC asked whether the liner installation could be approved outside of the permitting process. Ecology (Russ Brown) replied that this was possible.

d. Ecology (Russ Brown) asked when the test plan would be available. WHC (Tony Yount) said that the plan was finished and proceeding through internal clearance. Associated design reports should be available by mid-June, and definitive design, by the end of July. The QA Plan has been funded under a different task, and funds have not been approved for its completion. Conceptual design criteria are included in the permit application now, and functional design criteria should be ready in July. DOE-HQ review of this information prior to transmittal to Ecology is not anticipated.

Ecology requested that the test plan be cleared to Ecology as soon as possible. Ecology would like to have access to draft (uncleared) supporting design information. DOE (Cliff Clark) stated that it may be possible for Ecology to have such access under controlled circumstances. The issue of Ecology commitment to restrict public access to uncleared draft documents must be resolved. The issue is being addressed by legal staffs in relation to other operable units at this time. DOE suggested WHC prepare a presentation on the test plan for the next unit mangers meeting. WHC agreed.

e. WHC (Sue Price) requested that the NOD be available for WHC review before the next meeting. It was established that WHC will prepare a NOD response table, as it has for other units undergoing the permitting process, with two rounds of NODs and 90 day response time as provided in the Tri Party Agreement.

The next unit managers meeting was scheduled for June 20, 1990 at 9AM in the Federal Building.

NRDWSF UNIT MANAGERS MEETING
April 17, 1990

Attachment 2
Attendance List

Peggy Baker	SWEC	509-376-9830
George C. Henkel III	WHC	509-376-1994
Charlie Wilson	Golder	509-943-1019
George C. Evans	WHC	509-376-8939
Mark A. Wasemiller	WHC	509-376-9808
Sue Price	WHC	509-376-1653
Randy Roberts	WHC	509-373-1065
Thomas Yount	WHC	509-373-3729
Dennis Armstrong	WHC	509-373-1048
Russ Brown	Ecology	206-438-7526
Cliff Clark	DOE	509-376-9333
Rick Pierce	WHC	509-373-4846

NRDWSF UNIT MANAGERS MEETING
April 17, 1990

Distribution:

M.R. Adams	WHC	(L4-92)
M.J. Anthony	DOE	(A6-95)
S.A. Benfer	SWEC	(A4-35)
J.D. Bauer	WHC	(B3-15)
L.E. Borneman	WHC	(B2-19)
E.A. Bracken	DOE	(A6-95)
L.C. Brown	WHC	(H4-51)
R.W. Brown	WHC	(H4-55)
J.W. Cammann	WHC	(H4-54)
R.M. Carosino	DOE	(A4-52)
G.D. Carpenter	WHC	(H4-15)
C.E. Clark	DOE	(A6-95)
C. DeFigh-Price	WHC	(B2-20)
C.K. Disibio	WHC	(B3-02)
W. T. Dixon	WHC	(B2-35)
G.T. Dukelow	WHC	(R2-97)
D.L. Duncan	EPA	
K.R. Fecht	WHC	(H4-56)
C.J. Geier	WHC	(H4-57)
T.M. Hennig	DOE	(A6-80)
K.L. Hoewing	WHC	(B3-06)
R.D. Izatt	DOE	(A6-95)
G.W. Jackson	WHC	(R2-29)
R.J. Landon	WHC	(B2-19)
R.E. Lerch	WHC	(B2-35)
M. Lerchen	Ecology	
D.W. Lindsey	WHC	(R2-82)
H.E. McGuire	WHC	(B2-35)
T.M. Michelena	Ecology	
S.H. Norton	WHC	(T3-28)
J.W. Olson	WHC	(R2-82)
R.D. Pierce	WHC	(R2-80)
L.L. Powers	WHC	(B2-35)
S.M. Price	WHC	(H4-57)
L.W. Roberts	WHC	(R2-80)
R.J. Roberts	WHC	(R2-97)
F.A. Ruck III	WHC	(H4-57)
S.A. Wiegman	WHC	(B2-19)
K.A. Woodworth	WHC	(H4-55)
EDMC	WHC	(H4-51)
G.C. Henckel	H4-55	
G.C. Evans	H4-57	
M.A. Wasemiller	H4-55	
R.J. Roberts	R2-97	
T.L. Yount	R3-43	
D.L. Armstrong	R2-82	
R.D. Pierce	R2-80	

ADMINISTRATIVE RECORD (616 Non-radioactive Dangerous Waste Storage Facility)
[Care of Susan Wray, WHC (H4-22C)]

START

PHOTOCOPY
DO NOT RETURN TO RHA

QUALITY ASSURANCE PROGRAM PLAN
FOR
PROJECT W-O25, RADIOACTIVE MIXED WASTE (RMW)
LAND DISPOSAL FACILITY - NON DRAG OFF

Revision -2-

prepared for the
U.S. Department of Energy - Richland Operations Office
Contract No. DE-AC06-89RL11615

by

GOLDER ASSOCIATES INC.
Seattle (Redmond), Washington
Richland, Washington

Reviewed and Approved by:

Charles W. Lockhart, Project Director — Date 6-12-90

Patrick Corser, Project Manager — Date 6-12-90

Glenn Mills, Project Quality Assurance Manager — Date 6/12/90

JUN 1993
RECEIVED
EDMC

9 3 1 3 0 2 3 0 1 3

JUL 13 1990

ENGINEERING DATA TRANSMITTAL

Page 1 of 1

1. EDT 125907

2. To: (Receiving Organization) Distribution

3. From: (Originating Organization) Solid Waste Projects (83350)

4. Related EDT No: N/A

5. Proj/Prog/Dept/Div: W-025

6. Cog/Proj Engr: T. L. Yount 3-3729

7. Purchase Order No: N/A

8. Originator Remarks:

This QAPP has been reviewed and all comments incorporated this EDT will release a supporting document for release of WHC-SD-W025-QAPP-001

9. Equip/Component No: N/A

10. System/Bldg/Facility: 200W / 218-W5

11. Receiver Remarks:

12. Major Assm Dwg No: N/A

13. Permit/Permit Application No. N/A

14. Required Response Date: N/A

15. DATA TRANSMITTED

(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev No.	(E) Title or Description of Data Transmitted	(F) Impact Level	(G) Reason for Transmittal	(H) Originator Disposition	(I) Receiver Disposition
1	WHC-SD-W025-QAPP- 001		0	Quality Assurance Program Plan	2	2	1	
2								
3								
4								
5								
6								
7								
8								

16. KEY

Impact Level (F)	Reason for Transmittal (G)	Disposition (H) & (I)
1, 2, 3, or 4 see MRP 5.43 and EP-1.7	1. Approval 2. Release 3. Information 4. Review 5. Post-Review 6. Dist (Receipt Acknow. Required)	1. Approved 2. Approved w/comment 3. Disapproved w/comment 4. Reviewed no/comment 5. Reviewed w/comment 6. Receipt acknowledged

17. SIGNATURE/DISTRIBUTION (See Impact Level for required signatures)

(G) Reason	(H) Disp	(J) Name	(K) Signature	(L) Date	(M) MSIN	(J) Name	(K) Signature	(L) Date	(M) MSIN	(G) Reason	(H) Disp
2	1	Cog./Proj. Eng T. L. Yount			R3-43						
2	1	Cog./Proj. Eng. Mgr. D. R. Lucas			R3-43						
2	1	QA W. R. Thackaberry		6-26-90	S1-54						
2	1	Safety J. P. Reisenauer		6/26/90	R3-08						

18. Signature of EDT Originator — Date 6-26-90

19. Authorized Representative for Receiving Organization — Date

20. Cognizant/Project Engineer's Manager — Date 6/26/90

21. DOE APPROVAL (if required) Ltr No. 90-TSB-093

- [x] Approved
- [ ] Approved w/comments
- [ ] Disapproved w/comments

BD-7400-172 (2/89)

Revision Level	Section No.	Revision Description
2	Fig. 2-1	minor editorial corrections
	3.4	added section to clarify design change request process
	14.0	clarified text
	15.0	clarified text to reference use of client NCR procedures during Task III

9 3 1 3 0 2 3 0 0 1 5

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2.0 QUALITY ASSURANCE PROGRAM	2
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1.0 ORGANIZATION

1.1 Organizational Structure and Project Responsibilities;

The overall organizational structure of the Golder Associates Inc. (Golder) project team is shown on Figure 1-1. Primary responsibilities for the implementation of the requirements of this Quality Assurance Program Plan (QAPP) reside with the Project Director, the Project Manager, and technical staff. The Project QA Manager and assigned QA staff are responsible for the overall preparation and revision of this QAPP and its implementing procedures, as well as for monitoring and verifying compliance with QAPP requirements. Additional responsibilities of key personnel are described as follows:

- **Project Director**: The Project Director has ultimate responsibility for technical and quality performance on this project, and for ensuring that all U.S. Department of Energy - Richland Operations Office (DOE-RL) quality assurance, schedule, and budgetary requirements are satisfied.

- **Project Manager**: The Project Manager is responsible for conducting technical activities in compliance with all contractual technical and quality requirements, for coordinating all technical staff activities, for continuing liaison with DOE-RL contract officer's technical representative (COTR) through the completion of all tasks, submittal of routine progress reports, and assessment of all change requests. The Project Manager may delegate specific duties in support of these responsibilities.

- **Project QA Manager**: The Project QA Manager retains overall responsibility for the preparation and update of this QAPP and its supporting plans and procedures, and is responsible for verification of compliance with QAPP requirements through the monitoring, review, inspection, surveillance, and auditing procedures described herein. The Project QA Manager shall maintain current Lead Auditor qualifications as described in Sections 2.3 and 18.0 below. Specific duties in support of these responsibilities may be delegated within the guidelines of governing procedures.

- **Health and Safety Manager**: The Health and Safety Manager is responsible for the review of site safety plans and training programs prepared by Kaiser Engineers - Hanford (KEH) in order to ensure that any field activities conducted on this project by Golder or its subcontractors are performed safely and in compliance with applicable state and federal regulations.

1.2 Subcontractor Support

Subcontractor support for this project will be provided by both Golder and DOE-RL. For all subcontractor support activities that are Golder's responsibility, activity shall be initiated by the Project Director or Project Manager in compliance with the controls for procurement documents and acceptance of procured services described by Sections 4.0 and 7.0 of this QAPP.

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2.0 QUALITY ASSURANCE PROGRAM

2.1 Corporate Quality Policy and QA Program Plan Description

It is Golder's corporate policy to establish appropriate QA program controls for all work related to hazardous and/or radioactive mixed waste investigations and related design/ construction activities. This QAPP documents the program controls selected or developed for project W-025, "Radioactive Mixed Waste (RMW) Land Disposal Facility - Non Drag Off." It is prepared in compliance with the applicable requirements of (1) ANSI/ASME NQA-1, Quality Assurance Program Requirements for Nuclear Facilities [American Society of Mechanical Engineers (ASME), 1986], which is the standard established for all projects conducted at the Hanford Site by DOE-RL Order 5700.1A, Quality Assurance (DOE-RL, 1983), and (2) the current version of SD-W031-QAPP-001, "Project Specific Quality Assurance Plan W-031 and W-025, Radioactive Mixed Waste Disposal Facility - Drag Off and Non Drag Off." Figure 2-1 is a matrix that cross references the basic requirements and mandatory supplements of ANSI/ASME NQA-1 and SD-W031-QAPP-001 to the specific Golder QAPP sections and supporting plans and procedures that implement the requirements. A list of implementing QA procedures is provided in Figure 2-2.

The primary objective of this QAPP is to provide a procedural framework that will ensure that the design specifications, drawings, reports, analyses, recommendations, construction QA monitoring and inspection services, and all other types of services and assistance provided by Golder meet overall contractual requirements, applicable regulatory requirements, and are consistent with established engineering practices. All contractual changes that expand or otherwise affect the scope of technical activities, quality requirements, or employee health and safety as applicable to Golder or its subcontractors, shall be reviewed and modifications or additions to this plan and its implementing procedures made wherever required.

2.2 Construction Quality Assurance Plan Development Considerations

Within the overall ANSI/ASME NQA-1 QA program structure invoked by this QA Program Plan, the requirements of Technical Guidance Document: Construction Quality Assurance for Hazardous Waste Land Disposal Facilities, EPA/530-SW-86-031, OSWER Policy Directive 9472.00-3, (U.S. EPA, 1986) shall be followed, as appropriate, in the preparation of a secondary Construction Quality Assurance Plan (CQAP) prior to initiating activities on Task III. The CQAP shall address the specific requirements for format and content defined in the EPA technical guidance document cited above, and shall be developed and implemented in compliance with the procedures and controls described by this QAPP. The CQAP shall address specific project-level requirements as appropriate for the scope of Task III, as indicated in Figure 2-1. The implementing procedures referenced in this QA Program Plan may be drawn upon as necessary or appropriate for Task III project-level activities, provided

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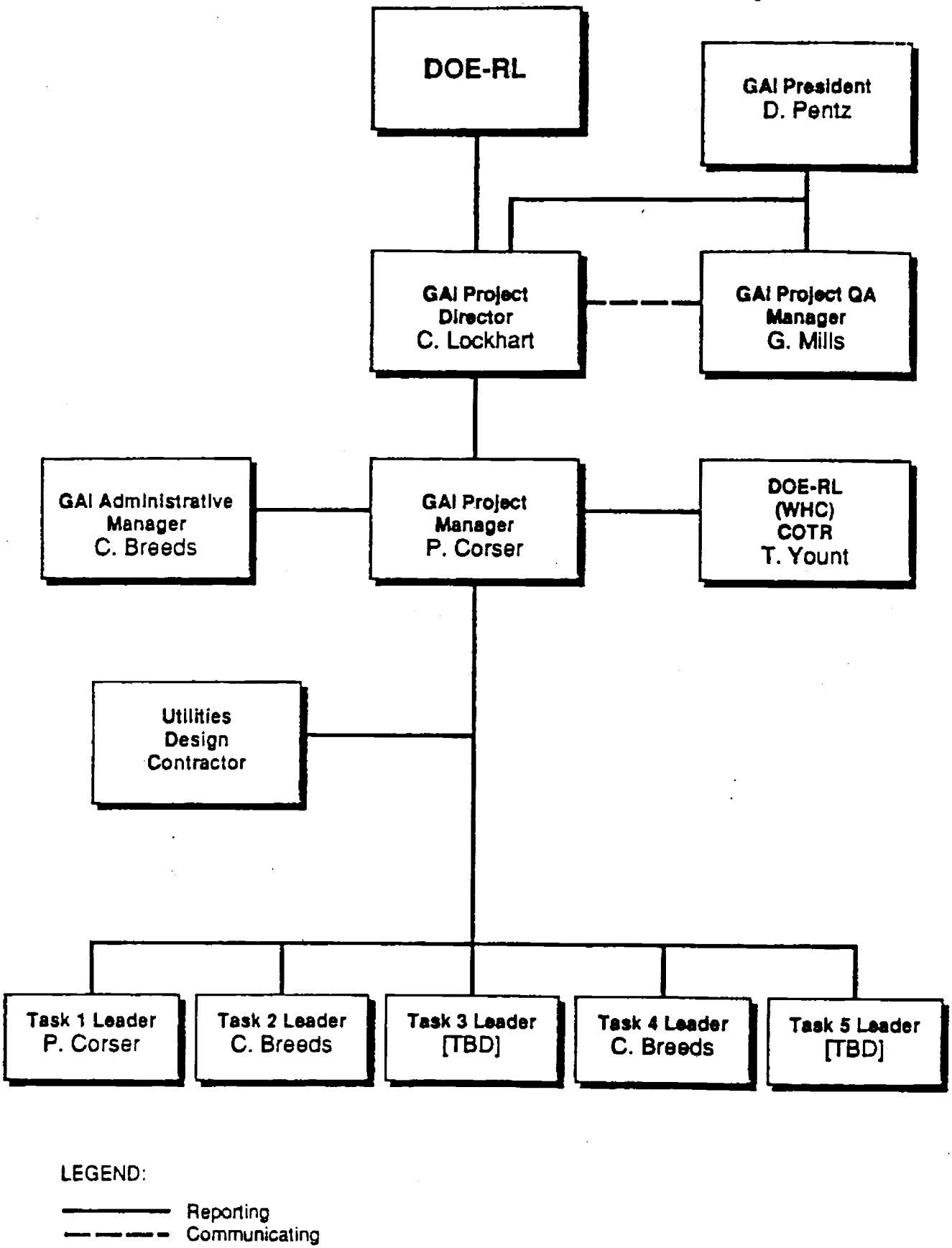

FIGURE 1-1
PROJECT ORGANIZATION
DOE-RL/NON DRAGOFF RWF PROJECT

PROJECT NO 883-1186 020 DWG. NO. 20255 DATE 10/17/89 DRAWN TK APPROVED GM

Golder Associates

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FIGURE 2-1

NOW DRAG-OFF RMW DISPOSAL FACILITY
QUALITY ASSURANCE PROGRAM REQUIREMENTS:
IMPLEMENTING PLAN SECTIONS AND PROCEDURES

Applicable 10CFR50 Appendix B Criteria	Applicable SO-W031-QAPP-001 Criteria	Title	NQA-1 Basic Requirements	NQA-1 Supplements	GAI QA Program Plan Sections	GAI Implem Procedures
I	1	Organization	BR-1	IS-1	1.0	
II	2	QA Program	BR-2	2S-1, 2S-3	2.0	P-2.0-1, I
III	3	Design Control	B-3	3S-1	3.0	P-3.0-2, I
IV	4	Procurement Document Control	BR-4	4S-1	4.0	P-4.0-1
V	5	Instructions, Procedures and Drawings	BR-5	--	5.0	P-5.0-1, I
VI	6	Document Control	BR-6	6S-1	6.0	P-3.0-2, I P-17.0-1
VII	7	Control of Purchased Material & Services	BR-7	7S-1	7.0	P-4.0-1, I
VIII	8	Identification and Control of Material, Parts and Components	BR-8	8S-1	8.0	P-3.0-2, I
X	10	Inspection	BR-10	10S-1	10.0	P-10.0-1,
XI	11	Test Control	BR-11	11S-1	11.0	P-3.0-2, (
XII	12	Control of Measuring and Test Equipment	BR-12	12S-1	12.0	P-12.0-1,
XIII	13	Handling, Storage and Shipping	BR-13	13S-1	13.0	-----
XIV	14	Inspection, Test and Operating Status	BR-14	14S-1	14.0	P-10.0-4,
XV	15	Nonconforming Items	BR-15	15S-1	15.0	P-15.0-1,
XVI	16	Corrective Action	BR-16	--	16.0	P-15.0-1,
XVII	17	Quality Assurance Records	BR-17	17S-1	17.0	P-17.0-1,
XVIII	18	Audits	BR-18	18S-1	18.0	P-18.01, P

FIGURE 2-2

PROJECT QUALITY ASSURANCE PROCEDURES

P-2.0-1,	"Training and Orientation"
P-3.0-2,	"Specific Work Instructions"
P-4.0-1,	"Procurement Document Control"
P-5.0-1	"Distribution and Control of Golder Associates Procedures"
P-6.0-1	"Engineering Drawing and Specification Control"
P-6.0-2	"Control of Correspondence and Communications"
P-10.0-1	"Technical Review"
P-10.0-3	"Surveillance Inspection"
P-10.0-4	"Receiving Inspection"
P-12.0-1	"Calibration and Maintenance of Measuring and Test Equipment"
P-15.0-1	"Control of Nonconformance Incident Reports, and Corrective Action."
P-17.0-1	"Quality Assurance Records Management"
P-18.0-1	"Audits"
P-18.0-2	"Auditor Qualifications"

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that they are acceptable in the context of the Technical Guidance Document (U.S. EPA, 1986). Specific requirements for CQAP format and content shall be considered in the preparation and review of the SWIs for its development; see Section 3.0 below.

2.3 Training and Qualification of Project Personnel

All project personnel shall be trained in the specific application of this QA Program Plan and its implementing procedures, to the extent appropriate for their work activities. Technical and QA staff training shall be conducted in compliance with procedure P-2.0-1, "Training and Orientation." Auditor/Lead Auditor training and qualification shall be in accordance with procedure P-18.0-2, "Auditor Qualifications." Training records shall be maintained in corporate QA files. Subcontractor training shall be performed to the extent required by individual SWIs and/or procurement documents. Personnel qualifications shall be documented by professional resumes and other verifiable credentials. Qualification and certification requirements for Construction Quality Assurance (CQA) inspectors and receiving inspectors for Task III activities shall be defined in the CQAP and shall be completed prior to initiating task activities.

2.4 Authority of QA Personnel

QA personnel assigned to this project shall have direct access to all levels of the technical organization of Golder or any of its subcontractors; they are specifically delegated the necessary organizational independence and authority to identify conditions adverse to quality, initiate corrective action processes, and otherwise ensure proper implementation of the QA program discussed in this plan. Such authority extends to the stopping of work, if required in response to serious quality problems or extreme situations.

2.5 Management Assessments

The QA Manager shall prepare an annual report to Golder management summarizing audit observations, findings, and any nonconformance activity resulting from inspections or surveillance. The report shall summarize corrective actions taken, and shall discuss any quality problem trends observed during the previous year. In addition to the QA Manager's report, an independent assessment of the effectiveness of the QA program prepared for this project shall be made at least annually by an upper management representative designated by the Office Manager. Both final reports shall include recommendations for any additional corrective action, and shall be submitted to the Office Manager and President, with copies to the Project Director and the Project QA Manager. Management assessment reports may address multiple projects with similar requirements.

3.0 DESIGN CONTROL

3.1 Task Management Process

The structure and technical content of deliverable plans, procedures, reports, drawings, laboratory analyses, or other work products shall be controlled by the application of appropriate QA procedures. All work on this project shall be initiated and controlled by means of SWIs issued in accordance with procedure P-3.0-2, "Specific Work Instructions." SWIs shall be prepared by the Project Director or Project Manager, and shall address all required technical activities. All SWIs require approval by the Project QA Manager or a qualified designee prior to issue.

3.2 Design Input and Analysis

Basic design input parameters, including reference specifications and conceptual drawings or sketches, shall be defined in SWIs to the designers in sufficient detail to provide a consistent baseline supporting design development, analysis, review, and evaluation of future design changes. All modifications to SWIs addressing design input or analysis shall document the source and rationale for the modifications, and shall be subject to the same review and approval cycles as the initial SWI as described in procedure P-3.0-2, "Specific Work Instructions." All design analyses shall be performed in compliance with governing SWI instructions, which shall specifically require a definition of the objective of the analysis, definition of design inputs and sources, literature search results or other background data, identification of any assumptions (indicating those which must be verified in the design process), and identification and full documentation of any computer program applications made as part of the analysis. All design analyses and supporting calculations shall be recorded on standard Golder engineering paper; shall be identified by subject, project number, and analyst's name; shall be checked and approved by the reviewer named in the governing SWI; and, when complete, shall be retained in the project quality records in compliance with Section 17.0 below.

3.3 Design Review Requirements

All design deliverables shall be reviewed and approved prior to submittal to the client in compliance with P-6.0-1, "Engineering Drawing and Specification Control" and/or P-10.0-1, "Technical Review", as appropriate for the type of deliverable. Identical review requirements apply to draft documents presented for client review and final documents incorporating client comments. Reviewer selection, documentation requirements, and other detailed requirements specific to engineering drawings and specifications are controlled by use of procedure P-10.0-1, as invoked by P-6.0-1; a detailed description of the main features of the technical review process embodied in P-10.0-1 is provided in Section 10.1 below. Any special conditions, client requirements, or other applicable quality requirements that may affect the performance of the review shall be identified on the SWI initiating the activity.

3.4 Design Change Requests

All change requests applicable to Golder drawings or specifications shall be documented and dispositioned as required by P-6.0-1, "Engineering Drawing and Specification Control." Change requests applicable to client drawings and specifications applicable during Task III shall be initiated using client engineering change request procedures as outlined in the CQAP. 2

4.0 PROCUREMENT DOCUMENT CONTROL

All project-related procurement documents shall be prepared, reviewed, and issued as required by procedure P-4.0-1, "Procurement Document Control." Justification for selection of suppliers or consultants shall be documented by memorandum and retained in the project quality records in compliance with Section 17.0 below. Subcontractors shall be required to work under the provisions of this QAPP to the extent appropriate for the service or item being procured. QA Program Plan provisions may be invoked directly, without modification, or, at the Project QA Manager's discretion, may be interpreted to suit the complexity of the procurement and/or the subcontractor's own QA program capabilities. Subcontractor QA requirements shall be included in procurement documents or in task-initiating SWIs as discussed in procedure P-3.0-2, "Specific Work Instructions."

5.0 INSTRUCTIONS, PROCEDURES, AND DRAWINGS

QA and technical requirements for all activities affecting quality shall be specified by means of SWIs, the QAPP, the CQAP, individual QA procedures, and/or technical procedures. Preparation, review, approval, distribution, and revision control of SWIs is addressed by P-3.0-1, "Specific Work Instructions"; similar controls applicable to the QA procedures listed in Figure 2-2 and any technical procedures that may be required by the CQA plan are controlled by procedure P-5.0-1, "Distribution and Control of Golder Associates Procedures." The work plan, the QAPP, and the CQAP shall be reviewed as noted in 10.1.1, and shall be approved by the Project Director, the Project Manager, and the Project QA Manager. They shall be subject to the distribution and revision controls described in Sections 8.4 and 8.5 of P-5.0-1. Preparation, review, approval, distribution, and revision control of engineering specifications and drawings shall be as specified by procedure P-6.0-1, "Engineering Drawing and Specification Control", with the exception that drawing format shall be in compliance with DOE-RL standards as specified by the client's COTR.

6.0 DOCUMENT CONTROL

Once client approval has been received, the work plan, this QAPP, the CQAP, and their implementing procedures shall be subject to the controlled distribution requirements contained in P-5.0-1, "Distribution and Control of Golder Associates Procedures." Controlled copies shall be distributed in accordance with procedure P-5.0-1 to designated client

representatives and to all Golder and subcontractor project personnel performing or supervising work. SWIs are subject to similar distribution control requirements as defined in P-3.0-2, "Specific Work Instructions." Copies of the current EPA and American Society for Testing and Materials (ASTM) methods applicable to Golder geotechnical laboratory testing shall be retained in the Golder Geotechnical library, available for laboratory use as required.

All project correspondence or meeting notes that 1) require Golder, Golder subcontractor, or DOE-RL action; 2) provide information necessary for performing the technical scope of work; or 3) modify or significantly affect the existing technical scope of work, shall be documented, distributed, and systematically filed in the project QA records in compliance with procedure P-6.0-2, "Control of Correspondence and Communications" and P-17.0-1, "Quality Assurance Records Management." All telephone contacts that in any way modify or affect the technical scope, budget, schedule, or contractual quality requirements shall be confirmed by letter correspondence. All letter correspondence to DOE-RL shall be reviewed and signed by the Project Director or Project Manager, and shall be retained as project QA records.

7.0 CONTROL OF PURCHASED MATERIAL, ITEMS, AND SERVICES

Golder procurement activities will be confined to those services, materials, items, and equipment that are required to support the technical responsibilities defined by the contract task descriptions. As part of its responsibilities under Task II, Golder will produce baseline engineering drawings and specifications. The client will assume responsibility under its own quality program for drawing and specification change control, updates, and translation into various procurement documents. Quality program controls applicable to Golder procurements are described below.

7.1 Subcontractor Evaluation

All subcontractors shall be evaluated prior to contract or purchase order award; with the single exception discussed in Section 1.2 above, selection shall be based on sole source justification, technical evaluation, QA program evaluation, and/or competitive bid as described in procedure P-4.0-1, "Procurement Document Control." Justification for selection of suppliers or consultants shall be documented by memorandum and retained in the project quality records in compliance with Section 17.0 below. All subcontractors shall be required to work under the provisions of this QAPP to the extent appropriate for the service or item being procured. Subcontractors shall comply with the specific QA requirements clauses included in their procurement documentation and/or accompanying SWIs.

7.2 Acceptance of Procured Services

If a subcontracted service results in a report, formal comments, analyses, or other work product, acceptance of the service will normally be by completion of at least a Phase 2 technical review in accordance with procedure P-10.0-1, "Technical Review", as described in Section 10.0 below. Additional levels of review may be required at the discretion of the

Project Manager. If appropriate for a particular task, subcontractors may be requested to perform an internal independent technical review in compliance with the specific QA requirements of the applicable procurement document and/or initiating SWI. If such an option is permitted, the subcontractor shall submit the completed document with all required review documentation for final review by the Project Manager prior to submittal to the client.

7.3 Acceptance of Procured Items

Acceptance of procured items shall be based on the requirements defined by procedure P-10.0-4, "Receiving Inspection."

8.0 IDENTIFICATION AND CONTROL OF MATERIAL, PARTS, AND COMPONENTS

Procured items shall be physically marked or tagged with the Golder purchase order number, purchase order item number, date of acceptance, and acceptance stamp as required by P-10.0-4, "Receiving Inspection." If field sampling activities by Golder or subcontractor personnel are required as part of a particular task, sample identification and any chain of custody control requirements shall be as defined by governing SWIs (and/or the CQAP if performed as part of Task III).

9.0 CONTROL OF PROCESSES

The structure and technical content of all deliverable plans, procedures, reports, drawings, or other work products is controlled through the application of the controls defined in this QAPP and the procedures referenced herein. The specific processes of construction monitoring and inspection required under Task III shall be as specified by the provisions of the CQAP and its implementing procedures, as noted in Section 2.2 above.

No special processes (i.e., processes requiring prequalification of equipment, personnel, and procedures) are anticipated for any task under the current contractual scope of work. Should requirements for the use of such processes arise, however, this QAPP and/or the CQAP shall be revised to include appropriate procedural controls, either as a project-specific plan appendix or as a separate procedure developed and approved in compliance with P-5.0-1, "Distribution and Control of Golder Associates Procedures."

10.0 INSPECTION

10.1 Technical Review

10.1.1 General Requirements

All deliverable plans, procedures, reports, drawings, comment responses, recommendations, or other work products produced as a contractual deliverable shall be subject to independent technical review in accordance with P-10.0-1, "Technical Review", by qualified individuals who have not been directly responsible for the preparation of the document being reviewed. Technical reviews are in-depth critical reviews that verify the accuracy of calculations, examine the applicability of references, and verify technical adequacy. All calculations shall be checked, dated, and initialled by both the preparer and the checker prior to presenting the resulting document for review. The Project Manager or designated Task Managers may specify the levels of review required in the SWIs initiating the activity, within the allowances of this Section and procedure P-10.0-1, but in all cases at least a Phase 2 review shall be performed. Reviewer assignments, any additional review instructions, and the required review level shall be identified in the SWI initiating the activity. Comments made as part of the review process are either mandatory or nonmandatory; all mandatory comments shall require formal documentation of comment resolution as required by the procedure.

10.1.2 Subcontractor Technical Review Requirements

Subcontractor authors may be required to participate in the technical review process as described in 10.1.1 above. Alternately, subcontractors may be requested to perform internal independent technical reviews, if appropriate for a particular task or activity as noted in 7.2 above. In the latter case, technical review requirements shall be based on interpretations or extractions of P-10.0-1 requirements, tailored for the specific needs of the task by the QA Manager as part of the procurement document/SWI review process. If such an option is permitted, the subcontractor shall submit the completed document with all required review documentation for final review by the Project Manager prior to submittal to DOE-RL. The Project Manager may request additional levels of review in compliance with P-10.0-1 requirements, or may document approval by the letter transmitting the document to the client.

10.2 Surveillance Inspection

Procedure P-10.0-3, "Surveillance Inspection", provides guidance for conducting surveillance inspections of field, office, and laboratory testing operations to verify compliance with governing plans and procedures; surveillance inspections may be requested at the discretion of the Project Director, Project Manager, Project QA Manager, or the client's COTR. The procedure assigns specific responsibilities for schedule development and inspection, and requires the resolution and corrective action of all observed nonconformances in accordance with procedure P-15.0-1, "Control of Nonconformances, Incident Reporting, and Corrective Action." Provisions are included in the procedure for issuing stop work orders if required.

10.3 Receiving Inspection

Receiving inspection in compliance with procedure P-10.0-4, "Receiving Inspection", shall be performed on all items procured for this project that are directly related to the quality of deliverable work products, testing, or field activities. Receiving inspection of liner materials shall also be performed on behalf of the client under Task III; specific inspection duties over and above P-10.0-4 requirements shall be enumerated in the CQAP. All receiving inspection shall be performed by inspectors designated and certified by the Project QA Manager and Project Manager. All designated inspectors shall receive formal training in the requirements of P-10.0-4 and the CQA, as appropriate, in compliance with P-2.0-1, "Training and Orientation."

11.0 TEST CONTROL

Acceptance test plans and procedures, the CQA developed for Task III activities, and/or other test plans and procedures required as part of particular task activities shall, as appropriate, require the incorporation of, or references to, detailed technical instructions for test performance. At a minimum, test plans or procedures shall consider the following items:

- Test prerequisites, such as instrumentation and calibration requirements, applicable design requirements, equipment precision and accuracy requirements, cautionary information regarding potential sources of error or inaccuracy, a total equipment list, test personnel qualification requirements, test schedule requirements, environmental considerations, and data collection or storage requirements;

- Definition of quantitative and qualitative completion or acceptance/rejection criteria;

- Definition of any DOE-RL (WHC) and/or Golder inspection, hold, witness, or surveillance points. At a minimum, in compliance with SD-W031-QAPP-001 requirements, the CQAP prepared under Task III shall include mandatory client witness points for bentonite installation, liner installation and welding, electrical system testing, nondestructive examination of piping welds, pressure testing of the leachate collection system, and acceptance testing; mandatory client surveillance points shall be established for asphalt pavement installation, heat trace testing, leachate collection system pipe welding, and leachate collection tank integrity testing;

- Methods for documenting or recording test data and results; and

- Methods for evaluating test data or test reports.

All geotechnical laboratory test procedures shall be in compliance with the latest edition of EPA or ASTM methods as invoked by SWI or CQAP requirements.

12.0 CONTROL OF MEASURING AND TEST EQUIPMENT

All measuring and test equipment owned or leased by Golder that is used in field or geotechnical laboratory investigations shall be controlled in compliance with procedure P-12.0-1, "Calibration and Maintenance of Measuring and Test Equipment", and the requirements of the CQAP or applicable SWIs.

13.0 HANDLING, STORAGE, AND SHIPPING

All handling, storage, and shipping requirements applicable to procured items shall be as defined in applicable procurement documents in compliance with P-4.0-1, "Procurement Document Control." Similar requirements applicable to measuring and test equipment shall be contained in individual equipment files as described in P-12.0-1, "Calibration and Maintenance of Measuring and Test Equipment." Any specific requirements for geotechnical laboratory custody controls and special handling and storage requirements shall be included in the SWIs initiating the activity.

14.0 INSPECTION, TEST, AND OPERATING STATUS

Items, materials, and references procured by Golder shall be accepted by receiving inspection and shall be marked or identified with acceptance tags as described in P-10.0-4, "Receiving Inspection." Rejected items will be tagged as described in procedure P-15.0-1, "Control of Nonconformances, Incident Reporting, and Corrective Action." Facility construction inspection and completion status reports under Task III shall be logged and documented as described in the CQAP; see Section 2.2 above. 2

15.0 NONCONFORMING ITEMS

Procedure P-15.0-1, "Control of Nonconformances, Incident Reporting, and Corrective Action", establishes a system for the identification and reporting of nonconformances related to the use of approved procedures, drawings, or specifications. It provides for identification of causes, disposition and implementation of corrective action measures that may be required to reduce or preclude future occurrences and will apply to all technical activities that are completely within Golder purview. Deficiencies and nonconformances may be observed as a result of receiving inspection or surveillance inspection activities as discussed in Section 10.0 above. For Task III, defects observed as a result of routine construction inspection shall be documented and distributed for immediate correction as required by the CQAP; client nonconformance reporting procedures shall be invoked when such defects are not corrected within the conditions and guidelines established by the CQAP. 2

16.0 CORRECTIVE ACTION

As discussed in Section 15.0 above, procedure P-15.0-1, "Control of Nonconformances, Incident Reporting, and Corrective Action", provides for the identification of causes, disposition and implementation of corrective action measures that may be required in order to reduce or preclude future nonconformances. Corrective action requirements related to audit findings or observations are addressed in procedure P-18.0-1, "Audits." Corrective action requirements related to defects observed during routine construction inspections shall be defined in the CQAP.

17.0 QUALITY ASSURANCE RECORDS

17.1 General Requirements

Project QA records shall be retained and managed as required by procedure P-17.0-1, "Quality Assurance Records Management." For the purposes of this project, the function of Record System Administrator shall be assumed by the Redmond Office Project Secretary. Duplicate records are required; storage facilities shall meet the duplicate storage requirements defined in the procedure. The project QA records file organization shall be defined in the form of a records index, and shall be prepared by the Redmond office Project Secretary with guidance from the Project Manager and Project QA Manager. The project file organization shall be organized to accommodate expansion. Additional sections and subheadings may be added as required due to increased activity or requirements for more specific detail in individual tasks. The records index shall be actively updated; corrections and additions may be made by hand, but shall be formally updated on at least a monthly basis. An updated copy of the index shall be routed to the Project QA Manager whenever it is formally updated. When specified by the client, "permanent" or "nonpermanent" records classification shall be noted on the records index and maintained on the index through records turnover.

17.2 Working Files

Working documents may be retained at the Golder project office, other Golder offices, or subcontractor facilities within the allowances of P-17.0-1. Working file organization is at the discretion of the activity, but must contain all SWIs, all procurement or contractual documentation, and any other documentation specifically required by the SWIs or procurement documents. Standard metal filing cabinets shall be used for temporary storage of working documents.

17.3 Records Turnovers

Records turnovers shall be performed at the direction of the client's COTR. The Project Manager shall inform the Project Secretary of any records turnover requirements. The Project Secretary shall update the project QA records index, remove the original records from storage, and place them in order in individual records boxes. Box indexes and labels shall be prepared, based on the updated index. The Project QA Manager or designee shall review the

completed turnover package, and, if acceptable, seal boxes pending turnover to the client. Shipping instructions shall be provided by the Project Manager.

18.0 AUDITS

One comprehensive internal audit shall be performed by Golder in the first quarter of project activity; additional audits may be performed at the request of the Project Director, Project Manager, Project QA Manager, or client's COTR. All audits shall be performed in accordance with procedure P-18.0-1, "Audits" by a Lead Auditor and audit team qualified in compliance with procedure P-18.0-2, "Auditor Qualifications."

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Golder Associates Inc.

Quality Assurance Procedure

Number: P-2.0-1
Title: TRAINING AND ORIENTATION

Prepared By:	Approved	Approved	Effective Date	Rev. Level
4-2-90	4/3/90		9/3/90	7

9 3 1 3 0 3 0 3 4

Record of Revision

Revision Level	Page Number	Section Number	Revision
7	1	4.0	deleted uncited references per latest revision of P-5.0-1

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1. PROCEDURE

The purpose of this procedure is to provide guidelines for conducting and documenting training and orientation of project personnel in the contents of the general requirements, plans, procedures, and instructions invoked to control or direct project quality.

2. APPLICABILITY

This procedure applies to all Golder Associates personnel performing or managing activities under project-specific Quality Assurance Program Plan (QAPP) requirements.

3. DEFINITIONS

None.

4. REFERENCES

4.1 Golder Associates Quality Assurance Procedure P-3.0-2, "Specific Work Instructions." 7

4.2 Golder Associates Quality Assurance Procedure P-5.0-1, "Distribution and Control of Golder Associates Procedures."

5. DISCUSSION

Training and orientation of project personnel is a shared responsibility of Project and QA management. Whenever this procedure is invoked by project-specific QAPP, QA personnel shall provide personnel newly assigned to the particular type of project a general orientation in the regulatory background and hierarchy of the plans and procedures selected to control project activities. QA personnel shall also provide specific training in the requirements of the applicable QAPP and referenced QA procedures that are applicable to the work that will be performed by the trainee(s). Technical direction is provided in the Specific Work Instructions (SWIs, see procedure P-3.0-2, "Specific Work Instructions") prepared for each task; additional detailed training in the requirements of SWIs and in any Technical Procedures shall be provided by the Manager. In all cases, training methods, levels, and documentation requirements shall be suitable to the scope and complexity of the technical objectives of the project or task, and shall accommodate variations in individual trainees' education, experience, and level of previous training.

6. RESPONSIBILITIES

6.1 QA Manager (or designee)

The QA Manager is responsible for providing a general orientation in the regulatory background and hierarchy of project-controlling plans and procedures; for training of all project staff in the proper use and application of QA procedures and project-specific QAPPs; for selecting training methods appropriate for the complexity of the plan or procedure, the type of personnel assignment, previous training and experience, client requirements, and other factors; and, for reviewing training session records prior to routing to QA and project files.

6.2 Project Manager (or designed Task Leader)

The Project Manager is responsible for providing technical direction to project staff through the use of SWIs; for providing additional training in technical requirements when required by task complexity; for providing training in the individual technical procedures invoked by SWIs or the QAPP; for selecting technical training methods appropriate for the complexity of the task or technical procedure, the type of personnel assignment, previous training and experience, client requirements, and other factors; for forwarding all technical training memoranda, meeting notes, or records to the QA Manager for review; and, for notifying the QA Manager of any changes or additions to project staff or their functional assignments.

7. MATERIALS

7.1 Controlled Document Transmittal/Reading Training Memorandum (Exhibit A)

7.2 Personnel Training Record forms (Exhibit B)

8. PROCEDURE

8.1 Orientation

Orientation sessions shall be held by the QA Manager or designated QA personnel when the Project Manager advises that technical personnel have been newly hired, or have been assigned to a particular type of project for the first time.

As a general guideline, orientation sessions should address Golder's corporate quality policy, background regulatory information, applicable regulations and standards likely to be encountered by the employee, the general responsibilities of project personnel for implementing QA program requirements in their work, a general discussion of the role of QAPPs and their implementing QA and technical procedures, and a general discussion of proper recordkeeping practices. Orientation sessions should be documented using training record forms as discussed in 8.4.3 below.

8.2 QA Training

QA training activities shall be initiated whenever new or revised QA procedures or plans are issued, whenever SWIs invoking QA plan or procedure requirements are issued to untrained personnel, whenever requested by a Project Manager, or whenever deemed necessary by the QA Manager. Methods, content, and documentation shall be in accordance with the requirements and guidelines of Section 8.4 below.

8.3 Technical Training

Technical procedure training shall be initiated whenever new or revised technical procedures are issued, whenever SWIs invoking technical procedure requirements are issued to untrained personnel, or whenever requested by the Project Manager. Methods, content, and documentation shall be in accordance with the requirements and guidelines of Section 8.4 below.

Additional technical training shall be performed whenever (at the discretion or request of the Project Manager or designed Task Leader) the complexity of a work assignment requires additional detailed instruction to emphasize, clarify, or elaborate upon the requirements of the SWI. Training sessions shall be held as discussed in 8.4.3 below.

8.4 Training Methods

The following training methods shall be used singly or in combination based on: the complexity of plans, procedures, or instructions and their relationship to project quality; the type of personnel assignment; previous training and experience of the trainee or trainees; specific client requirements as expressed in the QAPP; and other factors. General guidelines for methods selection are provided for each type.

8.4.1 Reading Training

Project personnel shall be required to read and acknowledge their understanding of all formally distributed QAPPs, QA procedures, technical procedures, or project-specific activity plans. Since all such documents will be under controlled distribution in accordance with requirements or procedure P-5.0-1, "Distribution and Control of Golder Associates Procedures", documentation of completion of reading training is provided by signature on the Controlled Document Transmittal/Reading Training Memorandum (see Exhibit A).

Reading training generally may stand alone as a training method when recipients have been under controlled distribution for previous versions, when revisions are minor, when the recipient has participated in the development or revision of the procedure, or when procedure usage by the recipient is likely to be minimal.

8.4.2 Training Memoranda

Explanatory memoranda should generally be issued with distributed documents when procedures or plans are newly issued, or when personnel have not been trained in previous versions, or when major revisions have been made, or when deemed necessary by the QA Manager or Project Manager due to interpretation problems in actual use. Such memoranda should summarize the major points of the procedure or plan with emphasis on any new requirements or changes. Acknowledgement of understanding of the requirements of individual procedures and training memoranda shall be documented by signature on the transmittal/training memo (Exhibit A). Copies of the memorandum and the signed memo shall be retained in corporate QA files and project files when appropriate.

8.4.3 Training Session

Training sessions should generally be held when QAPP or procedure changes are major in nature, when they result from significant nonconformances or audit findings or observations, or whenever additional training relative to SWI requirements has been deemed necessary by project management. Training sessions should be documented on a Personnel Training Record (see Exhibit B) or by a memorandum to file supplying the same information.

8.5 Subcontractor or Consultant Training

Unless otherwise directed by the Project Manager and QA Manager, subcontractor or consultant training shall be provided by detailed instructions appended to their work packages, or, if appropriate, by controlled distribution of appropriate plans and procedures. In such cases, subcontractor or consultant understanding and acceptance of such plans and procedures shall be documented by signature on the transmittal/training memo (Exhibit A). Copies of the signed memo and any accompanying memoranda shall be retained in corporate QA and project files.

TO: Otterson, Joey DATE: 03/27/90

FR: GLENN MILLS LOCATION: Seattle

RE: CONTROLLED DOCUMENT TRANSMITTAL / READING TRAINING MEMORANDUM

_____ ACKNOWLEDGEMENT OF RECEIPT AND TRAINING

Attached is your controlled copy of the referenced document(s). Read each document and destroy any previous revisions in your possession. Please sign below acknowledging receipt and completion of reading training. If you have any questions, contact Glenn Mills at (206) 883-0777.

_____ ACKNOWLEDGEMENT OF RECEIPT

Attached is your controlled copy of the referenced document(s). Please sign below acknowledging receipt. If you have any questions, contact Glenn Mills at (206) 883-0777.

Signature _____ Date _____

DOCUMENT	REVISION LEVEL
TP-1.2-3	0

cc: Corporate QA personnel files
Project file

Return signed transmittals to:

GOLDER ASSOCIATES INC.
QUALITY ASSURANCE GROUP
4104 148TH AVE. N.E.
REDMOND, WA 98052

Golder Associates, Inc.

PERSONNEL TRAINING RECORD

Training Session Date:_____ Trainer:_____

Reference Requirements, Procedures, Plans or Instructions:_____

_____

_____

Attendees:

Name (print)	Signature	Name (print)	Signature
Name (print)	Signature	Name (print)	Signature
Name (print)	Signature	Name (print)	Signature
Name (print)	Signature	Name (print)	Signature
Name (print)	Signature	Name (print)	Signature

Summary:_____

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_____

Reviewed by:_____ Date:_____

cc: QA files
Project file _____
Job/Task No.

9 3 1 3 3 3 0 1 1

9 3 1 3 1 0 3 0 9 1 2

Golder Associates Inc.

Quality Assurance Procedure

Number: P-3.0-2
Title: SPECIFIC WORK INSTRUCTIONS

Prepared By:	Approved	Approved	Effective Date	Rev. Level
[illegible] 4-2-90	[illegible] 4/3/90	[illegible]	4/3/90	6

9 3 1 3 7 3 1 0 1 3

RECORD OF REVISIONS

Revision Level	Page No.	Section No.	Revision
6	1	4.0	deleted uncited references per latest revision P-5.0-1
	2	6.4	minor editorial correction
	3	8.1	deleted requirement for work start date
	5	8.6	minor editorial correction

9 3 1 3 1 3 3 0 1 4

1. PURPOSE

This procedure provides methods for documenting and initiating work using Specific Work Instructions (SWIs).

2. APPLICABILITY

SWIs shall be prepared under the requirements of this procedure for:

- All work associated with the production of contract deliverables.
- Letters or other communications that contain data, evaluations, results of analyses, recommendations, or other information which will be used in site characterization, design, testing, or performance assessment activities.
- Provision of formal comments to the client.
- Initiation or procurement activities, including renegotiation of consulting agreements. (Note: Project Managers may issue Purchase Orders directly, without preparing SWIs.)
- Initiation of field activities.
- Any other situation requiring, at the Project Manager's discretion, a documented means of assigning work.

3. DEFINITIONS

3.1 Specific Work Instructions (SWI)

SWIs are controlled documents that describe the scope of work or activities to be performed, and provide specific direction to the extent necessary to achieve the desired results. SWIs serve as the basic authorization to perform work and shall be issued to all assigned field, laboratory, and office personnel prior to the commencement of work. Requirements for the use of specific procedures or specifications are included; due dates and time charging instructions may also be provided when appropriate.

4. REFERENCES

None.

6

5. DISCUSSION

SWIs provide the means for ensuring that personnel performing work are assigned appropriate project and task numbers; that appropriately detailed guidance for performing the work is provided; that special requirements or considerations affecting the performance of the work are identified; and, that internal and subcontractor interfaces are identified where necessary.

6. RESPONSIBILITIES

6.1 Project Manager

The Project Manager (or designee) is responsible for the initiation and approval of SWIs for applicable project activities.

6.2 QA Manager

The QA Manager (or designee) is responsible for reviewing and approving SWIs to ensure compliance with client requirements, and to ensure that applicable procedures and documentation for the control of quality-related activities have been incorporated.

6.3 Project Secretary

The Project Secretary is responsible for issuing a control number for each SWI, keeping a current SWI log, filing the SWI in the project QA records, and distributing the SWI as required by this procedure.

6.4 Technical Staff

Individuals issued SWIs are responsible for completing assigned tasks in accordance with the guidelines provided. SWIs shall be retained in the individual's work area; superseded revisions of SWIs shall be discarded or marked "Superseded." Questions regarding SWI interpretation shall be addressed to the Project Manager or QA Manager as appropriate. 6

7. MATERIALS

SWI Forms (See Exhibit A)

8. PROCEDURE

8.1 Preparation

SWIs may be typed or handwritten, using the form shown in Exhibit A. The Project Manager or designated preparer shall fill in all applicable portions except for the control number and file number. The required information for each blank is listed below, keyed to the numbers in the blanks in Exhibit A.

1. **Project:** Enter the client and project name.

2. **Date:** Enter the distribution date.

3. **Revision:** Enter the revision number.

4. **Author:** Enter Originator's name.

5. **To:** Enter the name of the individual(s) assigned work.

6. **Subject:** Enter the title of the applicable task, if appropriate.

7. **Job Number:** Enter the Golder Associates job and task number that the work shall be charged to.

8. **Scope or Work:** Briefly state the general scope of activities or purpose of the work assignment.

9. **Specific Instructions:** Provide detailed instructions for completing the task; include references to technical procedures to be used, equipment requirements, references to be investigated, or similar details. Provide attachments as required. If known, include the manhours allotted for the activity and the required completion date. 6

10. **Reporting Requirements:** Describe type of report required, if appropriate, and provide the name of the individual who should receive the report.

11. **Subcontract Interface:** Provide the name of subcontractor contacts as appropriate.

12. **Special Handling Requirements:** Enter shipping requirements, temperature requirements, special process requirements, special sample processing or special routing or mailing requirements for reports.

13. **Applicable Specifications and Procedures:** Enter any QA procedures, technical procedures, or other applicable work-controlling documents.

8.2 Control Number System and Log

SWIs shall be controlled through the use of unique numbers and revision levels. The Project Secretary shall assign a control number to the SWI in sequential order based on the previously assigned number and enter the number where designated by Block 14 of Exhibit A. A log shall be maintained for all issued SWIs that identifies the number, revision, originator, recipient(s), and subject. A copy of the first page of each SWI shall be retained in a master reference file attached to the log.

8.3 File Number

The Project Secretary shall assign the file location for the SWI as required by the current project QA records index. The number shall be entered where designated by Block 15 of Exhibit A.

8.4 Approval

Completed SWIs shall be forwarded to the QA Manager and Project Manager for review and approval. The QA Manager shall review the SWI to assure compliance with client requirements and to ensure that references to applicable procedures and documents have been incorporated. The Project Manager shall review the SWI for compliance with project needs, content, and completeness of the instructions. Minor corrections of SWI text prior to approval may be made by hand, provided that the change is initialed and dated by the reviewer. The QA Manager and Project Manager shall indicate approval by signing and dating the SWI.

8.5 Distribution

The Project Secretary shall forward copies of approved SWIs to all of the individuals named in Block 5 of Exhibit A, the QA Manager or Coordinator and the Project Manager. The original SWI shall be retained in the Project QA records files.

8.6 SWI Revisions

Whenever an SWI is revised, the revised version shall go through the same approval process as the original. Revisions may be marked on the original SWI by drawing a single line through the old information, adding the changes, and identifying each change by a small delta enclosing the revision number. If revisions are marked on the original, approval of each change must be indicated by initials and date. As an alternative, a separate revised SWI may be prepared. The original document (unless marked up as the revision,) and the corresponding entry on the SWI log shall both be marked as superseded to prevent inadvertent use of outdated documents. 6

P-3.0-2

SWI

SPECIFIC WORK INSTRUCTIONS **No.:** 14.

Project: 1.

Date: 2. **Revision:** 3. **Author:** 4.

To: 5.

cc: QA Coordinator **File No.:** 15.

Subject: 6. **WBS No. or Job No.:** 7.

Scope of Work: 8.

Specific Instructions: 9.

Reporting Requirements: 10.

Subcontract Interface: 11.

Special Handling Requirements: 12.

Applicable Specs. and Procedures: 13.

QA Approval/Date: _____ Project Manager Approval/Date: _____

Golder Associates

9 3 1 3 1 2 3 1 0 0 0

Golder Associates Inc.

Quality Assurance Procedure

Number: P-4.0-1
Title: PROCUREMENT DOCUMENT CONTROL

Prepared By:	Approved	Approved	Effective Date	Rev. Level
M.J. Ollgaard 2/2/90	2/2/90	for CW Lockhart 2/2/90	2/2/90	10

RECORD OF REVISIONS

P-4.0-1

Revision Level	Page Number	Section Number	Revision Description
10	1	3.3	clarified review requirement
	3	6.4	deleted section; mandatory President review not required
	5, 6	8.4	expanded discussion of inspection requirements, clarified
	6	8.5	add reference to inspection plans

1. PURPOSE

The purpose of this procedure is to control the procurement of all items, materials, and services and to ensure the quality of such procurements when they have a direct effect on project work.

2. APPLICABILITY

This procedure applies to two general categories of procurements:
1) support-related procurements, which are routine and have no direct influence on project work, and 2) project-related procurements, which do have a relationship or effect on the quality of work. Although applicable to both categories, most of the requirements of this procedure address the project-related category, which may include consulting services, subcontractor services, laboratory services, equipment, materials, or other items.

3. DEFINITIONS

3.1 Procurement Document

A procurement document is a written contract that identifies and/or defines the terms, conditions, technical requirements, and quality requirements which items or services must meet in order to be considered acceptable by the purchaser. A procurement document may be in the format of a consulting agreement, subcontract, or Purchase Order(PO).

3.2 "Project-Related" Procurement Document

A project-related procurement document is directly related to the quality of the end item or work product, requiring in-depth review by QA and project personnel to ensure that all applicable requirements are properly identified to the supplier or consultant. As defined above, the procurement document may be in the form of a consulting agreement, subcontract, or PO.

3.3 Support-Related Procurement Document

A support-related procurement document, usually a PO, has no direct relationship to project quality. As an example, POs for drafting or duplicating services are considered to be support-related. QA reviews are not required.

3.4 Requests for Quotation (RFQs)

A Request for Quotation (RFQ) is a document provided to a prospective supplier or consultant containing all the intended provisions of a procurement document, and is subject to the same approval cycles. Changes resulting from a prospective supplier's bid response must be incorporated into the procurement document and be subjected to review and approval prior to issue.

3.5 Source Selection

Source selection is the process by which potential suppliers of services or equipment are identified, evaluated and selected. Project-related procurements must receive sole source, technical, or QA evaluations prior to selection. Support-related services do not require such evaluation.

3.6 Sole Source

Sole source selection is one option in the source selection process; it involves selection of a supplier or contractor based on the uniqueness or recognized reputability of the item or service offered without a formal evaluation of alternative sources. Sole-source selections for project-related procurements require documentation of the justification.

4. REFERENCES

4.1 Golder Associates QA Procedure P-3.0-2, "Specific Work Instructions"

5. DISCUSSION

This procedure provides a uniform method of assuring that all applicable requirements have been met on procurement documents. The level of control required depends on whether or not the procurement has a direct relationship to project quality. The procedure defines the differences between project-related and support-related procurements, describes the required content of project-related procurement documents, defines the review process that ensures inclusion of Quality Assurance (QA) requirements, and provides the methods to be used for controlling procurement document changes.

6. RESPONSIBILITIES

6.1 Project Manager

The Project Manager is responsible for 1) initiating the procurement process, either by direct preparation or by issuing Specific Work Instructions (SWI's, see procedure P-3.0-2), 2) coordinating the preparation and approval of documents between the Contracts Administrator and the QA Manager, and 3) providing the technical specifications for the RFQ or procurement document. The Project Manager is also responsible for ensuring that all required legal and contractual requirements are incorporated into any RFQ for subcontracted services or materials, subcontracts or consulting agreements that result from RFQs, and all extensions or modifications of subcontracts or consulting agreements. If another individual is delegated responsibility for performing any part of the procurement process, the Project Manager shall document the request by means of an SWI.

6.2 QA Manager

The QA Manager reviews procurement-initiating SWIs, RFQs, and any subsequent changes (with the exception of the purely administrative changes noted in 8.4) to ensure that all customer quality requirements are met and to add subcontractor quality requirements appropriate for the procurement.

6.3 Office Manager

The Office Manager or designated Administrative Manager reviews and authorizes all procurement documents (consulting agreements, subcontracts, POs and their extensions or revisions).

7. REQUIRED MATERIALS

None

8. PROCEDURE

Figure 8-1 is a matrix that relates responsibilities and methods for each type of procurement document to each stage of the development of the procurement documentation. The following sections correspond to the developmental stages of the procurement as they are listed in the Figure.

8.1 Initiation

Consulting agreements or subcontracts (and requirements for RFQ preparation if competitive bid techniques are used), as well as project-related or support-related POs, may be initiated directly by the Project Manager or may be delegated by SWI.

8.2 Definition of Requirements

The requirements for project-related procurements shall be generally defined by the initiating SWI or, when requested, by the detailed RFQ. Procurement requirements shall be explicitly included in the documentation, and shall follow the guidelines of section 8.4 below as appropriate. Additional requirements may be added as part of the QA review process described in 8.5 below.

8.3 Source Evaluation and Selection

8.3.1 Evaluation and Selection Methods:

Suppliers, consultants, and subcontractors shall be evaluated and selected by methods appropriate for the category of the procurement and its scope or complexity. It is the responsibility of the Project Manager to determine whether the services are support or project-related. The Project Manager shall select the evaluation method most appropriate for the procurement, consistent with client requirements. In general, project-related procurements will use one or more of these techniques, while support-related procurements will use only the sole source, technical evaluation, or competitive bid techniques. Available methods are as follows:

- Sole Source: Sole source selection may be based on the technical recognition of a supplier's particular expertise and reputation. The Project Manager shall document sole source justification for all project-related procurements and route copies to project and QA files.

- **Technical Evaluation:** Potential contractors or vendors may be selected based on a review of their technical qualifications; a trial purchase may be issued at the Project Manager's option. Acceptable performance may result in a technical recommendation approving the supplier for future use. Documentation of technical evaluations and/or acceptable performance on a trial purchase order shall be routed to the project files and QA files if appropriate for the type of procurement.

- **QA Evaluation:** When requested by the Project Manager, the QA Manager may make evaluations by review of supplier's quality program or procedures or by on-site survey of a supplier's technical and quality capabilities. Copies of the QA evaluation or survey report shall be routed to the project and QA files.

- **Competitive Bid:** Selections made by issuing RFQs and evaluating competitive proposals must be carefully coordinated to ensure that all legal, contractual, and QA requirements are properly included in the RFQ. Results of the evaluation process and reviews of bidder qualifications shall be routed to project and QA files.

8.4 Preparation of Procurement Documentation

Consulting Agreements, Subcontracts, and project- or support-related POs shall be directly prepared by the Project Manager or as delegated by SWI. All procurement documents shall provide the following types of information as appropriate for the item or service procured.

- **Scope of Work:** The document shall provide a statement of the scope of the work to be performed by the supplier, consultant, or subcontractor.

- **Contractual Requirements or Addenda:** All necessary contract documents shall be included in the procurement package. Such documents may include standard terms and conditions, or representations and certifications of the knowledge and acceptance of various federal, state, or local statutes and regulations.

- **Technical Requirements:** All necessary technical requirements, such as compliance with design drawings, design specifications, procedures, codes, traceability requirements, or regulatory requirements shall be defined. Controlled copies of drawings and specifications shall be transmitted with the procurement documents wherever required.

- **QA Requirements:** All project-related procurement documents shall contain a clause requiring the supplier to provide unhampered access to his facilities for the purposes of source inspection, surveillance inspection, or audit. Inspection requirements or other quality requirements appropriate for the item or service shall be included by other appropriate quality clauses or by reference to

separately prepared inspection plans; the level of detail required in such clauses shall be commensurate with the type of procurement, supplier quality capabilities, quality history, and other factors.

- **Documentation Requirements**: The procurement document shall specify any documentation or reporting requirements applicable to the supplier, consultant, or subcontractor. Documentation requirements may be expressed by individual quality clauses or in the body of the procurement document, and shall define required due dates, retention times, and disposition upon completion of the contract.

- **Nonconformances**: When appropriate for the type of procurement, definition of and requirements for reporting of nonconformances shall be included in a specific clause.

- **Spare and Replacement Parts**: When complex equipment is procured, the procurement document shall require the suppler to identify appropriate spare and replacement parts and define any appropriate calibration, retesting, or other activity required for ordering, servicing or repair of the equipment.

8.5 Review and Approval

All procurement documents shall be reviewed by the Project Manager to ensure the inclusion of provisions that will ensure that the items or services to be provided will meet all Golder and client requirements. Project-related procurement documents also require the review and approval of the QA Manager in order to ensure that all required quality provisions are included. If warranted by the complexity of the procurement, inspection plans shall be prepared that identify the specific characteristics to be inspected and the inspection method required. Plans shall be prepared in checklist format, shall be sequentially numbered and identified to the Golder job and task number, and shall be reviewed and approved by the QA Manager prior to use. Inspection plans shall not be provided to the supplier or subcontractor, shall be identified by number in the body of the procurement document, and shall be forwarded to the project QA records when complete. See procedure P-10.0-4, "Receiving Inspection" for additional details on inspection plan use.

Objective evidence of review and approval shall be provided by the Project Manager and QA Manager's signatures on the procurement document.

8.6 Authorization and Final Approval

All procurement documents require authorization by the Office Manager or designated Administrative Manager prior to issue.

8.7 Change Control

All changes made as a result of an RFQ response or precontract negotiations shall be incorporated into the final procurement document prior to issue; the changes shall be evaluated in terms of effect on the original technical, quality, and other requirements. Modifications to design or procedures shall be evaluated, and technical and QA requirements shall be modified as necessary prior to issue. All subsequent changes shall be subject to the same review and approval cycle as used in the preparation of the original documents, with the exception that any revisions made purely for administrative or budgetary reasons shall not require QA review.

8.8 Records Requirements

Procurement-related records shall be retained to the extent appropriate for each procurement type. Project records should contain the following types of documentation:

- Final-approved procurement documents, with all revisions and attachments
- Initiating SWIs
- RFQs and competitive bid responses
- Competitive bid evaluation information
- Sole source justification (if performed)
- Technical justification (if performed)
- QA evaluation (if performed)

Corporate QA files shall contain copies of all QA evaluations, by supplier or consultant.

FIGURE 8-1

Procurement Activity	Responsibilities and Method	
	Consulting Agreement	Project-Related PO
Initiation	PM or as authorized by SWI	PM initiates, or delegates via SWI
Definition of Requirements	RFQ or SWI specification by PM or as authorized by SWI	By PM - initiated SWI or PO attachment
Source Selection	Sole source or technical evaluation by PM; or by QA evaluation; and/or by competitive bid	Sole source or technical evaluation by PM; or by QA evaluation; and/or by competitive bid
Preparation of Procurement Documentation	PM or as authorized by SWI	PM or as authorized by SWI
Review and Approval	PM and QA	PM and QA
Authorization or Final Approval	OM or designee	OM or designee
Changes	Same requirements except admin changes are exempt from QA review	Same requirements except admin changes are exempt from QA review

Golder Associates Inc.

Quality Assurance Procedure

Number: P-5.0-1
Title: DISTRIBUTION AND CONTROL OF GOLDER ASSOCIATES PROCEDURES

Prepared By:	Approved	Approved	Effective Date	Rev. Level
[illegible] 4-2-90	[illegible] 4/3/90	[illegible]	4/3/90	9

9 3 1 3 1 2 3 3 0 0 3 3

RECORD OF REVISIONS

Revision Level	Page No.	Section No.	Revision
9	1	4.0	deleted uncited reference
	2	6.2, 6.3	revised reviewers to include all senior technical staff
	2	6.5	clarified
	3	8.1.2	revised reference requirement to cited only
	5	8.2.4	edited for clarity
	5	8.3.1	revised reviewers to include all senior technical staff
	6	8.5	clarified extended minimum review time for TPs to two years
	Exhibit A		simplified

1. PURPOSE

This procedure establishes uniform numerical designation and format for technical and Quality Assurance (QA) procedures. Provisions are also made for the control of procedure distribution and revision.

2. APPLICABILITY

The procedures and format described herein are applicable to all Golder Associates Inc. technical and QA procedures.

3. DEFINITIONS

3.1 Technical Procedure

A technical procedure is a document that specifies or describes in detail how a technical activity is to be performed. Technical procedures include methods to be employed, equipment or materials to be used, and a planned sequence of operations. Technical procedures are designed to either provide or require a test data sheet, test log, or other work completion records that will provide objective evidence that work was performed in compliance with approved instructions and with appropriate quantitative or qualitative acceptance criteria. To the extent possible, technical procedures shall be written in such a manner as to permit their use on any project. Unique project requirements may be provided for by a project-specific addenda to standard procedures.

3.2 Procedure

A procedure is a document that outlines detailed activities required for implementation of a quality assurance program.

4. REFERENCES

None. 9

5. DISCUSSION

Technical and QA procedures shall be prepared, identified, distributed and controlled by the methods and format described in this procedure. Revisions of all procedures require the same level of review and approval as the original documents. The author originating a technical or QA procedure is responsible for soliciting internal review comments from all individuals with major project responsibilities that may be affected by its provisions. The author is responsible for resolving comments and obtaining all required approvals.

6. RESPONSIBILITY

6.1 Authors

Authors of procedures are responsible for obtaining informal reviews from technical or QA staff as appropriate, and for routing procedures through the final review process. Authors are also responsible for resolving all comments resulting from the final review process and for forwarding reviewer comments to the corporate QA files.

6.2 QA Manager

The QA Manager is responsible for reviewing and approving all technical and QA procedures, revisions, and addenda for compliance with requirements prior to submittal to appropriate senior technical staff or the Office Manager for final approval. The QA Manager is also responsible for systematic controlled distribution of all technical and QA procedures and their revisions. 9

6.3 Senior Technical Staff

Senior staff with experience appropriate for the discipline involved shall participate in the final review and approval of technical procedures, procedure revisions, or addenda which may be necessary for compliance with specific client requirements. 9

6.4 Office Manager

The Office Manager is responsible for performing final review and approval of all QA procedures and revisions.

6.5 Users

Users of procedures are responsible for maintaining controlled copies of technical and/or QA procedures and returning them when requested. Users are also responsible for understanding and implementing the provisions of the distributed procedures, and for participating in training sessions or completing procedure training reading assignments for new and updated procedures. 9

7. EQUIPMENT OR MATERIALS

None.

8. PROCEDURE

8.1 Preparation of Technical and QA Procedures

8.1.1 The author of the procedure shall determine which groups or individuals may be affected by the procedure and shall obtain informal comments prior to presenting a final draft for review.

8.1.2 Technical and QA Procedures shall be prepared in accordance with the following guidelines:

- Purpose: Briefly describe the specific purpose of the procedure.
- Applicability: Identify the work activities and/or groups to which the procedure applies.
- Definitions: Define words and phrases having special meaning within the procedure.
- References: List all cited reference documents, such as other related Golder Associates Technical or QA procedures, applicable regulatory guidelines, codes, or standards. 9
- Discussion: Include a brief, general explanation of the use of the procedure.
- Responsibility: Identify the organizational positions and responsibilities of the individuals charged with the implementation of the procedure.
- Equipment or materials: Identify any equipment, materials, or special forms necessary to support the activity described.

- Procedure: Describe the specific step-by-step procedure or instructions to be followed. When appropriate, provide a flow chart as an exhibit to enhance user understanding.

The content of the procedure shall contain all information necessary for proper implementation. Such information might include information, data sources, computer programs to be used, specific QA hold points, documentation requirements, and acceptance, rejection, and/or completion criteria.

Each of the subject headings listed above should be developed to the extent appropriate for the procedure. If no detailed discussion is required, "none" shall be placed under the heading.

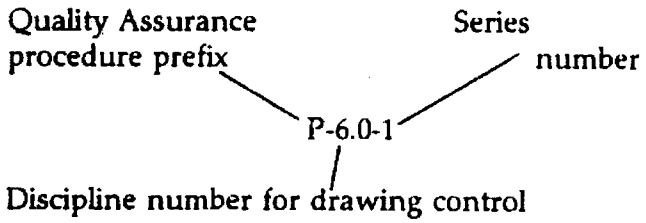
8.2 Identification

8.2.1 New technical and QA procedures shall be dated and assigned unique letter-number designators by the QA Manager.

8.2.2 The complete letter-number designator for a QA procedure shall include the following:

- The letter "P"
- The applicable Basic QA Requirement number as identified by the QA Manager or applicable quality policy directives.
- A secondary series number.

As an example, the first QA procedure for document or drawing control would be as follows:



The first revision of this procedure would be indicated parenthetically as P-6.0-1 (Rev. 1).

8.2.3 The letter-number designator for a technical procedure shall include the following:

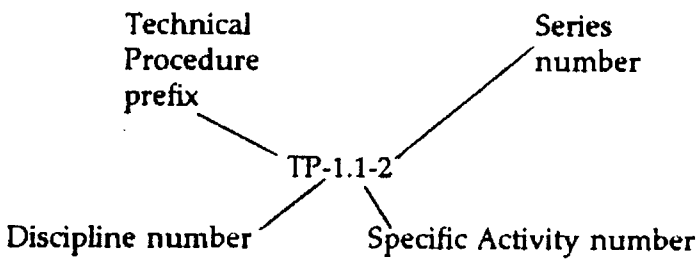
- The letters "TP"
- The discipline number (per 8.2.4)
- A secondary series number

8.2.4 The following discipline numbers are established for identification of Technical Procedures.

Discipline Description	Number
Administration and Records	0.0
Field Investigations	1.0
Special Studies	2.0
Laboratory Testing	3.0
(Reserved)	4.0
Data Gathering	5.0
Preparation of Maps or Specialized Graphics	6.0
Geologic Analysis	7.0

9

Specific activities for each discipline shall be numbered consecutively as technical procedures are written. For example, the second Technical Procedure written for surveying activities supporting field investigations would be as follows: 9



The first revision of the technical procedure would be noted as TP-1.1-2, Rev. 1.

8.2.5 The QA Manager shall assign unique identification numbers and shall maintain a periodically updated log of all issued procedures.

8.3 Review and Approval

8.3.1 Technical Procedures Review and Approval: The author of a technical procedure shall obtain at least one informal review for technical content by appropriate personnel prior to initiation of the formal review cycle. The author shall then route the procedure to the QA Manager and an appropriate senior technical staff member for review and approval. Subsequent comments shall be resolved by the author to the reviewers' satisfaction. A cover sheet indicating the current revision level shall be routed with the final draft for approval signatures. All review comments made during final review shall be retained in the Corporate QA files and shall be identified to the individual reviewer. 9

8.3.2 QA Procedure Review and Approval: The author of a QA procedure shall obtain at least one informal review by an appropriate individual prior to initiation of the formal review cycle. The author shall then route the procedure to the QA Manager and the Office Manager for review and approval. Subsequent comments shall be resolved to the reviewers' satisfaction. A cover sheet indicating the current revision level shall be routed with the final draft for approval signatures. All review comments made during final review shall be retained in the Corporate QA files and shall be identified to the individual reviewer.

8.3.3 Client Approval Considerations: The QA Manager shall determine when client approval of new procedures or changes is required. When client approval is required, the QA Manager shall make the necessary submittals and coordinate resolution of any client comments.

8.4 Distribution

Distribution of all procedures shall be controlled, with the exception of procedures that are issued for information purposes only. The QA Manager shall determine whether a procedure is to be controlled or issued for information only prior to distribution. The QA Manager shall supervise distribution of copies of all Technical and QA Procedures to all affected individuals and departments, and shall supervise external distribution to field offices, subcontractors, consultants, or clients. Each controlled procedure shall be distributed with a transmittal/training memo (see the example in Exhibit A) indicating which procedure and revision level was issued. The individual receiving the procedure shall follow the instructions of the checked requirements, sign the memo, and return it to the QA Manager for filing in Corporate QA personnel files. QA and technical procedures shall be distributed to personnel prior to the initiation of work. Task Leaders or Project Managers shall provide definition of procedure distribution needs when required. All recipients of procedures shall return them to the QA Manager upon termination of employment or upon request if there is no longer a requirement for use.

8.5 Revisions

8.5.1 General Requirements: All QA procedures currently distributed for project use shall be reviewed on at least an annual basis. The QA Manager is responsible for coordinating the review of QA and technical procedures. All or portions of any required revision may be delegated by the individual responsible for review. Revised procedures shall be reviewed in the same manner as the previous version per the requirements of paragraph 8.3. Reviewers shall assess changes that may be required by the latest editions of applicable national standards, regulatory guides, codes or other regulations. Technical procedures shall be reviewed at least biennially. Reviewers shall evaluate suggested changes that may have accumulated during the previous year, and incorporate if appropriate. 9

9 3 1 3 0 3 0 7 0

8.5.2 Revision Level Identification: Each page of a revised procedure shall contain the page number, date, and the most current revision number. The revised sentence or paragraph of each page of a revised document shall be indicated with a vertical line in the right hand margin. Revisions shall be numbered and the revision history documented on the title page of each document. A controlled copy shall be transmitted to each individual or organization on controlled distribution as described in paragraph 8.4.2. Records of all previous versions of procedures shall be maintained in the Corporate QA files. All recipients of a revised procedure shall immediately remove the obsolete procedure from their personal procedures notebook and destroy it or return it to the QA Manager with the signed document distribution and reading training memorandum.

8.6 Master Procedure Index

A master procedure index shall be maintained under the supervision of the QA Manager. The index shall include all active procedures by number and title and the current revision of each. The index shall be updated with each status change (i.e., updating procedure revisions, adding newly approved procedures, or removing procedures determined to be obsolete), and shall include the index issue date. The index may be updated by hand on an interim basis, but shall be formally updated at least quarterly. A copy of each issue shall be forwarded to the QA Manager.

TO: Otterson, Joey DATE: 03/27/90

FR: GLENN MILLS LOCATION: Seattle

RE: CONTROLLED DOCUMENT TRANSMITTAL / READING TRAINING MEMORANDUM

_____ ACKNOWLEDGEMENT OF RECEIPT AND TRAINING

Attached is your controlled copy of the referenced document(s). Read each document and destroy any previous revisions in your possession. Please sign below acknowledging receipt and completion of reading training. If you have any questions, contact Glenn Mills at (206) 883-0777.

_____ ACKNOWLEDGEMENT OF RECEIPT

Attached is your controlled copy of the referenced document(s). Please sign below acknowledging receipt. If you have any questions, contact Glenn Mills at (206) 883-0777.

Signature _____ Date _____

DOCUMENT	REVISION LEVEL
TP-1.2-3	0

EXAMPLE

9 3 1 3 0 3 0 7 2

cc: Corporate QA personnel files
Project file

_____

_____

Return signed transmittals to:

GOLDER ASSOCIATES INC.
QUALITY ASSURANCE GROUP
4104 148TH AVE. N.E.
REDMOND, WA 98052

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Golder Associates Inc.

Quality Assurance Procedure

Number: P-6.0-1
Title: ENGINEERING DRAWING AND SPECIFICATION CONTROL

Prepared By:	Approved	Approved	Effective Date	Rev. Level
MJ Otteson for 2/2/96	2/2/96	C.W. LOCKHART 2/2/96	2/2/96	3

9313130074

RECORD OF REVISIONS

P-6.0-1

Revision Level 3

Page Number	Section	Revision
7	8.7	Added 8.7.1, revised to clarify document storage considerations.

9 3 1 3 3 0 7 5

1. PURPOSE

This procedure describes the standard format, review and approval process, and distribution control methods for Golder Associates Inc., engineering drawings and specifications.

2. APPLICABILITY

This procedure applies to the preparation and control of engineering drawings prepared by both computer-aided and manual drafting techniques, and to engineering specifications.

3. DEFINITIONS

3.1 Engineering Drawing

An engineering drawing is a detailed graphic representation that defines the physical and operational design of a facility, structure, system, or component. An engineering drawing is governed by the requirements of this procedure when one or more of the following criteria are met:

- manufacturing details, views, dimensions, tolerances, or parts lists are provided
- three-dimensional, orthographic, or other representations that provide dimensions or direct instructions, that will be used to control assembly or interfaces with other systems, structures, or components
- the representation is subject to detailed design changes due to changing interface requirements with other systems, structures, or components

Engineering drawing criteria are not intended to apply to geologic maps, conceptual representations, planning documents, textual presentations, or sketches within test plans or test procedures. Review and approval of maps is controlled by procedure P-10.0-2, "Technical Review of Maps". Other representations are reviewed and approved within the context of their parent documents as required by QA procedure P-10.0-1, "Technical Review."

3.2 Engineering Specification

An engineering specification is a controlled document defining the complete design requirements of a system, system element, component, or equipment item. The engineering specification contains all detailed design information as well as technical information required for procurement including requirements for supplier acceptance testing and documentation. It may also contain information relative to handling and storage, shelf life, installation, pre-installation checkout testing, and routine maintenance.

3.3 Computer Aided Design (CAD) System

A computer aided design system is a computer system dedicated to the design and production of detailed graphic presentations, including engineering drawings.

3.4 Drawing/Specification Change Request (DSCR)

A drawing/specification change request is a standard form used to provide the details of a drawing or specification change. The DSCR must be reviewed and approved by the Project Manager, the QA Manager, and designer prior to release. DSCR's are uniquely numbered and, when incorporated, will be referenced in the revision change block on the drawing or first page of the engineering specification.

3.5 Drawing/Specification Transmittal

A drawing/specification transmittal is a standard form issued by the Document Custodian to transmit and confirm receipt of drawings, specifications, or DSCRs.

4. REFERENCES

4.1 Golder Associates QA Procedure P-3.0-2, "Specific Work Instructions"

4.2 Golder Associates QA Procedure P-10.0-1, "Technical Review"

4.3 Golder Associates QA Procedure P-10.0-2, "Technical Review of Maps

4.4 ANSI Y-14.1, "Drawing Sheet Size and Format"

5. DISCUSSION

Golder Associates' engineering drawings and specifications are produced in a standard format that identifies the revision level and approval for each revision, revision history, and project applicability. Once a drawing or specification is formally approved, it is a controlled document and all subsequent changes must be initiated by a Drawing/Specification Change Request (DSCR). Each drawing/specification revision and DSCR must be approved prior to issue. Upon approval, a DSCR is considered part of the controlled drawing/specification to which it applies and work must be performed in accordance with the change.

6. RESPONSIBILITIES

6.1 Project Manager or Designee

The Project Manager (or Designee) is responsible for issuing SWIs which initiate drawing/specification preparation and review activities and for review and approval of drawings/ specifications and changes thereto.

6.2 Designer

The Designer is responsible for developing drawings/specifications based on SWI request, resolving and incorporating review comments, and initiating or approving DSCRs.

6.3 Illustrator

The illustrator is the CAD or drafting technician who is responsible for translating conceptual drawings, design, or other information to reproducible master drawings in the general format indicated herein. The illustrator is also responsible for incorporation of all changes as required by approved DSCR's.

6.4 Document Custodian

The Document Custodian is responsible for maintenance of the drawing/specification issue and control system, issuing Drawing/Specification Transmittals and maintaining controlled storage of the latest approved version of the master drawing and, for drawings prepared using the Computer-Aided Design (CAD) system, magnetic disk or tapes.

6.5 Quality Assurance Manager (or Designee)

The Quality Assurance Manager is responsible for reviewing and approving drawings/specifications and DSCRs.

7. EQUIPMENT OR MATERIALS

None.

8. PROCEDURE

8.1 Preparation and Approval of Master Drawings

The Project Manager initiates the production of a drawing by issuing a Specific Work Instruction (SWI) in accordance with P-3.0-2. The SWI shall assign responsibility for the design, as well as the review and approval of the drawing.

Attachment A is a graphic representation of the drawing preparation, review and approval cycle described below.

8.1.1 Drawing Preparation

Based on SWI request, the drawing designer shall provide conceptual drawings, sketches, or other instructions to the illustrator for the production of preliminary drawings. Drawing content shall meet the requirements identified on the initiating SWI. Level of detail shall be commensurate with the intended use of the drawing. Information such as dimensions, tolerances, parts lists, installation sequences, and other completion or acceptance criteria shall be included as appropriate. When the preliminary drawing is developed to the satisfaction of the designer, it shall be marked "Preliminary Draft", and at the discretion of the designer, circulated for informal comments. Informal comments need not be resolved and may be

incorporated at the designer's discretion. When a draft has been prepared to the satisfaction of the designer, the illustrator and designer shall sign it in the space provided. This draft is considered the review draft.

8.1.2 Review and Approval of Drawings

The draft shall be issued for review as designated on the SWI. Copies for review shall be marked "Review Draft". All reviews shall be conducted in accordance with QA procedure P-10.0-1, Technical Review. As a minimum, a review by the Project Manager and QA Manager (or their designees) is required. The Project Manager may assign additional reviewers based on the complexity of the drawing, system interface requirements, or other concerns. Comments shall be documented on a Review Comment Form (RCF) and marked directly on the review draft by the reviewer. The review draft and RCF shall then be returned to the designer for resolution and comment incorporation. When all review activities are completed, the master drawing shall be routed to the reviewers for approval signatures. If Client approval is required by contract, it shall be obtained after all Golder approval signatures have been applied to the drawing. All SWIs, review drafts and associated RCFs shall be routed to the project files.

8.1.3 Drawing Format

Drawing format and sizes shall be in general accordance with ANSI Y14.1 guidelines, with zone designators and title and revision block layout typically as shown in Attachment B. All drawings shall carry Golder Associates job numbers, Work Breakdown Structure (WBS) numbers if provided by the client, and a project-unique drawing number assigned by the Project Manager. Revision levels shall be uniquely identified by sequential number or letter designations. Revision history shall be incorporated into the drawing in the revision block shown in zone D1/D2 of the example shown in Attachment "B".

8.2 Preparation and Approval of Master Engineering Specifications

The Project Manager initiates the production of a specification by issuing a SWI. The SWI shall assign preparation, as well as review and approval responsibilities.

Attachment C is a graphic representation of the specification preparation and review cycle described below.

8.2.1 Specification Preparation

Based on the scope of the SWI, the designer shall develop a preliminary draft document. Specification content shall meet the requirements identified on the initiating SWI. Level of detail shall be commensurate with the intended use of the specification. Information such as: supplier qualifications; procurement requirements; equipment testing, handling, and storage details; installation and maintenance requirements; and acceptance or completion criteria shall be included as appropriate. The document shall be marked "preliminary draft" and, at the discretion of the designer, shall be circulated for informal comments. Informal comments need not be resolved and may be incorporated at the discretion of the designer. When the specification has been prepared to the satisfaction of the designer, he shall sign the cover sheet in the space provided. This draft of the specification is considered the review draft.

8.2.2 Review and Approval of Specifications

The draft shall be issued for review as designated on the SWI. Copies issued for review shall be marked "Review Draft". All reviews shall be conducted in accordance with QA procedure P-10.0-1, Technical Review. As a minimum, review by the Project Manager and the QA Manager is required. However, the Project Manager may assign additional reviews based on the complexity of the specification, or other concerns. Comments shall be documented on an RCF and marked directly on the review draft by the reviewer. The review draft and the RCF shall then be returned to the designer for resolution and incorporation of comments. When all review activities are complete, the master specification shall be routed to the reviewers for approval signatures. If Client approval is required by contract, it shall be obtained after all Golder approval signatures have been applied to the specification. All SWIs, review drafts and associated RCFs shall be routed to the project files.

8.2.3 Specification Format

The specification cover sheet shall contain, as a minimum, the Golder Associates job number and a project unique specification number assigned by the Project Manager. It shall also contain the revision level, identified by sequential letter or number designators, revision history and approval signatures.

8.3 Drawing/Specification Change Requests

All drawing and specification changes shall be initiated by a Drawing/ Specification Change Request form (DSCR, see Attachment D). Change requests must contain a complete and clear description of the change, in the form of a sketch if appropriate. A DSCR may be initiated by the designer or other project personnel. Each request must be approved by the same groups or individuals who approved the drawing or specification being changed. If the

DSCR was not initiated by the designer, the designer's signature is also required. After the DSCR is approved, it is considered part of the controlled drawing, and work must be performed in accordance with the change.

8.4 Drawing/Specification Revisions

Drawing/specification revisions are the result of approved DSCRs. Drawings/ specifications shall be revised exactly as described on the DSCRs. All incorporated DSCRs shall be noted in the revision block. Changed areas in the drawing/specification shall be marked by a small delta enclosing the new revision level designator. The revised master shall be reviewed and approved in accordance with sections 8.1.2 and 8.2.2 above, by the same groups or individuals who approved the previous revision.

8.5 Issue and Control Requirements

Engineering drawings, specifications and DSCRs are controlled documents and copies shall be marked as such when issued. Unauthorized copies of controlled documents are not permitted. "Information only" copies may be requested through the Document Custodian. An active distribution control system shall be maintained by the Document Custodian to assure that each document holder is issued the appropriate DSCRs and revisions. Base drawings/specifications are issued to personnel as directed by the Project Manager. When revisions or DSCRs occur, the Document Custodian shall issue them to document holders via a Document/Specification Transmittal form (see Attachment E). Document holders shall sign for receipt of the documents and return the Transmittal to the Document Custodian. Superseded drawings, specifications, and DSCRs shall be destroyed or returned to the Document Custodian, with one exception: superseded documents with handwritten working information may be retained only if plainly marked "Superseded - For Information Only".

8.6 Procurement Considerations

All engineering drawings or specifications issued to suppliers or subcontractors shall be controlled as indicated in 8.5. Documents that are included in bid packages are not controlled and will be marked "Information Only." These documents will be upgraded to controlled documents only if a procurement follows bid activity.

8.7 Document Storage

8.7.1 Work in Process

The designer and illustrator are responsible for storage and safekeeping of all work in process. During non-working hours, all work in process shall be protected from damage and tampering; computer disks containing work in process shall be stored in a fire-resistant file room.

8.7.2 Drawing/Specification History File

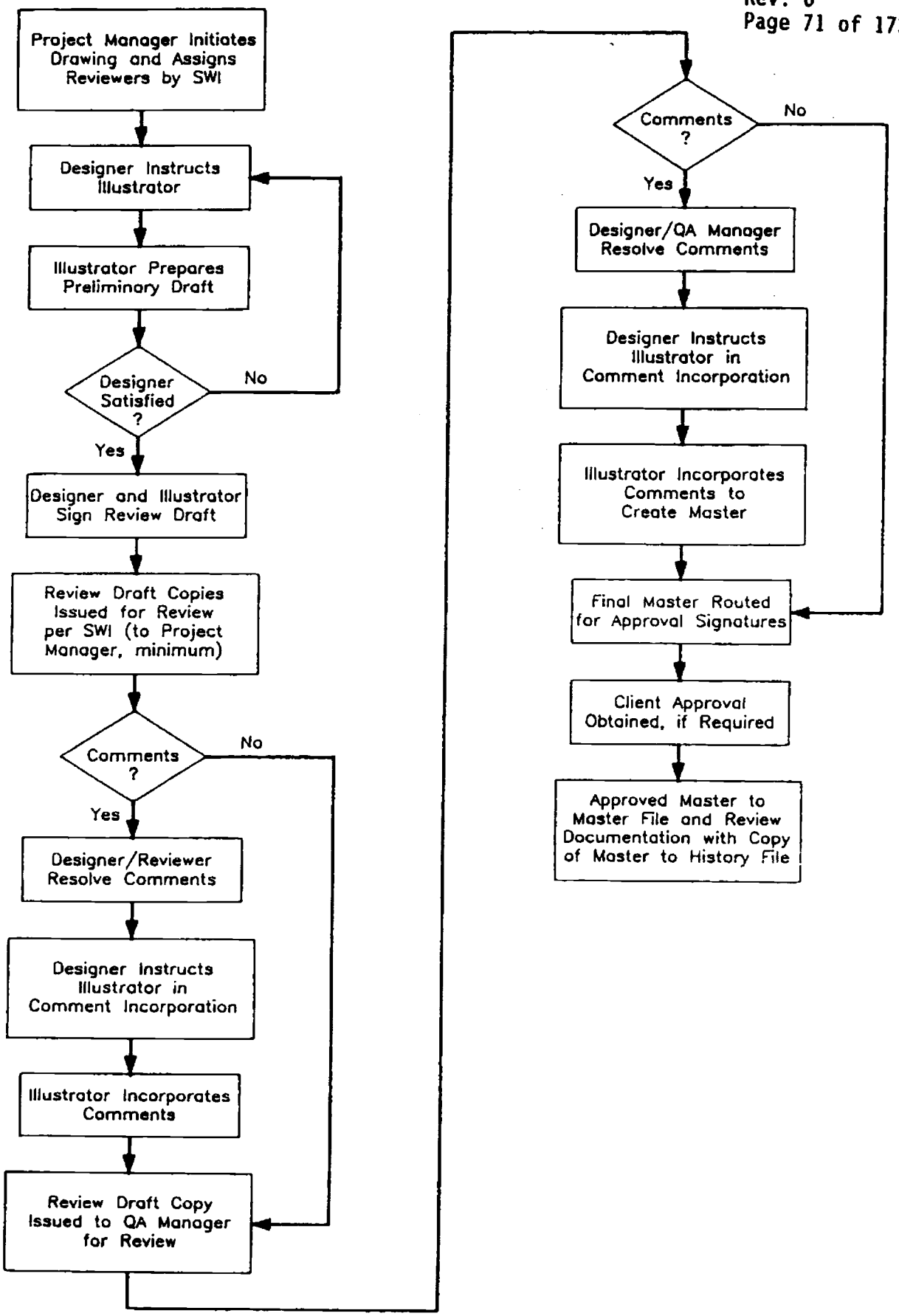
A Drawing/Specification History File shall be established for completed documents within the Project QA Records files. All review documentation shall be stored in the History File, along with a copy of the approved drawing/specification marked "File Copy - For Information Only". A copy of each subsequent DSCR shall also be marked as a file copy and added to the History File. When a DSCR is incorporated, the original shall be marked "incorporated" and filed with the documentation for the drawing/specification into which it was incorporated.

8.7.3 Master File

Approved masters, associated magnetic media, if applicable, and outstanding DSCRs shall be stored under the direct control of the Document Custodian in a Master File. The Master File is an active file which shall contain only current drawings/specifications and DSCRs. The Master File shall be the basis for all controlled drawing/specification distribution, and shall be located in an access-controlled fire-resistant file room.

8.8 Master Drawing/Specification List

8.8.1 A master drawing list and a master specification list shall be maintained by the Document Custodian. The lists may be issued on a project-specific basis, or may be all inclusive, but shall include all approved drawings/specifications by number and title, the current revision of each, and the date of drawing or specification approval. The list shall be updated with each status change, (i.e., updating drawing or specification revisions, adding newly approved drawings or specifications, or removing drawings or specifications determined to be obsolete), and shall include the list issue date. Master lists may be updated by hand on an interim basis, but shall be formally updated at least quarterly. A copy of each issue shall be forwarded to the appropriate Project Manager.



LOGIC CHART FOR DRAWING PREPARATION AND APPROVAL

QA PROCEDURE

JOB NO. 993-1024 DWG. NO.5649 DRAWN SL APPROVED GM

Golder Associates

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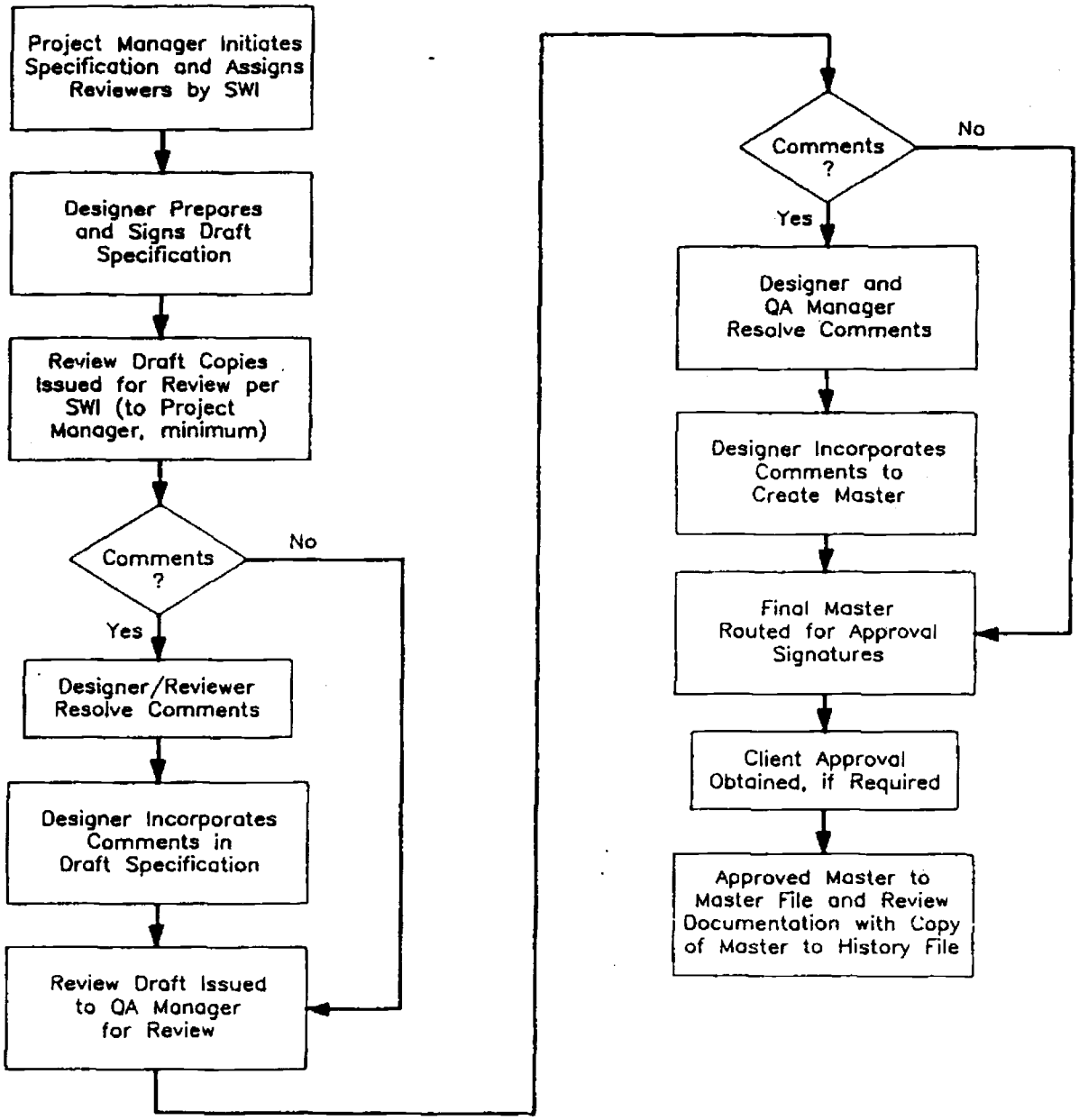

LOGIC CHART FOR SPECIFICATION PREPARATION AND APPROVAL

QA PROCEDURE

JOB NO. 993-1024 DWG. NO.5650 DRAWN SL APPROVED GM

Golder Associates

DRAWING/SPECIFICATION CHANGE REQUEST DSCR

Page 1 of _____ No.: _____

Drawing/Spec. No.: _____ Revision: _____

Project/Task No.: _____

Requested by: _____

Description of Change:

EXAMPLE

Approved by:

Project Manager: _____ Date: _____

QA Manager: _____ Date: _____

Designer: _____ Date: _____

Other: _____ Date: _____

Comments: _____

9 3 1 3 1 2 3 0 0 1 7

P-6.0-1 Attachment E

DRAWING/SPECIFICATION TRANSMITTAL

DISTRIBUTED TO: _____ DATE: _____

PROJECT NUMBER: _____

Document Number	Revision	Previous Revision: (Check one) Destroyed	Returned

ACKNOWLEDGED BY HOLDER: (SIGNATURE) _____ DATE: _____

Return to:

9 3 1 7 1 2 3 0 0 3 8

Golder Associates Inc.

Quality Assurance Procedure

Number: P-6.0-2
Title: DOCUMENTATION AND CONTROL OF CORRESPONDENCE AND COMMUNICATIONS

Prepared By:	Approved	Approved	Effective Date	Rev. Level
4-3-90	4/3/90		4-3-90	4

9 3 1 3 0 2 3 1 0 9 0

RECORD OF REVISION
P-6.0-2
REVISION 4

Page	Section	Revision
1	4	deleted uncited reference
Throughout		editorial

9 3 1 3 1 2 3 0 9 1

1. PURPOSE

This procedure defines the methods for documenting and controlling all incoming, outgoing and internal correspondence and communications, including the documentation of project-related meetings and telephone conversations.

2. APPLICABILITY

This procedure applies to all project-related incoming and outgoing corresponding or communications. It also applies to all meetings or telecons that may affect project activities in any of the following ways:

- GAI, client, or subcontractor action or response is required.,
- information necessary to the management or the conduct of project activities is transmitted, or
- the scope of project activities is modified

3. DEFINITIONS

None.

4. REFERENCES

None. 4

5. DISCUSSION

All project-related incoming, outgoing, and internal communications and correspondence shall be appropriately documented, distributed, and filed. This requirement applies to all formal communications, such as letters and transmittals, and the documentation of informal communications (such as meeting notes), notes from telephone conversations, and electronic mail (telex or telefax). In all cases the information shall be routed through the appropriate Project Secretary for proper handling, logging, distribution, and filing in the project QA records. All correspondence and records of communications become a part of the project QA records under the controls provided by this procedure.

6. RESPONSIBILITY

6.1 Project Secretary

The Project Secretary is responsible for issuing control numbers for all incoming and outgoing correspondence and communications, logging the communication, copying, and distributing the documents to required individuals and the correspondence project QA files.

6.2 Technical Staff

All technical staff are responsible for documenting project-affecting telephones calls and meetings, and for routing all incoming, outgoing, and internal project correspondence and communications to the Project Secretary for proper handling, and distribution.

7. EQUIPMENT OR MATERIALS

None.

8. PROCEDURE

8.1 Documentation of Telephone Calls and Meetings

All project-affecting telephone calls or informal meetings (as defined in 2.0) shall be documented on a Golder Associates Telecon/Contact Memorandum form (see Exhibit A) or memo to file. The originator shall designate the desired distribution and forward the document to the appropriate Project Secretary for logging, copying, and distribution to all required individuals and the project QA records.'

8.2 Routing of Correspondence/Telecons/Meeting Notes

All incoming and outgoing correspondence affecting a project (as defined in 2.0) shall be routed as soon as possible through the appropriate Project Secretary for logging, copying, and distribution to all required individuals and the project QA records. Internal correspondence shall also be routed through the secretary for copying and distribution as appropriate.

8.3 Assignment of Control Numbers and Filing

Unless otherwise directed in individual project QA programs plans, incoming or outgoing letters, telecopier messages, transmittals or project-affecting telecons shall be assigned a unique code number by the Project Secretary. The numbering system shall begin with a project-unique letter designator, as determined by the Project Secretary, followed by sequentially assigned numeric digits. An "I" for incoming and an "O" for outing may also be used to assist with correspondence identification.

8.3.1 The assigned number shall be recorded on the first page of the communication and in the appropriate (incoming or outgoing) communication log. The Project Secretary shall maintain the appropriate logs and sequence of numbers for each type of communication defined in 8.3.2. Several types of communications may be combined in a single log, as long as the retrievability of the information is assured. The logs shall be clearly labeled as to type, and shall be maintained by the Project Secretary.

8.3.2 Files shall be maintained for all of the following types of incoming and outgoing project-related correspondence and communications:

- Letters
- Telecopier/Telex messages
- Telephone Conversations/Informal Meeting Notes (Telecon/Contact memos)
- Transmittals

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Golder Associates

TELECON/ CONTACT MEMORANDUM

☐ Personal Visit
☐ Telephone: ☐ Incoming ☐ Outgoing

ROUTE TO:
Files
☐ Project
☐ Business Development
☐ Mailing List

Company Name: _____
Address: _____
_____
Person: _____
Telephone: _____
Job/subject: _____

Job No. _____
Date: _____
Time: _____

Remarks: _____

Action/Next Contact: _____

BY: _____

9 3 1 3 0 3 1 0 9 5

9 3 1 3 0 2 3 0 9 6

Golder Associates
CONSULTING GEOTECHNICAL AND MINING ENGINEERS

TITLE			EFFECTIVE DATE	REV. LEVEL
P-10.0-1 TECHNICAL REVIEW				
PREPARED BY	APPROVED	APPROVED		10
6-29-89	6/29/89	6/29/89	6/30/89	

9 3 1 3 1 2 3 0 0 9 7

RECORD OF REVISIONS

Revision	Page	Section	Description of Change
10		Throughout	Editorial changes
10	1	2.0	Revised to be specifically applicable to technical documents and to exclude administrative documents
10	1	3.2	Revised to address the scope of technical review
10	1	3.3	Clarified Project Manager's role
10	2	3.6	Clarified documentation requirements for nonmandatory comments
10	5 7 8	(5) (5) (6)	Allowed use of original for word processing with provisions
10	6 7	(8) (8)	Provided for an annotated QA review draft if necessary
10	6 7	(9) (9)	Provided for QA acceptance of comment resolution
10	7	(9)	Provided for PM concurrence of comment resolution
10	9	8.3	Revised review draft identifier requirements
10		Figure 8-1 Figure 8-2	Revised to reflect QA involvement in comment resolution

9 3 1 3 0 2 3 1 0 9 8

1.0 PURPOSE

This procedure establishes the requirements for formal evaluation of the technical and quality related aspects of written documents presented to the client as research products or contract deliverables.

2.0 APPLICABILITY

This procedure is applicable to all Golder Associates reports, test procedures, plans, or other technical documents that are produced as contract deliverables. The procedure may also be invoked for other types of documents when specifically requested by management. Typical documents requiring technical review include: project-specific scoping documents, test procedures, and plans; formal review comments to client or subcontractor documents; formal responses to client or client-directed reviews of Golder Associates documents; project management plans; project-specific QA program plans; letter reports; or any document that contains data, evaluations, recommendations, or process descriptions which may be used in design, testing, site characterization, site selection, performance assessment, or licensing support activities. Administrative documents do not typically require technical review. 10

3.0 DEFINITIONS

3.1 Author: The individual or individuals responsible for the original writing of the document being reviewed.

3.2 Independent Technical Review: A documented, in-depth critical review of a document to verify calculations, examine the applicability and technical adequacy of references and source documents, assure the use of documented literature search procedures when required, examine the validity of the technical approach, assure the completeness and accuracy of data, and ensure conformance with applicable client requirements, Specific Work Instruction (SWI) requirements and regulatory guidelines. A technical review may also emphasize the evaluation of judgments, conclusions, and recommendations made in final documents, especially in areas that are beyond the existing state of the art, or where technical criteria may be in the process of development or may not exist. The scope of a technical review may be focused on specific issues or areas of a document as directed by the Project Manager by means of SWI. 10

3.3 Independent Technical Reviewer: In an independent technical review, the individual assigned the responsibility for checking, reviewing, or otherwise verifying that document content is correct and accurate. Reviewers are designated by the Project Manager by means of SWIs. Although the Independent Technical Reviewers have qualifications similar to those of authors, they have no direct responsibilities for the production of the document being reviewed.

When only a Phase 2 review is performed on a document, the Project Manager assumes the role of Independent Technical Reviewer. 10

3.4 Project Review Board: A senior group of reviewers consisting of the Project Sponsor, a senior technical reviewer designated by the Project Manager and the QA Manager; responsible for conducting Phase 3 technical reviews on certain classes of final documents after incorporation of all draft level comments. Board membership is defined by the SWI that initiates the review activity.

3.5 Mandatory Comment: A comment in an independent technical review that identifies an area in a document that, in the opinion of the reviewer or reviewers, requires a significant change in order to achieve acceptability. Formal resolution of all mandatory comments is required in accordance with the guidelines of this procedure.

3.6 Nonmandatory Comment: A comment made in an independent technical review that corrects punctuation or offers improvements in understanding or corrections of syntax, but does not affect the technical content of the reviewed document. Nonmandatory comments may be documented on the Review Comment Form (if comment discussion is necessary to understanding), or by marking the reviewed text of the document, or both. Nonmandatory comments are to be incorporated at the discretion of the author or authors of the document. 10
Documentation of comment resolution and acceptance is not required for nonmandatory comments.

3.8 Review Comment Form (RCF): A multipurpose form (Attachment A to this procedure) used for documenting independent technical review activity. When grouped with the associated review and resolution drafts of a document and approved by QA, the RCF provides traceability of all formal mandatory review comments and the comment resolution process.

3.9 Review Draft: The document presented by the author or authors for independent technical review.

3.10 Resolution Draft: The updated text of the reviewed document with all changes incorporated as a result of the comment resolution process within a single review cycle. Resolution drafts may become the review drafts that undergo additional reviews; as an example, in independent technical review, the resolution draft resulting from the author/independent technical reviewer cycle (Phase 1) becomes the review draft for the project manager's review (Phase 2).

4.0 REFERENCES

4.1 Golder Associates QA Procedure P-3.0-2, "Specific Work Instructions".

9 3 1 3 0 2 3 0 1 0 0

5.0 DISCUSSION

There are three phases of technical review. Phase 1 is the review cycle between the author and the independent technical reviewer. Phase 2 is the review cycle between the Project Manager and the author. Phase 3 is the review cycle between the Project Review Board and the Project Manager. A deliverable document may be subjected to all three phases of review, if determined appropriate by the Project Manager. Phases 1 and 2 are appropriate for most documents, and Phase 3 is generally appropriate for final documents where content is critical or beyond the state of the art. As a minimum, however, a Phase 2 review cycle must be completed for each technical deliverable document prior to submittal to the client.

Reviews are initiated by the Project Manager via Specific Work Instruction (SWI). A Project Manager may invoke multiple reviews within one phase. It is preferred that multiple reviews be performed sequentially. However, if simultaneous multiple reviews are performed, care must be taken by the author to incorporate all reviewers' comments as resolved into one resolution draft. Copies of all review comments must accompany the resolution draft submitted to each reviewer for approval. 10

Each review is documented on a Review Comment Form (RCF). This form is used each time a Phase 1, 2, or 3 review is performed. All comments recorded on the RCF during a formal review cycle must be categorized by the reviewer as either mandatory or nonmandatory. Nonmandatory comments may be resolved at the author's discretion, and resolution need not be documented on the RCF. All mandatory comments must be formally resolved, and subsequent revisions to the document must be traceable to the comments. Informal comments may be solicited for a document prior to initiation of the review process. Once the process has started, however, informal changes to the document are not allowed unless they are purely editorial.

6.0 RESPONSIBILITIES

6.1 Author or Authors: Responsible for producing documents fully in compliance with SWI guidelines. Responsible for assuring that draft documents are as complete as possible prior to entering the review process. Resolves all mandatory comments with independent technical reviewers and/or QA.

6.2 Independent Technical Reviewer: Responsible for performance of critical reviews of documents as directed by SWI and this procedure. Provides documented mandatory comments and actively participates in the process of resolution as described by this procedure. Provides nonmandatory comments to the author or authors where appropriate for improvements or corrections in syntax, punctuation, or usage.

6.3 Project Review Board: Responsible for review and comment pertaining to final documents as directed by SWI and this procedure.

6.4 Project Manager (or designee): Responsible for initiation of document preparation and selection of appropriate types of technical review activities through the SWI process. Selects independent technical reviewers and the senior technical reviewer of the Project Review Board based on qualifications and experience. Approves and/or provides comments on documents presented for Phase 2 independent technical review. Responsible for comments resolution resulting from Phase 3 review.

6.5 QA Manager (or designee): Responsible for review and approval of each phase of the independent technical review process to verify incorporation or resolution of all mandatory comments.

7.0 REQUIRED FORMS

7.1 Review Comment Form (RCF): The RCF, included as Attachment A to this procedure, is a multipurpose form utilized to document comments made during each phase of the independent technical review process. The form provides the means of identifying authors and reviewers and providing traceability of comments, comment resolution, and document revision on a review cycle or phase basis. The RCFs, coupled with the review drafts, resolution drafts, and final drafts, create a document trail that demonstrates the efficacy of the review process from the production of the first draft of a document to the final draft submitted to the client as a work product.

8.0 PROCEDURE

8.1 Independent Technical Review: Independent technical review shall be performed as described in the steps listed below. Each step is numbered to correspond with the flow charts shown in Figures 8-1, 8-2, and 8-3 that represent each phase of the review cycle.

Phase 1: Author/Independent Reviewer Cycle (Ref: Figure 8-1)

(1) A draft document completed in accordance with an SWI is presented to the independent technical reviewer. The reviewer may be named on the same SWI or be designated on a separate SWI; the number or numbers of all SWIs governing the production or review of the document shall be noted on the RCF form as indicated on Attachment A.

(2) The independent reviewer performs a technical review of the draft document. The reviewer will verify calculations, examine technical approach, evaluate the adequacy of references, evaluate the effectiveness of the use of figures and tables, and/or other review activities appropriate for the type of document or as specifically directed by the SWI.

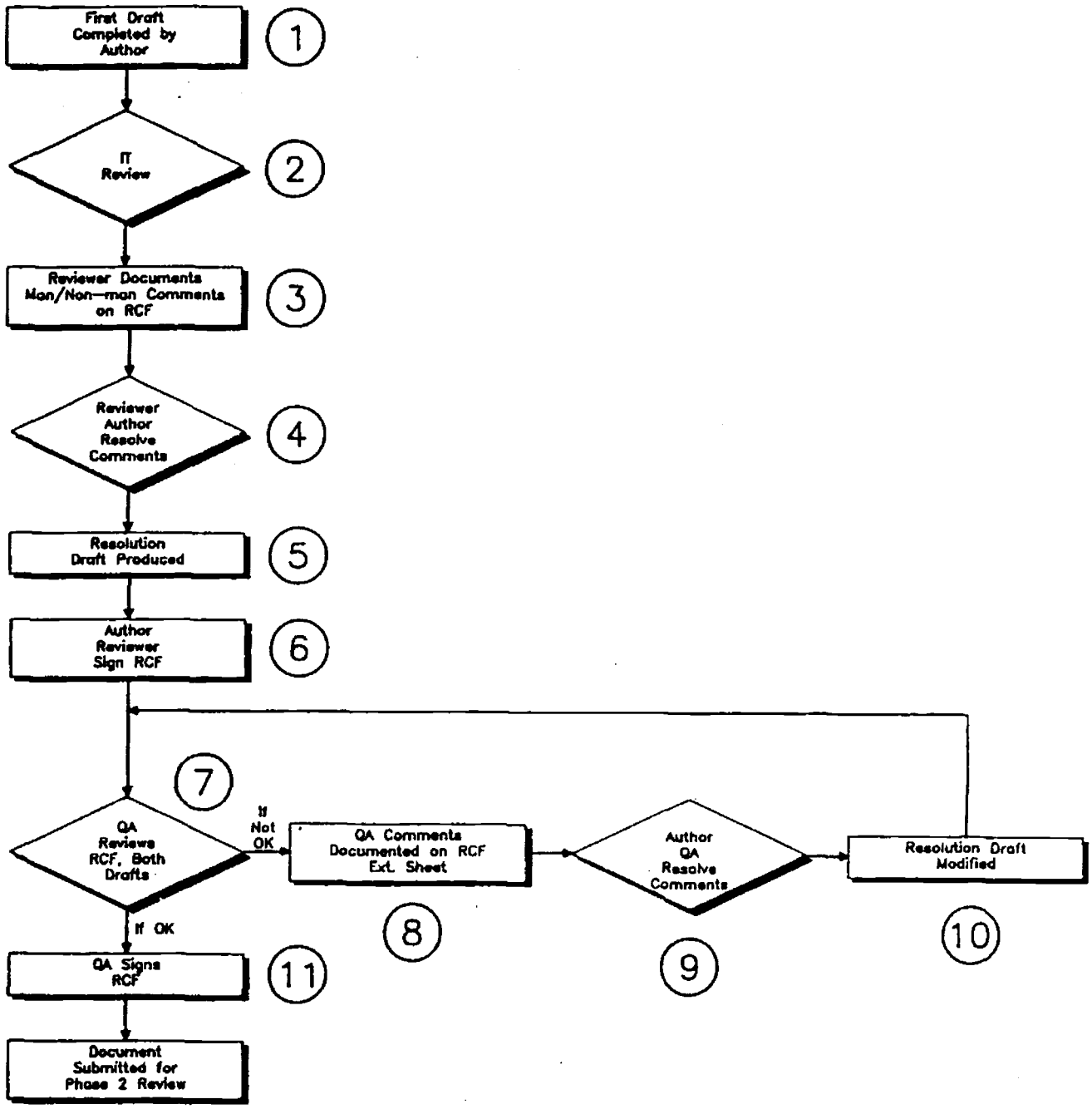

FIGURE 8-1
INDEPENDENT TECHNICAL REVIEW
PHASE 1: AUTHOR/INDEPENDENT REVIEWER CYCLE
P-10.0-1 R10

9 3 1 3 0 2 3 0 1 0 3

(3) The reviewer documents all comments on a RCF. The RCF heading shall be completed as described on page 2 of Attachment A. All comments shall be numbered and categorized as mandatory or nonmandatory. Text sections affected by comments shall be numbered in the review draft to correspond with the RCF comments, with the exception that, at the discretion of the reviewer, minor nonmandatory comments that do not require additional explanation or discussion may be marked directly in text without separate treatment on the RCF. The actual review draft shall be retained as a permanent record.

(4) The reviewer and author resolve all of the reviewer's mandatory comments; a concise but complete description of the resolution of each comment shall be recorded on the RCF. All "leave as is" resolutions require rationale. Revised text sections should be referenced. The reviewer shall initial each mandatory comment on the RCF to indicate acceptance of the comment resolution. Nonmandatory comments may be resolved at the author's discretion.

(5) An updated resolution draft of the document is produced through word processing. It is preferred that word processing input resulting from the resolution of comments be marked on a copy (not the original) of the review draft. However, providing none of the reviewer's comments are obliterated or changed in any way, the original review draft may be used. 10

(6) The author and the reviewer shall ensure the correct incorporation of comments on the updated resolution draft. If the document is acceptable after word processing, the author and reviewer shall sign the RCF to indicate approval of the resolution draft. At any time, if the reviewer has additional comments, the reviewer must document the comment on the RCF, annotate the original reviewed text accordingly, and review the updated resolution draft prior to signing the RCF. Multiple simultaneous reviews of the same version of a document may be performed in some cases. In such situations it is the author's responsibility to ensure that all reviewers' mandatory comments are integrated appropriately into the resolution draft, and that copies of all reviewers' comments accompany the resolution draft when it is presented to each reviewer for final approval.

(7) QA reviews the review draft, the resolution draft, and the RCF for compliance with this procedure and for any special QA concerns. If the package acceptable, the RCF is signed (step 11), and the entire package is then routed to the next phase of review. If the package is not acceptable, steps (8), (9), and (10) apply.

9 3 1 3 0 2 3 0 1 0 4

(8) QA shall document comments under the review comment section of the RCF as described in (3). The resolution draft may be annotated as a QA review draft if necessitated by comments. 10

(9) The RCF is routed back to the author who will resolve the mandatory comments with QA. The resolution will be documented as indicated in (4) above. QA shall initial each mandatory comment to indicate acceptance of the resolution.

(10) A corrected resolution draft will be submitted to word processing for update.

(11) If the document is acceptable after word processing, QA signs the accepted RCF. The signed RCF, the original review draft(s), and the final version of the resolution draft will be retained as permanent project QA records.

Phase 2: Project Manager's Review (Ref: Figure 8-2)

(1) The final resolution draft from Phase 1 is presented for the Project Manager's review. The Phase 1 RCF and the associated review draft(s) will be provided for reference purposes only. (Note: the Project Manager may designate all or portions of this review to a suitably qualified individual.) 10

(2) The Project Manager will perform a review of the Phase 1 resolution draft, emphasizing the general performance and comments resolution from the first phase of the review, along with the technical approach, adequacy of references, and/or other areas as specified by SWI. 10

(3) The Project Manager shall document comments on the RCF; all comments shall be categorized as mandatory or nonmandatory. All comments noted on the RCF shall be annotated along with the corresponding text section, with the exception that, at the discretion of the Project Manager, minor nonmandatory comments that do not require additional explanation or discussion may be marked directly in text without separate treatment on the RCF. The Project Manager's actual review draft shall be retained as a permanent record.

(4) The Project Manager and author resolve all of the mandatory comments; a concise but complete description of the resolution of each comment shall be recorded on the RCF. All "leave as is" resolutions require rationale. Revised text sections should be referenced. The Project Manager shall initial each mandatory comment on RCF form to indicate acceptance of the comment resolution.

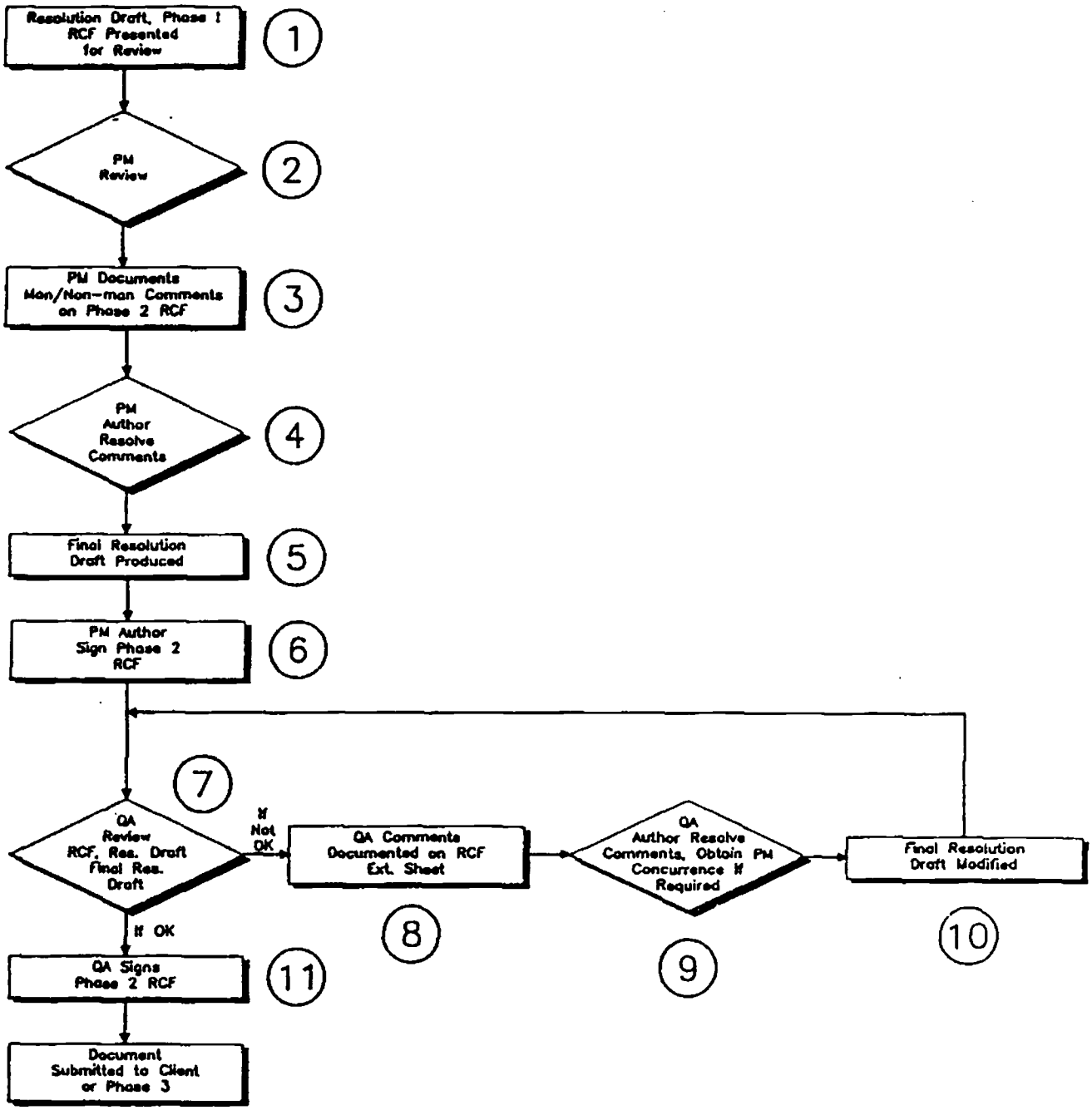

FIGURE 8-2
INDEPENDENT TECHNICAL REVIEW
PHASE 2: PROJECT MANAGER'S REVIEW
P-10.0-1 R10

PROJECT NO 993-1024 DWG NO 13196 DATE 4/20/89 DRAWN JSS APPROVED JO Golder Associates Inc.

9 3 1 3 0 2 3 1 1 0 6

(5) A final draft of the document is produced through word processing. It is preferred that word processing input resulting from the resolution of comments be marked on a copy (not the original) of the review draft. However, providing none of the reviewer's comments are obliterated or changed in any way, the original review draft may be used. 10

(6) The Project Manager and author ensure proper incorporation of their resolved comments. If the final draft is acceptable, the author and the Project Manager shall sign the RCF to indicate approval of the final draft.

(7) QA reviews the resolution draft, the final draft, and the RCF for compliance with this procedure and for any special QA concerns. If the package is acceptable, the RCF is signed (step 11), and the entire package is routed for Phase 3 review, if required. If the package is not acceptable, steps (8), (9), and (10) apply.

(8) QA shall document comments under the review comment section of the RCF as described in (3). The final draft may be annotated as a QA review draft if necessitated by comments. 10

(9) The RCF is routed back to the author who will resolve the mandatory comment with QA. The resolution will be documented as indicated in (4) above except that QA shall initial the resolution of mandatory comments. Where QA comments have technical impact, the author shall obtain Project Manager concurrence of comment resolution. 10

(10) A corrected final draft will be submitted to word processing for update.

(11) If the final draft is acceptable after word processing, QA shall sign the accepted Phase 2 RCF. The signed RCFs from Phase 1 and 2, the associated review draft(s), and the final draft will be retained as permanent project QA records.

Phase 3: Project Review Board Review (Ref: Figure 8-3); Note that for this phase, the Project Review Board's comments are accumulated on one RCF prior to the Project Manager's resolution of comments.

(1) A final draft document completed and reviewed in accordance with SWI instructions is presented to the Project Review Board. The Project Review Board shall review the document in sequence; the first reviewer will be the Senior Technical Reviewer appointed by the Project Manager, the second shall be the Project Sponsor, and the third shall be the QA Manager.

9 3 1 3 1 2 3 0 1 0 7

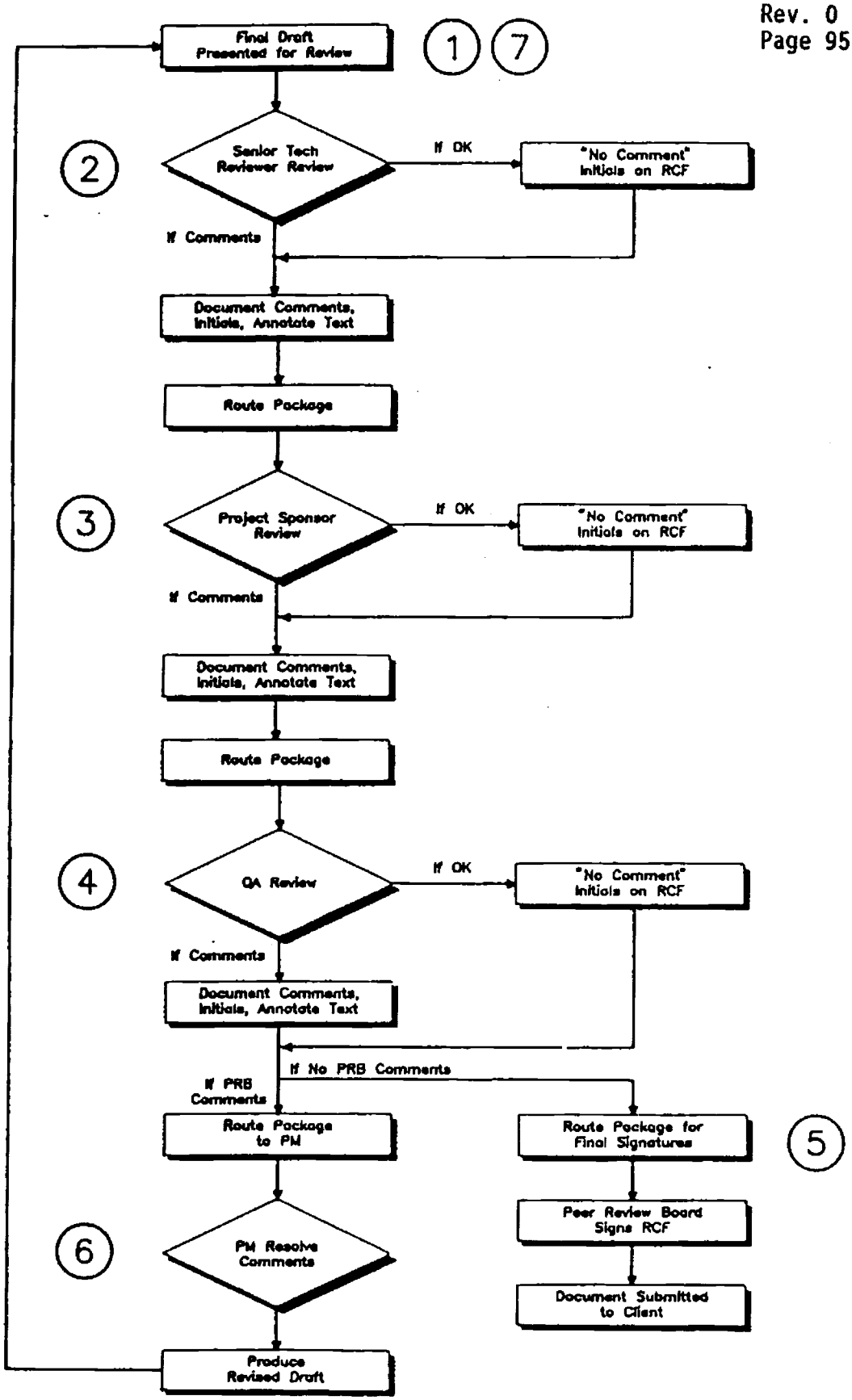

FIGURE 8-3
INDEPENDENT TECHNICAL REVIEW
PHASE 3: PROJECT REVIEW BOARD REVIEW
P-10.0-1 R10

PROJECT 993-1024 DWG NO 14257 DATE 6/30/89 DRAWN JSS APPROVED JO Golder Associates Inc.

9 3 1 3 0 2 3 0 1 7 8

(2) The Senior Technical Reviewer shall review the document; all comments are considered mandatory and shall be documented on a RCF. Comments shall be initialed to positively identify them to the reviewer. If there are no comments, it shall be so noted on the RCF and initialed. The review package shall be routed to the Project Sponsor.

(3) The Project Sponsor shall review the document; all comments are considered mandatory and shall be documented on the RCF. Comments shall be initialed to positively identify them to the Project Sponsor. If there are no comments, an initialed "No Comments" entry shall be made on the RCF as in (2) above. The review package is then routed to the QA Manager.

(4) The QA Manager shall review the document for procedural compliance and any unaddressed QA issues. Comments shall be initialed to positively identify the source, and shall be categorized as mandatory on the RCF. If there are no comments, it shall be noted as in (2) and (3) above.

(5) If there have been no comments throughout the review, the RCF and review package shall be routed for final approval signatures by the Project Review Board prior to submittal of the document to the client.

(6) If there are comments made by any member of the Project Review Board, the RCF and the review package shall be routed to the Project Manager or his designee for resolution of all comments. The Project Manager shall resolve all comments with the commenting members of the Project Review Board; however, all document changes made as a result will require the approval of the full board (Step 7). A concise but complete description of each comment shall be recorded on the RCF. All "leave as is" resolutions require rationale. Revised text sections shall be referenced. Text changes should be marked on a copy (<u>not</u> the original) of the review draft for input to word processing. However, providing none of the review comments are obliterated or changed in any way, the original may be used. 10

(7) A final draft of the document is produced through word processing; if it is acceptable, the Project Manager shall sign the RCF and route the final draft to the Project Review Board for final review and approval as indicated in items 2, 3, 4, and 5 above. Additional comment by any member of the Project Review Board will require repetition of the comment resolution process as described above prior to submittal of the document to the client.

9 3 1 3 0 2 3 0 1 9

8.2 File Documentation: File documentation supporting the independent technical review process will contain the following minimum information:

- Phase 1 and Phase 2: Completed RCF's for each phase; original review draft with reviewer's annotated comments; Project Manager's annotated review copy of the resolution draft; final approved document.

- Phase 2 only: Completed Phase 2 RCF; Project Manager's annotated review draft; final approved document.

- Phase 3: Completed Phase 3 RCF; annotated review draft with Project Review Board's comments; final approved document.

8.3 Draft Identification Requirements: Each annotated review document shall be uniquely identified to provide positive traceability to the associated RCF. At a minimum, the identifier shall include the reviewer's initials or name, date, and review phase. If multiple reviews are performed on the same day, alphabetical designators should be added to the date to differentiate between them.

8.4 Resolution of Review Conflicts: If unresolvable differences in opinion should arise in the resolution of review comments at any level, the issue shall be referred to higher management for decision. Protocol will be as follows, based on the level and type of review performed:

- Phase 1; Author/Reviewer issues shall be decided by the Project Manager. Author-Reviewer/QA issues shall be decided by the Project Manager and the QA Manager.

- Phase 2; Author/Project Manager issues shall be decided by the Project Sponsor. Author-Project Manager/QA issues shall be decided by the Project Sponsor and the QA Manager.

- Phase 3; any unresolvable issues will be referred to the President of Golder Associates Inc. for resolution.

9 3 1 3 0 2 3 0 1 1 0

P-10.0-1, Attachment "A"
Instructions for Completing RCF Forms

The instructions listed below correspond to the numbers in the blanks on the example RCF form. Personnel responsible for entering the required information on the form are indicated in parentheses.

1) Author(s): (Author) Identify the author or authors of the document under review identify.

2) Project Name: (Author) Insert the commonly understood name of the project.

3) Project No.: (Author) Insert the Golder Associates job and task number.

4) Page: (Reviewers) Pages are consecutively numbered by individual reviewers; total number of pages is added by QA when RCF is finally approved.

5) Document Title: (Author) Insert the document title.

6) Draft ID#: (Author) Enter the unique identifier for the draft under review.

7) SWI refs: (Author) Enter the SWI numbers for both the preparation and review of the document.

8) Reviewer(s): (Author) Enter the name of the reviewer.

9) Type of Review: (Author) Enter the type of review; Phase 1, Phase 2, or Phase 3.

10) Comment #: (Reviewers) Enter the number of each comment, as identified in the reviewed draft.

11) Page, Para. #, Line: (Reviewers) Enter the page, paragraph number, and line of each comment.

12) Mandatory/Nonmandatory: (Reviewers) Check the appropriate column for each comment.

13) Review Comment: (Reviewers) Enter the review comment.

14) Comment Resolution: (Author) Enter the resolution of each comment as agreed upon between the author and the reviewer.

15) Resolution Accepted: (Reviewer) Initial and date each resolved comment.

16) Phase 1 Approval: (Author, Reviewer, QA Reviewer) Sign and date approval in spaces provided.

17) Phase 2 Approval: (Author, Project Manager, QA Reviewer) Sign and date approval in the spaces provided.

18) Phase 3, Project Review Board Approval: (Senior Technical Reviewer, Project Sponsor, Corporate QA Officer, Project Manager) Sign and date approval in the spaces provided.

9 3 1 3 0 2 3 0 1 1 2

Ader Associates

REVIEW COMMENT FORM (

Author ① Project Name ② Project N

Document Title ⑤ Draft I.D. No. ⑥ S

Reviewer ⑧

Phase 1 ⑨ Phase 2 ⑨ Phase 3

Comment No.	Page, Line, Para, Section No.	Manda-tory	Non-manda-tory	Review Comment	Comment R
⑩	⑪	⑫	⑫	⑬	⑭

EXAMPLE

Phase 1 Approval ⑯		Phase 2 Approval ⑰		Project R
Author	Date	Author	Date	Senior Technic
Reviewer	Date	Project Manager	Date	Project Spons
QA	Date	QA	Date	Corporate QA
Other (Author, Reviewer)	Date	Other (Author, Reviewer)	Date	Project Manag

9 3 1 3 7 2 3 1 1 4

Golder Associates

RCF CONTINUATION SHE

Project Name _____ Project I

Document Title _____ Draft I.D. No. _____ S

Comment No.	Page, Line, Para, Section No.	Manda-tory	Non-manda-tory	Review Comment	Comment

EXAMPLE

9 3 1 3 0 2 3 2 1 1 5

Golder Associates
CONSULTING GEOTECHNICAL AND MINING ENGINEERS

TITLE	EFFECTIVE DATE	REV. LEVEL
P-10.0-3 SURVEILLANCE INSPECTION		-0-
PREPARED BY / APPROVED / APPROVED		
7/11/86 / 7/14/86 / 8/12/86	8-12-86	Ø
7/10/87 / 8/11/87 / 8/13/87	8/13/87	1
6/9/89 / 6/9/89 / 6/13/89	6/13/89	2

Revision Level	Page No.	Section No.	Revision Made P-10.0-3
2	All	All	Editional corrections throughout to reflect organizational changes, modifications to related procedures.

9 3 1 3 0 2 3 0 1 1 7

1.0 PURPOSE

This procedure defines the requirements for conducting surveillance inspections of in-process project activities, including field operations and laboratory testing.

2.0 APPLICABILITY

This procedure shall be used by all Golder Associates Inc. Quality Assurance (QA) personnel requested to perform surveillance inspection of field, laboratory, or other in-process activities requiring compliance with established procedures or methods.

3.0 DEFINITIONS

3.1 Surveillance Inspection: The documented act of monitoring or witnessing the performance of work in process to verify that activities are being conducted in accordance with approved procedures, methods or instructions.

4.0 REFERENCE

4.1 Golder Associates QA Procedure P-15.0-1, "Control of Nonconformances, Incident Reporting, and Corrective Action".

5.0 DISCUSSION

Surveillance inspection is a management tool that may be used during the course of project activities to verify that work in process is being performed in accordance with specified procedures, methods, or instructions. Surveillance inspections are also used to identify and correct both real and potential deficiencies at the earliest possible opportunity to minimize any adverse impacts on the quality and validity of work. The types of activities subject to surveillance inspection include development of procedures, study plans, or other project documents; field activities including instrument installations, testing, and sampling; laboratory activities, including testing and calibration of measurement and test equipment; and subcontractor or consultant activities in any of the areas mentioned above.

6.0 RESPONSIBILITY

6.1 QA Manager: Responsible for establishing surveillance requirements and policies in compliance with client QA requirements and Golder Associates Inc. corporate quality policy. Designates inspection responsibility to qualified personnel who are independent from the work being examined; all designated inspectors are trained in the requirements of this procedures. Responsible for directing the performance of surveillance inspections and when necessary, coordinating schedules with Project Managers, Task Leaders, and Laboratory Managers.

6.2 Designated Inspector: The designated inspector has primary responsibility for conducting surveillance inspections in accordance with this procedure. The designated inspector is responsible for: confirming surveillance inspection schedules with the QA Manager; when appropriate, making detailed arrangements to witness specific portions of an activity; documenting inspection results; reporting of nonconformances; and verifying that corrective actions for dispositioned nonconformances have been properly implemented.

6.3 Project Managers, Task Leaders or Laboratory Managers: Project Managers, Task Leaders, or Laboratory Managers are responsible for coordinating surveillance schedules with QA Manager and the designated inspector. In case of a stop work order, they are responsible for halting operation in a logical and orderly manner that will protect data already obtained, or prevent further damage. They are also responsible for ensuring that corrective actions for dispositioned nonconformances are properly implemented.

7.0 EQUIPMENT OF MATERIALS

Approved QA, technical, testing, or laboratory plans and procedures; project schedules; reference materials as required; Surveillance Inspection Report (SIR) forms (see Exhibit A).

8.0 PROCEDURE

8.1 Surveillance Inspection Scheduling: All project activities, including document preparation, field testing, and laboratory work may be subjected to surveillance inspection at any point during the activity. It is the intent of this procedure that the surveillance inspection be conducted without significantly interfering with the planned course of the activity. Surveillance inspections in no case shall compromise safety considerations or adversely affect the gathering of data. Reasonable advance notice shall be provided to the Project Manager, Task Leader, or Laboratory Manager prior to inspection activities, who shall provide schedule information, procedure documentation, or such other support as may be required. Frequency and scheduling of surveillance inspections shall be determined by the QA Manager based on project schedules, type of activity, and results of past surveillance inspections or audits.

8.2 Inspection Guidelines: At a minimum, surveillance inspection shall verify compliance of the activity with applicable plans, procedures, methods, and Specific Work Instructions.

The following additional items shall be considered during surveillance inspections of laboratory or field testing activities:

- Equipment or instrumentation calibration status and general condition;
- Status or stage of completion of the test or activity must be apparent from test data sheets or logs;

- Test operations and sequencing for the phase of the activity observed must comply with approved procedure requirements;

- The actual starting and stopping times of the surveillance shall be noted on the SIR form;

- Test data sheets and records required by the test plans or procedures must be filled out properly, to the extent necessary for the phase of the test observed.

8.3 Nonconformances and Stop-work Orders: Nonconformances and incidents shall be documented and handled as indicated in procedure P-15.0-1 "Control of Nonconformance, Incident Reports, and Corrective Action." Deficiencies of a minor nature that would not affect a permanent or significant change in quality if not corrected and can be brought into conformance with immediate corrective action shall not be categorized as a nonconformance. If a nonconformance requires stopping work in order to prevent future discrepancies, danger to personnel, loss of data, or similar problems, the designated inspector shall immediately notify the QA Manager, obtain concurrence, and issue stop work instructions. The affected Project Manager, Laboratory Manager, or Task Leader(s) shall be immediately notified.

9.0 RECORDS

9.1 Surveillance Inspection Report (SIR) Forms: An SIR form shall be filled out for each surveillance and routed to the QA Manager for review prior to routing to the project QA records; at a minimum the report shall contain the following information:

- Name of the inspected activity or test, with associated job number,
- Personnel contacted using the surveillance,
- Date and start/stop times of the surveillance,
- References to governing plans or procedures,
- Observations of equipment condition and calibration status,
- General observations and comments,
- NCIR numbers for any nonconformances resulting from the surveillance,
- Discussions of any immediate action taken to correct minor deficiencies or to stop work, and
- Signature of designated inspector and date.

SURVEILLANCE INSPECTION REPORT

SIR

Page 1 of ___

No.:

Inspected Activity or Test: _____

Job Number: _____

Personnel Contacted: _____

Reference Requirements: _____

Insp. Date: _____ Start Time: _____ End Time: _____

Equipment condition/Calibration Status: _____

Observation and Comments (Use Extra Sheets as Required): _____

NCIR Reference (if any): _____

Inspector: _____ Date: _____

Reviewed By:

QA Manager: _____ Date: _____

Comments: _____

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9 3 1 3 0 2 3 0 1 2 2

Golder Associates
CONSULTING GEOTECHNICAL AND MINING ENGINEERS

TITLE	EFFECTIVE DATE	REV. LEVEL
P-10.0-4 RECEIVING INSPECTION		
PREPARED BY / APPROVED / APPROVED		
10-15-87 / 10/20/87 / 10/20/87		1
1-12-90 / 1/12/90 / 1/12/90 / 1-12-90		2

RECORD OF REVISIONS
P-10.0-4

Revision Level 2

Page Number	Section	Revision
1	2.0	Revised to allow reference materials to be evaluated per TP-5.1-1 and P-10.0-1 as an option, rather than a requirement
2	6.0	Editorial changes, and clarified QA Manager's involvement
Throughout		Changed "Corporate QA Officer" to "QA Manager"

9 3 1 3 0 2 3 0 1 2 4

1.0 PURPOSE

This procedure defines the requirements for receiving inspection of project related materials, and equipment.

2.0 APPLICABILITY

This procedure is applicable to project-related items, materials, and equipment procured for Golder Associates projects which are governed by the requirements of 10 CFR 50, Appendix B as interpreted by ANSI/ASME NQA-1. This procedure is applicable only to procurements directly in support of such projects. As an option, reference materials may be reviewed and evaluated under the requirements of technical procedure TP-5.1.1, "Conducting and Documenting Technical Literature Searches" and QA procedure P-10.0-1, "Technical Review", in lieu of this procedure. 2

3.0 DEFINITIONS

3.1 Receiving Inspection: The documented examination or measurement by an independent party to verify that materials, equipment, or services received conform to procurement specifications.

4.0 REFERENCES

4.1 Golder Associates QA Procedure P-17.0-1 "Quality Assurance Records Management."

4.2 Golder Associates QA Procedure P-15.0-1, Control of Nonconformances, Incident Reports, and Corrective Action."

4.3 10 CFR 50, Appendix B, Sections VII, VIII as interpreted by ANSI/ASME NQA-1.

5.0 DISCUSSION

5.1 The purpose of the receiving inspection function is to assure that items, materials, and equipment from Golder Associates' suppliers conform to the requirements specified in procurement documentation. All items received are to be clearly identified to maintain traceability of supplier documentation to the item procured, and to ensure that only correct items are accepted for use. All nonconforming items, materials or equipment shall be identified and reported in a timely fashion to aid in assuring effective corrective action.

9 3 1 3 0 2 3 0 1 2 5

6.0 RESPONSIBILITIES

6.1 Receiving Inspector: The Receiving Inspector is responsible to clearly document the results of all receiving inspections and verify proper identification and marking of all received items, materials, or equipment. Identifies and documents all nonconforming items or supplier documents and is responsible for the physical segregation and identification of these items where possible. The Quality Assurance Manager is responsible for designating and training all receiving inspectors. 2

6.2 Records System Administrator: The Records System Administrator is responsible for the filing, duplication, and maintenance of all completed receiving inspection records and related documentation in accordance with QA procedure P-17.0-1.

6.3 Property Control Administrator: The Property Control Administrator is responsible for the release and retrieval, inventory, and tracking of items, materials, or equipment when property controls are a contractual requirement.

6.4 Project Secretary: The Project Secretary is responsible for the processing of completed receiving inspection records and related documents in accordance with QA procedure P-17.0-1 and distribution to the Property Control Administrator, Records System Administrator, Cost Accounting, and others as determined by project management.

7.0 MATERIALS

- Quality Assurance acceptance stamp
- QA accept tag
- Procurement document(s)
- Receiving document(s)
- Nonconformance/Incident Report (NCIR) forms

8.0 PROCEDURE

All project related materials and equipment shall be inspected upon receipt as follows:

8.1 Golder Associates Project Materials and Equipment: Project related equipment and materials shall be inspected at the time of receipt for conformance to procurement document requirements.

8.1.1 At a minimum, the following attributes shall be verified:

- o Dimensions and configuration shall be in accordance with drawings, specifications, or other requirements as referenced in procurement documentation,
- o Test reports, certificates of conformance, calibration and maintenance information or other required supplier documents shall be correct and complete,
- o Identifying label plates, tags, serial numbers, or other markings shall be correct and legible,
- o Preservation, packing, and storage instructions shall be provided if required by procurement documentation,
- o There shall be no visual evidence of damage or deterioration, and
- o Acceptance Testing of received items, when required as a condition of acceptance by procurement documentation, shall be conducted and results documented by the Receiving Inspector. In cases where Acceptance Testing may be performed by a separate testing group, the Receiving Inspector is responsible for coordination and scheduling as required.

8.1.2 Inspection and acceptance of all received items, materials, or equipment will be documented by placement of a QA acceptance stamp (See exhibit A) and date on the receiving invoice or packing slip. All items, materials, or equipment shall be physically identified by attachment of a Golder Associates QA accept tag (See exhibit B). The QA accept tag shall remain attached to the item at least until the item is installed or placed in service. Each item shall be assigned a unique positive identification traceable to the procurement order. These identifiers shall also be noted in the receiving inspection documentation.

8.1.3 A copy of the requesting ordering documents, the original receiving invoice and packing slip shall be forwarded to the Project Secretary for validation and file identification in accordance with QA procedure P-17.0-1. Copies will be distributed to Cost Accounting for initiation of payment activity and to the Record System Administrator for inclusion in the project records.

8.1.4 When property controls are a contractual requirement, the Project Secretary shall provide a copy of the procurement documents with a copy of the QA accepted receiving documents to the project Property Control Administrator. This shall serve as notification of items, materials, or equipment which have been accepted by QA and may be entered into the property control inventory.

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8.2 Client/Government Furnished Equipment and Materials: Client Furnished Materials (CFM) and Government Furnished Materials (GFM) shall be inspected at the time of receipt. At a minimum, the following attributes shall be verified:

- Identifying label plates, tags, serial numbers, or other markings shall be correct and legible, and
- There shall be no visual evidence of damage or deterioration.

Inspection and acceptance of all CFM and GFM items shall be documented and reported in accordance with the requirements of sections 8.1.2 through 8.1.4.

8.3 Nonconformance Reporting: All items or materials found to be discrepant shall be documented on a Nonconformance/Incident Report (NCIR). The NCIR shall be logged and processed in accordance with QA Procedure P-15.0-1, "Control of Nonconformances, Incident Reports, and Corrective Action." All discrepant items shall be physically segregated from acceptable materials and equipment whenever possible, and clearly identified by attaching a copy of the open NCIR to the item. Discrepant items shall not be released for use or continued processing until all open NCIR items have been resolved.

8.4 Inspection Stamp Control: Inspection and acceptance of received items, materials, or equipment shall be verified by use of a Golder Associates QA acceptance stamp (See exhibit A). QA acceptance stamps shall be issued by the QA Manager; each receiving inspector is directly responsible for the control and use of his/her assigned stamp. QA acceptance stamps shall not be loaned, borrowed, or used by unauthorized personnel. In the event of loss, or suspected misuse, the QA Manager shall be notified immediately. 2

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G A I 01

Golder Associates
QA Acceptance Stamp

Exhibit A

843-1040-050/1

Job No. _____ Date _____
P. O. No. _____ Serial No. _____
P. O. Item _____ Quantity _____
Part No. _____
Description/Comments _____

Inspector _____

Golder Associates

QA ACCEPT

QA Accept Tag
Exhibit B

843-1040-050/2

9 3 1 3 0 2 3 0 1 3 0

9 3 1 3 0 3 0 1 3 1

Golder Associates
CONSULTING GEOTECHNICAL AND MINING ENGINEERS

TITLE			EFFECTIVE DATE	REV. LEVEL
P-12.0-1 CALIBRATION AND MAINTENANCE OF MEASURING AND TEST EQUIPMENT				
PREPARED BY	APPROVED	APPROVED		
3/23/88	3/23/88	3/23/88	3/23/88	7
1-12-90	1/12/90	1/12/90	1-12-90	8

RECORD OF REVISIONS
P-12.0-1

Revision Level 8

Page Number	Section	Revision
Throughout		Editorial corrections, and changed "Corporate QA Officer" to "QA Manager"
3	6.1	Added condition-found report-related responsibilities
Throughout		Deleted Field Laboratory Manager
3	6.2	Changed "Test Operator or Investigator" to "Field or Laboratory Personnel"
4	8.2	Deleted "lack of use" criterion for extending calibration interval
4	8.3	Added condition-found report requirements
5	8.7	Added requirements regarding damaged equipment
6	8.9	Added requirements regarding calibration-related nonconformances and audit findings

1. PURPOSE

This procedure defines the system to be used for the calibration, control, and maintenance for the calibration, control, and maintenance of measuring and test equipment and calibration standards.

2. APPLICABILITY

This procedure is applicable to all Golder Associates owned or leased measuring and test equipment used in laboratory analyses and field investigations. This procedure is not applicable to standard commercial measurement devices such as rulers, compasses, tape measures, mercury thermometers, or levels, provided that the required level of accuracy does not exceed the limits of the standard equipment.

3. DEFINITIONS

3.1 Calibration

Calibration is defined as periodic comparison of an instrument or measurement device to a standard of known and greater accuracy in order to assure continuity and accuracy of measurements or data. If no standards meeting the requirements of paragraph 3.2 exist, then the basis or justification of calibration method must be documented.

3.2 Calibration Standard

A calibration standard is a device or reference used as a means of comparison for determining quantitatively the accuracy, precision, and repeatability of instruments or measurement devices. Calibration standards must have a traceable, known relationship to nationally recognized standards such as those maintained by the National Institute of Standards and Technology (NIST).

4. REFERENCES

4.1 Golder Associates Quality Assurance Procedure P-18.0-1, "Audits."

4.2 Golder Associates Quality Assurance Procedure P-10.0-3, "Surveillance Inspection."

4.3 Golder Associates Quality Assurance Procedure P-15.0-1, "Control of Nonconformances, Incident Reports, and Corrective Action."

5. DISCUSSION

Calibration and maintenance of instrumentation is required so that the accuracy and precision of data collected, and hence the calculations based on the data, are known. Calibration should not be construed as the instrument adjustments or accuracy checks commonly performed during or as part of test operations, but rather consists of those systematic, periodic evaluations of instrumentation or equipment that verify performance within specified levels of accuracy, precision, and repeatability. Calibration shall be performed in a clean environment, giving due consideration for dust, relative humidity, temperature, and vibration, as necessary for the equipment being calibrated.

Calibration records are normally retained in the laboratory; copies of records specific to certain tests shall be forwarded to project files when requested.

6. RESPONSIBILITIES

6.1 Laboratory Manager

The Laboratory Manager is responsible for the implementation of the calibration and maintenance program within the laboratory. Detailed responsibilities for implementation include:

- Establishment of an identification system by assigning a unique serial number for each piece of equipment in inventory for issuing, tracking, calibration, charge accumulation, use, and recall;
- Provision of calibration and maintenance support to field operations when project size does not permit an onsite calibration facility;
- Assurance of the acceptable calibration status for all equipment, by use of a locator/recall system and calibration status labels prior to releasing for project work;
- Performance or direction of calibration and maintenance activities for all Golder-owned or leased instruments and equipment controlled by a particular Golder office;
- Maintenance and development of the master equipment file, which contains equipment calibration and maintenance instructions, established calibration intervals, and definition of special shipping and handling requirements;

- Maintain suitable storage facilities and instructions for use and care of laboratory standards, separate from other tools and equipment in the calibrated inventory; and

- Review all condition-found reports for equipment found to be out of calibration, and preparation of technical memoranda evaluating the potential effect on measurements made with such instruments over the previous calibration interval.

Specified duties supporting these responsibilities may be delegated to qualified personnel. 8

6.2 Field or Laboratory Personnel

Equipment users are responsible for verifying acceptable calibration status of all equipment or instrumentation used during a test, and returning such equipment to the Laboratory Manager when recalibration or maintenance is required.

6.3 Project Manager or Task Leader

The Project Manager or Task Leader is responsible for assuring that the equipment or instrumentation procured for or selected for use on a project is of sufficient range, accuracy, tolerance, and construction to provide meaningful data or measurements. In addition, the Project Manager or Task Leader is responsible for assuring that all equipment or instrumentation procured or leased for a particular project is routed through the Laboratory Manager, or for assignment of equipment numbers, entry of information into the equipment file, establishment of calibration interval, and entry into the locator/recall system; and for notifying the Laboratory Manager when client calibration needs exceed existing standards and new requirements must be incorporated into the equipment file.

6.4 QA Manager

The QA Manager is responsible for assuring that procurement documentation for equipment and instrumentation requires manufacturer's documented calibration certification, calibration instructions, maintenance requirements, storage requirements, and special handling requirements; and for scheduling internal audits or surveillances to monitor the effectiveness of the calibration program.

7. EQUIPMENT

Equipment required to implement the provisions of this procedure consists of a file containing calibration procedures and records for all measuring and test equipment, a locator/recall system, and the necessary calibration standards and maintenance tools required by the measuring and test equipment file.

8. PROCEDURE

8.1 Equipment Designation and Tagging

The Laboratory Manager shall assign unique numerical designators to all measuring and test equipment within their respective inventories. Designator assignment should be logical based on the calibration requirements of the instrument or system. If a system component can be used in various applications, the component should be given a unique number. The number should be marked permanently on the equipment. Once calibrated, the equipment shall have a readily visible calibration tag (see Exhibit "A") affixed indicating calibration acceptance, date of last calibration, due date of next calibration, initials of the person performing the calibration, and the equipment number. Equipment calibrated by an outside laboratory shall display the calibration label of that laboratory. In addition, a Golder Associates label will be applied to indicate acceptance in the laboratory tracking and control system. Equipment requiring calibration with each use shall so indicate on the calibration label. This requirement does not apply to equipment normally subjected to adjustments or operational checks before use; such adjustment is not considered calibration as defined in 3.1. Equipment with expired calibration shall be tagged with a red tag indicating "Out of Service" (see Exhibit "A").

8.2 Calibration Interval

The required calibration interval shall be assigned by the Laboratory Manager. In no case shall the calibration interval exceed the maintenance interval. The calibration interval shall be based on manufacturer's recommendations, level of projected use, probable usage environment, and usage history. Laboratory standards shall not be used as measuring or test devices beyond the scope of the calibration function. 8

8.3 Condition-Found Report

Calibration records shall document the as-found calibration status of all equipment. All equipment found to be out of tolerance shall be referred to the laboratory manager for evaluation and preparation of a memo to the equipment file and QA Manager addressing the potential effect on measurements from the previous calibration date. Significant effects shall prompt the initiation of a nonconformance report, which shall be documented and resolved in compliance with P-15.0-1 "Control of Nonconformances, Incident Reports, and Corrective Action." See 8.9 below. 8

8.4 Equipment File

The Laboratory Manager or Field Laboratory Manager shall develop and maintain a comprehensive equipment file which contains, by equipment number, specific calibration instructions, original calibration certifications, calibration intervals, maintenance instructions,

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storage requirements, special handling requirements, calibration history (including condition found reports for each calibration), and, if appropriate, reference to the project that it was originally procured against.

8.5 Calibration Sources

Calibration may be performed internally under the direction of the Laboratory Manager, or by qualified external sources. Calibration technique shall be as defined in the Equipment File. Regardless of whether the calibration is performed internally or by an external source, all reference standards shall be traceable to nationally recognized standards. If no standards exist, justification of the calibration method must be a permanent part of the equipment file. Procurement documents for calibration and maintenance services shall require the source to perform the calibration and maintenance to established procedures with traceability to nationally recognized standards. The procurement document shall also require the source to provide a condition-found report and certificates of calibration (and maintenance, if a regular maintenance cycle is required). This documentation shall be reviewed by the Laboratory Manager for compliance with procurement requirements, prior to accepting the equipment into inventory and subsequent release for project use.

8.6 Equipment Tracking and Recall System

The Laboratory Manager is responsible for the maintenance of a system for controlling the issue of equipment, maintaining visibility of equipment location and calibration due dates, and issue of recall notices for recalibration and maintenance. The system may be maintained manually, or may be computerized, but in either case shall initiate recall activity well in advance of the calibration expiration dates in order for test managers to plan for equipment downtime.

8.7 Storage and Special Handling

Storage requirements shall be as specified by the manufacturer or in accordance with accepted industry practice. Equipment and reference calibration standards shall be used only for their intended purposes. They shall be adequately protected from moisture, dust, atmospheric contamination, and physical damage. Calibrated instruments being shipped or transported to field operations shall be securely packaged to prevent damage or loss of calibration due to shock, vibration, extremes of temperature, or moisture. Damaged equipment shall be tagged with a red "Out of Service" tag (see Exhibit A). If the date of equipment damage cannot be determined, the equipment shall be considered out of calibration, and addressed as a nonconformance (see Section 8.9). 8

8.8 Surveillances or Audits

When required by individual project-specific QA program plans or office baseline QA program plans, surveillances or audits shall be conducted periodically to verify compliance with this procedure, per the requirements of procedures P-10.0-3, "Surveillance Inspection" and P-18.0-1, "Audits". Frequency shall be as defined by governing QA program plans.

8.9 Calibration-Related Nonconformances and Audit Findings

When use of equipment with expired calibration, no calibration, or damage is observed in a surveillance inspection, the situation shall be documented as a nonconformance and resolved in compliance with P-15.0-1, "Control of Nonconformances, Incident Reports, and Corrective Action." If like situations are observed in an audit, they shall be documented as audit findings and resolved as required by P-18.0-1, "Audits." In both cases, resolution processes shall include a technical evaluation by the Laboratory Manager of the validity of test results obtained through the use of the equipment since its last calibration date. 8

Exhibit A
P-12.0-1

993-1024//10023

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Golder Associates Inc.

Technical Procedure

Number: P-15.0-1
Title: CONTROL OF NONCONFORMANCES, INCIDENT REPORTS, AND CORRECTIVE ACTION

Prepared By:	Approved	Approved	Effective Date	Rev. Level
6/12/90	6/12/90	6/12/90		15

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RECORD OF REVISIONS

P-15.0-1

Revision Level 15

Page Number	Section	Revision
all	all	minor editorial corrections throughout
4	6.4	changed President to Office Manager
4	7.0	added reference to NCIR forms
6	8.2.2	added discussion of design control measures applicable to dispositioned items. Changed President to Office Manager.
Exhibit B	Exhibit B	corrected C/A section of flow chart.

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1. PURPOSE

This procedure establishes a system for the identification and reporting of nonconformances to specified requirements or approved procedures. It provides for identification of causes, disposition, and implementation of corrective action measures to preclude future occurrences. The same basic identification and reporting system is also utilized for the reporting of incidents.

2. APPLICABILITY

This procedure is applicable to nonconforming items, services, or activities that are identified during inspections or reviews, or to incidents that may occur in the field or office.

3. DEFINITIONS

3.1 Nonconformance

A nonconformance is a deficiency in characteristic, documentation, or procedure which renders the quality of material, equipment, services, or activities unacceptable or indeterminate. When the deficiency is of a minor nature, does not effect a permanent or significant change in quality if it is not corrected, and can be brought in conformance with immediate corrective action, it is not categorized as a nonconformance. Such situations might include: technical reviews signed but undated; use of pencil instead of ink; typographical errors in reports. However, if the nature of the condition is such that if it is not corrected it may result in a permanent and significant impact on the quality of the item, test, or report, it must be brought to the attention of the Project Manager and QA Manager (or their designees) for resolution and concurrence on the scope of required corrective action. Examples of nonconformances might include the following: incomplete or inadequate technical reviews; computer programs not verified or validated; testing not in accordance with procedures; sample traceability missing or deficient; sample collection not as prescribed by procedures; use of uncalibrated instrumentation for testing, measurement, or analysis.

3.2 Significant Nonconformance

A reportable nonconformance may be considered significant if it could invalidate the purpose of the activity, or be detrimental to the safety of personnel or public. Examples might be discovery of forged data; catastrophic loss of computerized data for which there is no backup; an improper use of a procedure which has endangered or could endanger others; lack of cooperation in the implementation of corrective action from nonconformances

previously considered reportable; or nonconformances resulting from misapplication, misuse, or non-use of approved test or safety procedures to the extent that the test activity is no longer valid, or personnel safety is endangered.

3.3 Incidents

An incident is defined as any unexpected event during an activity which may have significant impact on project costs, schedule, validity of data or analysis, safety, or environment. Incidents are major events that are clearly not in the category of uncertainties characteristic of geoscientific investigations. Examples might include: major accidents, major equipment failures, fires, earthquakes, cave-ins, or site support failures.

3.4 Disposition

Disposition is defined as the action taken to correct the immediate situation; examples might be: to re-run a portion of a test that was not being conducted in accordance with procedures; to calibrate test equipment found to be out of calibration and re-run any required tests; to re-perform independent technical review; to re-acquire samples; to return defective equipment to the manufacturer for repair or replacement. Item dispositions shall be specified as reject, accept-as-is, repair, or rework as appropriate.

3.5 Reject

"Reject" is an appropriate disposition when a nonconforming item is not acceptable, cannot be repaired such that it performs properly, or reworked such that it complies with the original requirements.

3.6 Accept As-Is

"Accept as-is" is an appropriate disposition when a nonconforming item is determined to perform its intended function properly, even though it does not comply with original requirements. Technical justification for the acceptability of an item dispositioned "accept as-is" shall be documented in the Nonconformance/Incident Report (NCIR).

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3.7 Repair

Repair is an appropriate disposition when a nonconforming item can be restored to a condition such that it performs its intended function properly, even though it cannot be brought into compliance with the original requirements. Technical justification for the acceptability of an item dispositioned "repair" shall be documented in the NCIR.

3.8 Rework

Rework is an appropriate disposition when a nonconforming item can be brought into compliance with original requirements by correction or completion.

3.9 Corrective Action

Corrective action is defined as the specific action or actions taken to reduce or preclude the likelihood of future occurrences. Examples might include: revision of procedures for clarity or to resolve conflicting interpretations or instructions; conducting specific training exercises relative to the nonconformance; to redesign faulty equipment; to evaluate and select alternate sources of supply.

4. REFERENCES

Golder Associates QA Procedure P-10.0-3, "Surveillance Inspection"

5. DISCUSSION

All personnel are responsible for reporting possible nonconformances to the QA Department. If determined to be a minor deficiency, the condition may be immediately corrected to the satisfaction of cognizant QA personnel. However, if determined to be a nonconformance, the condition will require full documentation, investigation, disposition, and corrective action. Nonconformances are documented by QA on the Nonconformance/Incident Report (NCIR). The QA Manager and the Project Manager confer to determine the disposition and cause of the condition, and the corrective action necessary to preclude recurrence. If required by contract, the nonconformance is reported to the client. To close the nonconformance, the QA Manager confirms that all required actions have been appropriately completed. Incidents are reported and documented similarly, with the additional requirement of immediate and more detailed reporting to the client.

6. RESPONSIBILITIES

6.1 All Personnel

All personnel shall notify QA representatives when nonconforming conditions are observed; in case of incidents, all personnel are responsible for immediately reporting the situation to both the Project Manager and the QA Manager.

6.2 QA Personnel

QA Personnel performing inspections or reviews have the authorization and responsibility for obtaining immediate corrective action in cases of minor deficiencies, and for initiating nonconformance reports in cases of nonconformance. They are responsible for stopping work when necessary and appropriate and for the physical separation and identification of nonconforming items or documents whenever possible.

6.3 Project Manager and QA Manager

The Project Manager and QA Manager are jointly responsible for reviewing and approving all nonconformances, determining cause, providing disposition and defining the corrective action required to preclude or reduce the likelihood of future occurrences. The QA Manager is responsible for reporting all nonconformances to the client when required by contract. In the case of significant nonconformances and incidents, the Project Manager and QA Manager shall notify their respective client contacts. On a case by case basis, the QA Manager and the Project Manager may delegate responsibility for certain aspects of resolution of nonconformances to the Project or Field QA Coordinator and Project Administrator or cognizant Task Leader.

6.4 Office Manager

The Office Manager acts when necessary to resolve differences between Quality Assurance and Project Management regarding corrective action required as a result of nonconformances.

7. EQUIPMENT OR MATERIALS

NCIR forms (Exhibit A) as required.

8. PROCEDURE

8.1 Handling of Minor Deficiencies

Cognizant QA Personnel shall evaluate apparent deficiencies to determine whether or not a nonconformance exists, given the criteria of 3.1 above. If the situation is minor as defined therein, immediate action may be taken to correct the deficiency and shall be documented on a Surveillance Inspection Record (SIR) form in compliance with P-10.0-3 "Surveillance Inspection." In borderline situations or in any case where there is the least uncertainty, the QA Manager shall be apprised of the situation and shall provide direction as required.

8.2 Handling of Nonconformances

The process for documenting and resolving a nonconformance is described below. A logic chart (Exhibit B) is included which graphically represents this process is included.

8.2.1 Initiation of Nonconformance/Incident Documentation; Stop Work Orders, Identification and Segregation

In cases of nonconformances, cognizant QA personnel will initiate a Nonconformance/Incident Report (NCIR; see Exhibit A). All NCIR forms will be numbered consecutively. A log will be maintained by QA in which the date, NCIR control number, description of nonconformance, project reference and status will be recorded. The situation or discrepancy shall be described on the NCIR in concise, descriptive language, and shall include all appropriate references to documents or procedures. If the situation requires stopping work to prevent further discrepancies, danger to personnel, loss of data, or other problems, the originator of the NCIR shall, after immediately notifying the QA Manager and obtaining concurrence, stop work as required. If work stoppage will affect the scheduled performance of related activities, as in construction or testing, the cognizant Task Leader or Project Manager shall likewise be immediately notified. If the nonconformance is associated with materials, items, or reports, they shall be physically separated or segregated wherever possible and identified with a copy of the open NCIR pending completion of review and disposition.

8.2.2 Review

The NCIR shall be routed to the QA Manager for review; a copy of the initial report shall be retained for tracking purposes; completeness of information will be verified, probable cause will be determined, and recommendations for corrective action will be prepared. The QA Manager then shall meet with the Project Manager; together, they shall jointly agree as to probable cause, disposition, and the corrective action required to preclude recurrence. If nonconformances relate to design requirements, any use as-is or repair dispositions shall require the application of the same design control measures and approvals as was required for the original design. When appropriate, disposition authority may be delegated to personnel technically competent in the applicable area, or additional technical support may be obtained as required. If agreement cannot be reached, the Office Manager shall be consulted for resolution of their differences. The cause, disposition and corrective action shall be documented on the NCIR and a corrective action completion date agreed upon. The QA Manager shall notify the client's QA representative when so required by contract, and advise them that complete documentation will be forwarded upon completion of corrective action. On a case by case basis, or in field situations, the QA Manager and Project Manager may delegate all or portions of the review process.

8.2.3 Corrective Action

Corrective action measures shall be selected to prevent or reduce the likelihood of future occurrences and shall address root causes to the extent identifiable; selected measures shall be appropriate in relation to the seriousness of the nonconformance and shall be realistic in terms of the resources required to implement them. Corrective action instructions are summarized on the NCIR, but shall be communicated in appropriate detail to project staff by the QA Manager and Project Manager (or their designees) by the means most appropriate to the situation. This may be by special corrective action group meetings, training sessions, by individual Specific Work Instructions, by internal memo, or by such other means as may be required to implement the required action. Nonconformances indicative of serious trends or worsening conditions shall require specific detailed reports to management. All such actions shall be documented and will become part of the nonconformance files.

8.2.4 Verification of Effectiveness of Corrective Action

Verification of effectiveness of corrective action shall be as required by individual corrective action instructions. Acceptability of reworked items shall be based on original criteria. Acceptability of repaired items shall be based on criteria equivalent to the original requirements.

8.2.5 Closure

The QA Manager shall confirm that both the disposition and verification of corrective action have been accomplished to his satisfaction. Upon confirmation, the QA Manager shall sign the NCIR for each action. The NCIR shall then be considered closed and the date entered in the log. When required by contract, copies of the NCIR and all supporting information shall be submitted for information to the client's QA organization.

8.3 Significant Nonconformances

Significant nonconformances shall be handled in the same manner as reportable nonconformances except that, when required by contract, they shall require the notification of client QA and Project representatives by the QA Manager and Project Manager.

8.4 Incidents

All personnel with knowledge of an incident are responsible for immediate notification of the Project Manager and QA Manager. NCIR's for incidents shall be prepared in the same manner as those for nonconformances. Upon receiving a report of an incident, the QA Manager will verify that the Project Manager has received the information and, if required, immediately notify the client. Verbal notification must take place within 24 hours; a detailed report will be prepared by the Project Manager and QA Manager and submitted to the client within 14 days. The Project Manager and QA Manager are responsible for resolution of any client requests resulting from the reporting of incidents. If the incident involves Golder Associates' responsibility, formal corrective action reports may be submitted in addition to NCIR forms in order to permit a more detailed level of reporting.

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Golder Associates

NONCONFORMANCE/INCIDENT RE

Project Client/Title: _____

Project/Task No. _____

Stop Work? ☐ YES ☐ NO

☐ NONCONFORMANCE

☐ SIGNIFICANT

☐ INCIDENT

NCIR #

DATE:

REPOR

EXAMPLE

CONDITION

Description of Condition (location, time/date of occurrence?)	Disposition to Correct Condition

ACCEPT: QA Mgr./Date _____ Proj. Mgr./Date _____ D

CORRECTIVE ACTION

Cause of Condition	Corrective Action Required
	Estimated Completion Date: _____

ACCEPT: QA Mgr./Date _____ Proj. Mgr./Date _____ Dt

Client Notified by: _____ Date _____

Client Representative Notified _____

Disposition Complete: QA Mgr./Date _____

Corrective Action Complete: QA Mgr./Date _____

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Golder Associates

NCIR/CONTINUATION SHEE

Continuation of Section _____

NCI

EXAMPLE

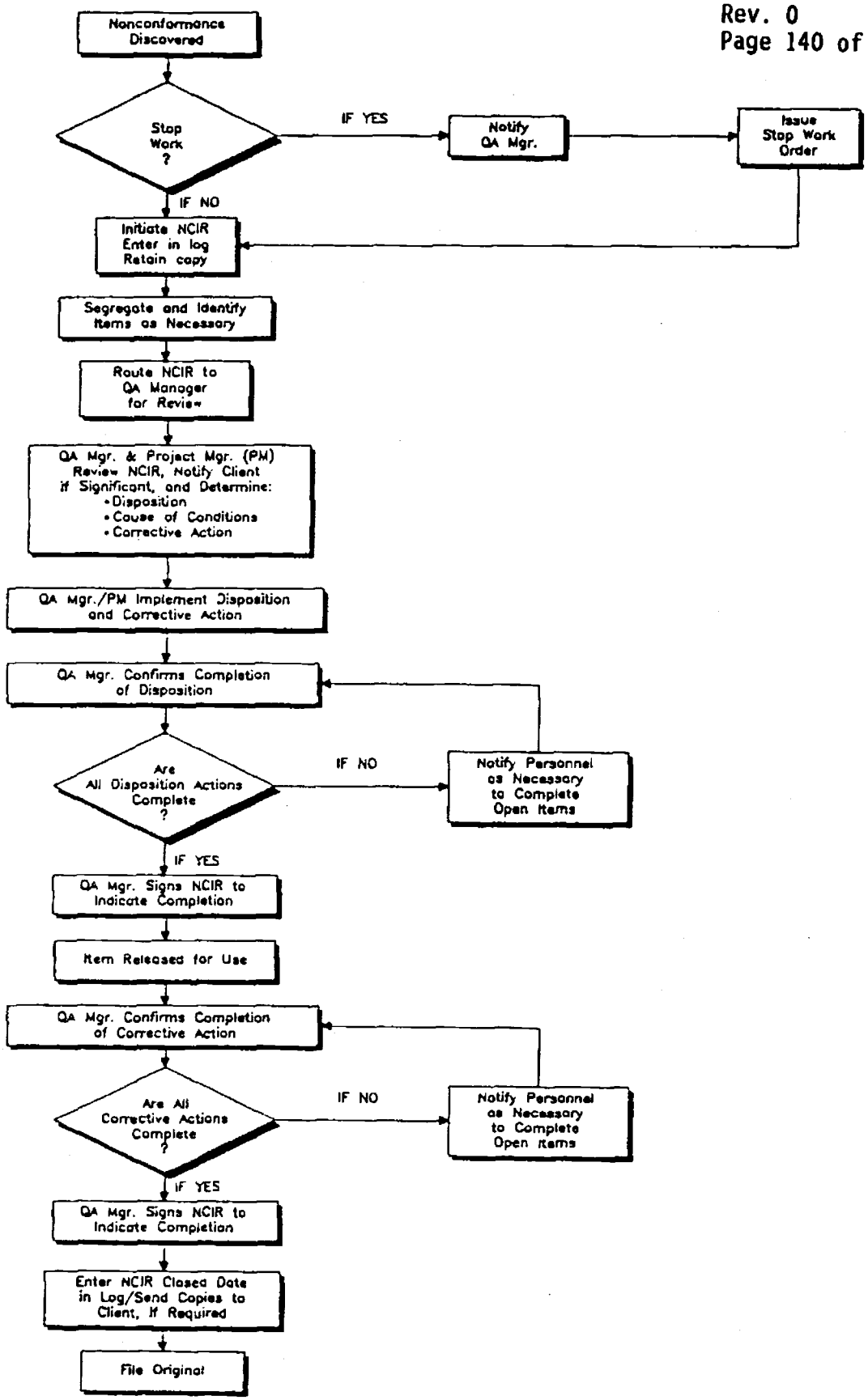

EXHIBIT **B**

NONCONFORMANCE RESOLUTION

QA PROCEDURE P-15.0-1

PROJECT NO 9931024 DWG NO 33730 DATE 6/11/90 DRAWN JSS APPROVED JO

Golder Associates

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Golder Associates Inc.

Quality Assurance Procedure

Number: P-17.0-1
Title: QUALITY ASSURANCE RECORDS MANAGEMENT

Prepared By:	Approved	Approved	Effective Date	Rev. Level
[illegible] 4-2-90	[illegible] 4/3/90	[illegible]	4/3/90	11

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RECORDS OF REVISIONS
P-17.01

Revision Level 11

Page Number	Section	Revision
2	4.0	deleted uncited references per P-5.0-1 Rev. 9

1. PURPOSE

This procedure provides the methodology for the collection, storage, maintenance, retrieval and turnover of Quality Assurance (QA) records.

2. APPLICABILITY

When invoked by project-specific plans or procedures, this procedure applies to the management of all completed documents generated within the context of a QA program that provide evidence of the quality of items or activities affecting quality.

3. DEFINITIONS

3.1 Quality Assurance Records

Quality Assurance Records are completed documents which furnish objective evidence of the quality of items or services, those activities affecting quality, or the completeness and quality of data.

3.1.1 Project QA Records

Project QA records are those Quality Assurance records (as defined above) maintained for a specific project. As examples, correspondence, notes of telephone conversations, project deliverables, reports of data obtained in the field, Specific Work Instructions, and technical reviews are considered project QA records.

3.1.2 Duplicate Records

Duplicate records are copies of the project QA records made at the point of file entry and stored separately from the originals as a measure of protection against loss or damage.

3.1.3 Corporate QA Records

Corporate QA records are those records which may generally be drawn upon to support all project QA programs. Such records may include QA and Technical Procedures, QA Program Plans, personnel training records, audit records, and other records for which QA is directly responsible. Corporate QA Records are stored in the corporate QA files. If a client requires certain types of records stored in the corporate QA files as part of the project QA records,

copies will be routed to the project QA files and will be subject to the duplication and storage requirements defined in this procedure.

3.2 Records Index

A records index is an actively updated list of the project or corporate QA records which defines the location of the records within the filing system.

3.3 QA File Center

The QA File Center is a locking, fire resistant room with controlled access in which project QA records are normally stored.

3.4 Archives Facility

The Archives Facility is a controlled access facility separate from the QA File Center in which duplicate project QA records are normally stored.

4. REFERENCES

None. 11

5. DISCUSSION

This procedure addresses Quality Assurance records, which fall into two categories: QA records maintained for a specific project, and corporate QA records which may be drawn upon to support all project QA programs. A client may require that certain types of corporate QA records be included in the project QA records. In such cases, copies of the corporate records will be routed to the project files, and handled as original project records. Project QA records are reviewed and validated by the Project Secretary prior to filing. Original project QA records are normally stored in the QA File Center. The duplicate files are normally stored in the Archives Facility. Both facilities are under the control of the Records System Administrator. Corporate QA files are stored in a fire resistant, locking cabinet under the control of the QA Manager. Access to records of either type is controlled by a formal checkout system.

6. RESPONSIBILITIES

6.1 Project Manager

The Project Manager is responsible for establishing the basic project structure by dividing project activity into individual tasks, and for providing guidance in the design of the project records index based on the division of tasks.

6.2 Project Secretary

The Project Secretary is responsible for designing the Project Records Index in cooperation with the Records System Administrator, and with guidance from the Project Manager. The Project Secretary is also responsible for providing index changes to the Records System Administrator, and for validating and submitting records for storage.

6.3 Project Personnel

Project personnel are responsible for submitting completed documents to the Project Secretary in a timely manner for validation and forwarding to the project QA files.

6.4 QA Manager (or designee)

The QA Manager is responsible for the maintenance of the corporate QA files and the Corporate Records Index.

6.5 Records System Administrator

The Records System Administrator is responsible for assisting in the design of the Project Records Index with the Project Secretary based on guidance from the Project Manager, and is responsible for the production and maintenance of the Project Records Index, and for storage and control of project QA records files and duplicate files.

7. EQUIPMENT OR MATERIALS

Access-controlled, locking, fire resistant cabinets, access-controlled locking facilities with metal cabinets, and appropriate filing accessories are required to meet the records storage requirements of this procedure.

8. PROCEDURE

8.1 Project QA Records

8.1.1 Project Records Index

At the beginning of each project, a Project Records Index shall be designed which provides the basic structure of the project filing system. The first Index produced identifies the types of records anticipated for the project and assigns a location in the filing system for each type. As the project progresses, the Index is updated to include more and more specific information. The Index shall be designed in a cooperative effort by the Project Secretary and the Records System Administrator. The Project Manager shall provide guidance in the design of the Index based on the project structure and his division of the project activities into job tasks.

As a minimum, the Project Records Index shall include:

- The Golder job number
- The client contract number
- The project title
- A numerical listing of the files
- The title of the file associated with each number. The title shall be specific enough to allow easy retrieval and filing of records.

The Records System Administrator shall produce the Index and update it on a regular basis. The Project Secretary shall provide the Records System Administrator with the information necessary to accurately update the Index. The Records System Administrator shall concur with changes or additions to the Index.

8.1.2 Collection and Validation

Project personnel who generate documents in support of a project shall submit the completed documents to the Project Secretary.

The Project Secretary shall review each document to ensure that it is complete as required by the appropriate QA Procedure, legible, identified with the project number, and contains sufficient information to permit identification between the document and the activity to which it applies. If problems are identified, the document may be returned to the preparer for resolution. The Project Secretary shall also assign a file number to the document based on the Project Records Index. The Project Secretary shall validate each document by

applying a dated records stamp, or by initialing and dating the document. Validated documents shall be forwarded to the Records System Administrator for duplication and filing. At the Project Manager's option, duplication may be performed by support staff. Completed documents awaiting validation and/or entry into the project QA records shall be temporarily stored during non-working hours in a fire-resistant, locking file cabinet, or locking, access-controlled fire-resistant file room.

8.1.3 Duplicate Files

The Records System Administrator shall ensure that a duplicate of each project QA record submitted for filing is produced and properly stored. Duplicate file organization shall be identical to the organization of the original records files. Duplicates shall be stored in binders or folders, in filing cabinets or in containers on shelving. Duplicates shall be stored at a facility which has limited access and is sufficiently removed from the original records to avoid damage or destruction of both sets of files from the same hazardous condition. Normally, duplicates are stored at the Archives Facility. However, when acceptable to the QA Manager and the affected Project Manager, another location may be used provided that the other requirements of this section are met.

8.1.4 Storage Requirements

Project QA records are normally stored in the QA File Center by the Records System Administrator. However, when acceptable to the QA Manager and the Project Manager, records may be stored in another location which has access controls commensurate with those described in paragraph 8.1.5 of this procedure. In either case, records shall be stored in a manner which effectively prevents deterioration or damage from natural disasters or environmental conditions. Records shall be stored in binders, folders, or envelopes in metal cabinets or on shelving in containers. Records files shall be organized separately by project and in accordance with the individual project records index. Special processed records, such as photographs, negatives, and magnetic media shall not be stored in stacks and shall be protected from excessive light, electromagnetic fields, and excessive temperatures and humidity as appropriate for the record type.

8.1.5 QA File Center Access

Access to the QA File Center is limited. The Records System Administrator, with the concurrence of the QA Manager, shall compile a list of personnel allowed direct access to the QA File Center. At least one representative from each project for which records are filed in the Center shall be included on the list. The Project Manager shall designate the project representative. The list shall be posted outside the File Center. All others may gain access only when escorted by an authorized individual, or by permission of the Records System Administrator. The QA File Center shall remain locked when unattended.

8.1.6 Records Retrieval

Individuals may request that files or individual records be retrieved for their use. Requests should be directed to the Records System Administrator. However, any authorized individual (see paragraph 8.1.5) may retrieve records. A formal checkout system shall be used which includes, as a minimum, an outcard to replace the item removed.

8.1.7 Corrections and Revisions

Revisions to records shall be done in accordance with the appropriate QA procedures when applicable. Other corrections shall be made by drawing a single line through the incorrect information and initialing and dating the new entry. Approval of the correction or revision must be equivalent to the level and/or type of approval required for the original information, or as directed by Specific Work Instruction. All corrections and revisions to records checked out of the records files must be brought to the attention of the Records System Administrator to permit appropriate revision of the duplicate files.

8.1.8 Retention Time

All project QA records are considered permanent until turned over to the client or until the close of the contract. After that time, the Project Manager shall determine the disposition of the remaining records unless special direction is provided by the client. Normally, they shall be entered into the Golder archives system.

8.1.9 Records Turnover

Records shall be turned over to the client at their request. Unless otherwise requested by the client, the originals shall be shipped and the duplicates shall remain the property of Golder Associates. Records which have been turned over are the property of the client and maintenance of those records will no longer be considered the responsibility of Golder Associates.

Records to be turned over to the client shall be packaged securely for shipping. Each package of records shall contain an index of the records in that package and shall be clearly labeled as to client, project number, and total number of packages in the shipment. A set of indexes shall be sent to the client under separate cover. Additional requirements may be specified by the client.

8.1.10 Contract Closeout

The date of contract closeout shall be identified by the Project Manager. After this date, records remaining in Golder's possession are no longer subject to the requirements of this procedure. If no records turnover has been requested, and both the duplicate and the original sets remain, the duplicate set may be discarded.

8.2 Corporate QA Records

8.2.1 Corporate Records Index

The Corporate Records Index shall list and provide the location of the records in the corporate QA records files. The QA Manager shall ensure that the index is updated as necessary to reflect changes.

8.2.2 Storage Requirements

Corporate QA records are stored in a locking, fire resistant file cabinet.

8.2.3 Corporate QA Records Access

Access to corporate QA records is by permission of the QA Manager or his designee. A list of personnel allowed access to the files shall be posted on the cabinet.

8.2.4 Retention Time

The following records, as a minimum, shall be retained in the corporate QA files:

- Correspondence from both the current and previous year
- Personnel records for current Golder employees and current subcontractors
- Current revision of each procedure and each QA Plan.

Other records may be transferred to the Golder Archives at the discretion of the QA Manager. Transferred records are no longer subject to the requirements of this procedure. The current contents of the corporate QA files shall be clearly identified on the Corporate Records Index.

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Golder Associates
CONSULTING GEOTECHNICAL AND MINING ENGINEERS

TITLE			EFFECTIVE DATE	REV. LEVEL
P-18.0-1 QUALITY ASSURANCE AUDITS				
PREPARED BY	APPROVED	APPROVED		
3/24/88	3/24/88	3-31-88	3/31/88	12

9 3 1 3 3 3 1 1 6 5

RECORD OF REVISION

Revision Level	Page Number	Section Number	Revision P-18.0-1
12	4	8.1	Clarified audit schedule review requirements
12	6	8.6	Added statement re: notification of situations requiring immediate CA
12	6	8.8	Clarified audit report content requirements
12	8	9.0	Clarified audit record requirements
12	Throughout		Changed "Corporate QA Officer" to "QA Manager"

1. PURPOSE

The purpose of this procedure is to establish methodology and general guidance for Quality Assurance (QA) audits performed by Golder Associates personnel.

2. APPLICABILITY

This procedure applies to all Golder Associates QA audits of internal and subcontracted project activities.

3. DEFINITIONS

3.1 Quality Assurance Audit

A planned and documented investigation performed in accordance with written procedures or checklists for the purposes of verification, by examination and evaluation of objective evidence, that applicable elements of a Quality Assurance program have been developed, documented, and effectively implemented in accordance with specified requirements.

3.2 Lead Auditor

A qualified, and certified individual authorized to organize and direct audits, report findings, and evaluate corrective action. Lead Auditors shall be trained, qualified and certified as required by procedure P-18.0-2, "Auditor Qualification."

3.3 Auditor

A qualified and trained individual authorized to perform audit functions under the direction of a Lead Auditor. Auditors shall be qualified and trained as required by procedure P-18.0-2, "Auditor Qualification."

3.4 Technical Observer

An audit team member assigned to observe audit activities under the direction of the Lead Auditor. At the Lead Auditor's discretion, technical observers may be requested to participate in areas of an audit for which they have particular technical expertise.

3.5 External Audit

An audit of the QA program of a subcontractor, supplier, consultant, or other external organization.

3.6 Internal Audit

An audit of those portions of a Quality Assurance program controlled by and within Golder Associates' own organizational structure.

3.7 Finding

A deficiency or lack of compliance with any element of the QA program which renders the quality of items, services, or activities unacceptable or indeterminate. All findings must be formally resolved to assure effective correction of the observed condition and the adoption of preventive measures to reduce or preclude the likelihood of recurrence.

3.8 Observation

A weakness in a program or practice that could lead to a more serious deficiency or finding if not corrected. Although not necessarily constituting a lack of compliance or affecting quality, all observations must be formally resolved to assure effective correction of the observed condition and the adoption of preventive measures to reduce or preclude the likelihood of recurrence.

3.9 Management Assessment

An independent, annual assessment of the overall effectiveness of the QA program by a representative of Golder Associates upper management familiar with the scope of contractual QA requirements and Golder Associates' QA program. The assessment is documented by means of a report that is presented to the President of Golder Associates, the Principal-in-Charge, and the QA Manager.

4. REFERENCES

4.1 Golder Associates Quality Assurance Manual, Section 18.0, "Quality Audits."

4.2 Golder Associates Quality Assurance Procedure P-18.0-2, "Auditor Qualification."

4.3 10 CFR 50, Appendix B, Section XVIII, as interpreted by ANSI/ASME NQA-1.

5. DISCUSSION

QA audits are performed periodically on internal or subcontracted project activities to verify project performance relative to established quality requirements and to provide management information on the effectiveness of project QA programs. Auditing is a positive activity, which has as its

ultimate goal the improvement or enhancement of project performance. QA audits are independent, formal processes with strict rules of conduct and protocol designed to assure the impartiality and usefulness of the results. Auditor and technical observer selection is based on experience, training, and functional independence from the organization or group being audited. The activities of auditors and observers are directed by a trained and qualified Lead Auditor who has primary responsibility for audit planning, conduct, reporting of results, and monitoring the effectiveness of corrective action. The effectiveness of the auditing program itself is evaluated by an annual independent management assessment.

6. RESPONSIBILITIES

6.1 QA Manager

Responsible for establishing audit schedules in project-specific QA Program Plans. Responsible for selection of Lead Auditors who are functionally independent from audited organizations. In conjunction with the Lead Auditor, reviews and approves audit plans and reports prior to release. Responsible for preparation of an annual report to management on the previous year's audit activity.

6.2 Lead Auditor

Responsible for the organization and direction of audits; selection and supervision of auditors and technical observers functionally independent from the organization or group being audited; and the evaluation of observations and findings. In conjunction with the QA Manager, reviews and approves audit plans and reports prior to release. Presents audit results to project management and evaluates corrective action responses.

6.3 Auditor

Under the direction of the Lead Auditor, responsible for assisting in audit preparation, conduct, and report preparations.

6.4 Technical Observer

At the direction of the Lead Auditor, responsible for assisting in audit preparation and conduct in selected audit areas.

6.5 Audited Organization

Responsible for the provision of time, workspace, and availability of personnel as necessary to support the performance of the audit. Responsible for the effective resolution of audit findings and observations.

7. REQUIRED MATERIALS OR DOCUMENTS

- Notification letter or memorandum
- Audit plan
- Pre- and post-audit attendance sheets
- Audit checklists (see Exhibit A)
- Reference plans or procedures
- Audit Quality Notices (see Exhibit B)

8. PROCEDURE

8.1 Audit Scheduling

QA audits shall be conducted in accordance with schedules contained within individual Project Specific QA Program Plans. Audit frequency shall be based on the scope, level of activity, and complexity of the project as well as the number of personnel assigned, specific client requirements, and other factors. Schedules presented in each QA Program Plan shall be considered minimum requirements, and shall be periodically reviewed and revised to accommodate changing project requirements. Audit frequency may be increased at the discretion of the QA Manager or when requested by management.

8.2 Audit Plan Preparation

The Lead Auditor shall be responsible for preparation of an audit plan. The audit plan shall be approved by both the Lead Auditor and QA Manager, and shall include the following:

- The source of the requirement for conducting the audit
- The audit number (consecutive on a calendar year basis)
- Identification of the audited organization
- The specific project, tasks or activities being audited
- A discussion of any special emphasis or focus
- Specific plan, procedures, or requirement references
- The prospective date(s) of the audit

- Identification of the audit team, with definition of audit responsibilities.

Audit team selection shall be based on team member independence from the organization being audited. Technical observers may be selected if, in the opinion of the Lead Auditor, a particular type of expertise would enhance audit effectiveness. Audit files and nonconformance records for the audited organization shall be reviewed for trends or repetitive problems. Existence of such conditions shall prompt the re-examination of problem areas.

8.3 Audit Notification

The Lead Auditor shall transmit a memo or letter of notification transmitting the audit plan to the prospective auditee at least two weeks prior to the projected audit date. The notification letter or memo shall set the date, time, and location of the opening meeting, request that appropriate personnel from the audited organization be in attendance, and, for external audits, request separate working space for the audit team to work in during the course of the audit.

8.4 Audit Checklist Preparation

Lead Auditors shall be responsible for directing the preparation of the audit checklist. Checklist format is provided as Exhibit A. Auditors or technical observers may be assigned the preparation of checklist sections, particularly in areas for which they will assume auditing responsibilities. The checklist shall be reviewed and approved by the Lead Auditor and the QA Manager. Approval shall be indicated by signature and date on sheet of the checklist.

Checklist content shall be consistent with the scope of the audit presented in the Audit Plan; checklist items shall be structured in question format and shall directly relate to the procedure and plan requirements applicable to the audited area. As much as possible, questions should focus the inquiry towards an evaluation of the effectiveness of implementation of plan and procedure requirements.

Copies of the checklist, the audit plan, and any required reference specifications, procedures, or plans shall be distributed to the audit team prior to the audit. The Lead Auditor shall brief the audit team on the general scope of the audit, the details of the audit plan, and discuss audit checklist assignments prior to the pre-audit meeting.

8.5 Pre-audit Meeting

The preaudit meeting shall be conducted by the Lead Auditor and shall be attended by the audit team and appropriate representatives of the audited organization. Attendance shall be documented. The scope of the audit and duties of the auditors or any technical observers shall be briefly presented.

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Questions from the audited organization shall be answered, proper lines of communication established, and a time set for the closeout meeting.

8.6 Conducting the Audit Investigation

Each auditor should proceed with the investigations required on their assigned portion of the checklist. Auditing techniques should include records review, interviews with project staff, and direct observation of project activities. Personnel interviewed shall be noted in the response column on the checklist. When evaluating similar items of information, a sufficiently large sample shall be selected to support any conclusions. The audit team shall meet and report on audit progress at the direction of the Lead Auditor. Observed conditions that require immediate corrective action shall be promptly reported to the management of the audited organization; in any case, daily briefings shall be given to the audited organization at their option. The Lead Auditor may restructure the audit in terms of emphasis and auditor assignment as required to accommodate changes to the audit plan or checklist required as a result of information obtained during the audit. Demand on project resources and time should not be increased beyond the level presented in the opening meeting without first clearing such requests with the management of the audited organization.

8.7 Post-Audit Meeting

When all checklist items have been completed, the audit team shall meet and present their potential findings, or observations to the Lead Auditor. The Lead Auditor shall review the auditors' input, obtain additional clarification where required, and prepare a draft list of potential findings and observations for presentation to representatives of the audited organization in a post-audit meeting. Discussion should be limited to the presentation of findings and observations and the resolution of any errors or misunderstandings. Audited personnel shall be advised that a written report will be forthcoming with full details of any findings or observations. Attendance shall be documented.

8.8 Audit Report Preparation

After the post-audit meeting, the auditors shall prepare final copies of their completed checklist sections and submit them to the Lead Auditor. The Lead Auditor shall document each finding or observation on an Audit Quality Notice (AQN, see Exhibit B) and shall prepare a formal audit report in the form of a memo or letter to the management of the audited organization. The report shall include the following:

- A brief description of the audit scope
- Identification of the audit team and all personnel contacted from the audited organization

- A general statement of effectiveness
- Discussion of all findings, observations, and comments

The audit report shall formally transmit any AQNs, which shall contain sufficient detail to permit effective corrective action responses. All AQNs shall require response by the audited organization regarding its proposed corrective action within fifteen working days after receipt. The report shall be reviewed, approved, and countersigned by the QA Manager prior to transmittal.

8.9 Determination of Cause and Proposed Corrective Action

The audited organization shall respond to the AQNs in the time specified. The deficiency shall be investigated and the cause determined and documented on the AQN; the description of cause must address the basic source of the problem. Proposed corrective action must address the possibility of similar problems outside the audited sample, and, considering the source or cause of the problem, must be capable of implementation at an effective level.

8.10 Review of AQN Responses and Audit Closeout

The Lead Auditor shall evaluate responses from the audited organization to assure that the proposed corrective action for each finding or observation has been adequately addressed. In some cases, corrective action may require reassignment to other groups for the corrective action to be considered effective. (In cases in which corrective action responsibilities lead back to the Lead Auditor's organization, the proposed corrective action on the AQN must be reviewed by an independent management representative familiar with the auditing process to assure the appropriateness of the response. The same management representative must countersign the AQN upon closeout.) The Lead Auditor shall initiate a letter or memorandum to inform the audited organization and the QA Manager of the acceptance or rejection of audit responses. Memoranda indicating acceptance must identify any conditions that must be verified prior to audit closeout. Methods of verification of corrective action may include direct examination, reaudit, interview, or other appropriate means selected by the Lead Auditor. Memoranda indicating rejections must contain sufficient detail to redirect the auditee and establish a new response due date. The Lead Auditor or a designated audit team member shall actively track the resolution of observations or findings until closeout. The Lead Auditor and the QA Manager must concur on the closeout of all findings and observations.

8.11 Management Assessments

An independent management assessment of the overall implementation of QA program requirements on projects requiring QA Program Plans shall be conducted at least once annually to provide upper management independent evaluations of the effectiveness of all elements of the QA program including auditing. Such

assessments may be performed by outside consultants with appropriate expertise or by senior management officials; assessments shall be documented in letter or memo format and forwarded to the President, Principal-in-charge, and QA Manager. The QA Manager shall be responsible for any required corrective action resulting from management assessments.

9. RECORDS

Audit records shall be retained as follows:

- Corporate QA Records: Notification letter or memorandum, pre- and post-audit attendance sheets, audit plan, completed checklist, audit report letter or memorandum, completed and closed AQNs (with any additional related responses from the audited organization attached), and, in a separate file, independent management assessments.

- Project QA Records: Same as above, less completed checklists and management assessment documentation, with transmittal letters if required for informational submittals to the client by the QA Program Plan.

GOLDER ASSOCIATES
QA AUDIT CHECKLIST

Approved by _____ Lead Auditor

_____ Quality Assurance Officer

Approval Date _____

Audit Number _____

Date _____

Audited Organization _____

QUESTION	REFERENCE REQUIREMENT	

EXAMPLE

P-18.0-1
Exhibit B

GOLDER ASSOCIATES, INC.
AUDIT QUALITY NOTICE (AQN)

1. TO:_____

2. ORGANIZATION:_____

3. COMPANY OR PROJECT:_____

4. FROM:_____

5. AQN NUMBER:_____

6. TYPE OF NOTICE:_____

___ FINDING ___ OBSERVATION

7. DESCRIPTION OF REQUIREMENT:_____

8. DISCUSSION OF CONDITION REQUIRING CORRECTIVE ACTION:_____

9. DISCUSSED WITH:_____ DATE:_____

10. AUDITED ORGANIZATION TO COMPLETE THE FOLLOWING ITEMS AND RETURN TO GAI QA BY:_____

11. PROPOSED CORRECTIVE ACTION; LIST FUNDAMENTAL BASIS FOR DEFICIENCY AND ACTION TO BE TAKEN TO PREVENT RECURRENCE:_____

12. COMPLETION SCHEDULED BY:_____
DATE

13. RESPONSIBLE FOR CORRECTIVE ACTION:_____
_____
DATE

CLOSEOUT

14. CLOSED BY:_____
LEAD AUDITOR

DATE CLOSED:_____

15. APPROVED BY:_____
GAI QA MANAGER

DATE APPROVED:_____

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Golder Associates
CONSULTING GEOTECHNICAL AND MINING ENGINEERS

TITLE			EFFECTIVE DATE	REV. LEVEL
P-18.0-2 AUDITOR QUALIFICATION				
PREPARED BY	APPROVED	APPROVED		
3/29/88	3/29/88	3-31-88	3/31/88	4

Revision Level	Page Number	Section Number	Revision P-18.0-2
4	Throughout		Changed "Corporate QA Officer" to "QA Manager"
4	3	8.1.2	Clarified qualification lapse definition
4	3	8.1.3	Clarified certification responsibilities if Lead Auditor is also QA Manager
4	4	8.2.2	Clarified preaudit discussion content
4	5	8.3.3	Defined responsibilities for maintenance of audit log
Exhibit A			Added second certification block

1. PURPOSE

This procedure defines the requirements for the qualification, training, and orientation of Golder Associates' Quality Assurance (QA) auditors, lead auditors, and technical observers.

2. APPLICABILITY

This procedure applies to all Golder Associates' QA auditors, lead auditors, and technical observers performing audit functions under the requirements of procedure P-18.0-1, "Quality Assurance Audits."

3. DEFINITIONS

3.1 Quality Assurance Audit

A planned and documented investigation performed in accordance with written procedures or checklists to verify, by examination and evaluation of objective evidence, that applicable elements of a QA program have been developed, documented, and effectively implemented in accordance with specified requirements.

3.2 Lead Auditor

A qualified individual, certified by Golder Associates' management, who is authorized to organize and direct audits, report findings, and evaluate corrective action.

3.3 Auditor

A qualified and trained individual authorized to perform audit functions under the direction of a lead auditor.

3.4 Technical Observer

An audit team member assigned to observe audit activities under the direction of the lead auditor. At the lead auditor's discretion, technical observers may be requested to participate as an auditor in areas of the audit for which they have particular technical expertise.

4. REFERENCES

4.1 ANSI/ASME NQA-1, Basic Requirement 18, Supplement 2S-3, and Appendix 2A-3.

4.2 Golder Associates QA Procedure P-18.0-1, "Audits."

5. DISCUSSION

All QA audit functions shall be performed by qualified lead auditors, auditors, or technical observers who are independent from direct responsibility for the activities being audited. Qualification of auditors and technical observers shall be based on appropriate work experience and on audit-specific training and guidance provided by the lead auditor. Lead auditors shall be experienced in the auditing process, and, by virtue of passing a comprehensive examination, shall have demonstrated knowledge of 10 CFR 50 Appendix B, ANSI/ASME NQA-1, general requirements of QA programs, evaluative auditing techniques, and audit planning and execution.

6. RESPONSIBILITIES

6.1 Lead Auditor

Responsible for selection of the audit team; trains newly assigned auditors or technical observers in the requirements of procedure P-18.0-1 and provides general background in the provisions of 10 CFR 50 Appendix B, ANSI/ASME NQA-1, and Golder Associates QA program. Responsible for providing direction to the audit team in the requirements of individually assigned checklist sections and any referenced plans or procedures.

6.2 QA Manager

Responsible for the certification of lead auditors in conjunction with the Office Manager.

6.3 Office Manager

Responsible for the certification of lead auditors in conjunction with the QA Manager.

7. MATERIALS

- Lead Auditor Qualification Record (Exhibit A)

8. PROCEDURE

8.1 Lead Auditor Qualification Requirements

8.1.1 Basic Requirements

Lead auditors shall possess the oral and verbal communication skills necessary to effectively conduct an audit. By written examination, they shall have demonstrated their knowledge of the applicable regulatory guidelines and standards, the general requirements of QA programs, appropriate auditing techniques, and the methods of audit planning. Lead auditors shall have participated in at least five (5) previous audits in the three years prior to certification, one of which, in the last year prior to certification, shall have been conducted on a program for which 10 CFR 50 Appendix B was a regulatory requirement. Lead auditors shall have additional technical and/or QA related experience totalling at least ten (10) points as required by the Lead Auditor Qualification Record (Exhibit A). Qualification points shall be assigned in accordance with the guidelines provided in paragraphs 2.1, 2.2, 2.3, and 2.4 of Appendix 2A-3, ANSI/ASME NQA-1.

8.1.2 Maintenance of Qualification and Requalification

Lead auditor performance shall be assessed on an annual basis to assure continued facility with the auditing process and P-18.0-1 requirements. Qualification may be maintained by continued active work assignment within the QA organization, participation in an audit training program, or by active participation in the audit process. In any case, in order to maintain qualification, at least once every two years a lead auditor must lead or participate in an audit conducted in accordance with procedure P-18.0-1. If qualification should lapse, the QA Manager and the Office Manager shall assess the circumstances requiring requalification. Retraining may be required if warranted, but in all cases the candidate shall be re-examined as described in 8.1.1 above, and shall participate in at least one nuclear level audit under the direction of a certified lead auditor.

8.1.3 Certification

The branch Office Manager and QA Manager will certify individuals as lead auditors when the basic qualification requirements are met as defined in 8.1.1 above, except that if the QA Manager is also the candidate for certification, the Office Manager alone shall certify. Lead auditors will be recertified on an annual basis provided that the maintenance requirements defined in 8.1.2 are met and documented. Lead auditors whose qualifications have lapsed will be recertified only when the requalification requirements described in 8.1.2 have been completed.

8.2 Auditor and Technical Observer Qualification Requirements

8.2.1 Experience Requirements

Auditors shall have at least 2 years geotechnical, nuclear industry, or QA background; auditors and technical observers shall have at least six months' experience working under Golder Associates' (or similar) QA program. Technical observers assigned audit duties shall have expertise in the assigned area as documented by corporate resume. In exceptional circumstances (for example, a situation in which a potential observer or auditor has a particularly useful technical expertise but is an independent consultant or has just recently joined the company), experience requirements for a particular individual may be waived by the lead auditor for a particular audit; written justification shall be retained on file, however, and the training and orientation required by 8.2.2 given additional emphasis.

8.2.2 Qualification of Auditors and Technical Observers

Auditors and technical observers shall participate in a preaudit orientation meeting led by the lead auditor. In addition to discussing the detailed scope of the audit to be performed, the lead auditor shall provide newly assigned auditors and observers instruction in the provisions of 10 CFR 50 Appendix B, ANSI/ASME NQA-1, proper auditing technique, and the provisions of Golder Associates' QA procedure P-18.0-1, "Audits." Regardless of previous experience, all auditors or observers shall be briefed in the requirements of their assigned checklist sections and in the provisions of any referenced plans or procedures. 4

8.3 Qualification Documentation Requirements

8.3.1 Lead Auditor Qualification Documentation

If performed internally, lead auditor examinations shall be retained in confidential personnel files. Successful examination completion, assessment of communications skills, experience, credentials, certification, and annual evaluation shall be documented on the Lead Auditor Qualification Record (Exhibit A) and retained in corporate QA personnel files. Qualification points shall be assigned for experience as discussed in paragraphs 2.1, 2.2, 2.3, and 2.4 of Appendix 2A-3, ANSI/ASME NQA-1. If examinations are performed by outside agencies, copies of course completion certifications and notification of successfully completed examinations shall also be retained in corporate QA personnel files.

8.3.2 Auditor and Technical Observer Training Records

Auditor and technical observer training and orientation as required by section 8.2.2 above shall be documented on a standard QA training record (see Exhibit A, P-2.0-1, "Personnel Training"); training records shall be reviewed and approved by the Corporate QA Officer.

8.3.3 Audit Participation Records

Records of audit participation by all lead auditors, auditors, and technical observers shall be documented by the audit log and summary maintained in corporate QA records. The log shall be updated at least quarterly by the Lead Auditor or designated QA personnel, and copies routed to the individual corporate QA personnel records for the auditors and observers so identified. 4

8.3.4 Records of Technical Experience

Corporate resumes documenting the general technical experience and background of all lead auditors, auditors, and technical observers shall be retained in corporate QA personnel records.

LEAD AUDITOR QUALIFICATION RECORD

Golder Associates

Auditor	Date	
QUALIFICATION POINT REQUIREMENTS		CREDITS
Education-University/Degree Date	4 Credits Max.	
1. Undergraduate Level 2. Graduate Level		
Experience-Company/Dates	9 Credits Max.	
Technical (0-5 credits), and Nuclear Industry (0-1 credit), or Quality Assurance (0-2 credits), or Auditing (0-4 credits)		
Other Credentials	2 Credits Max.	
1. 2.		
Rights of Management	2 Credits Max.	
Justification: Evaluated by: (Name and Title)	Date	
	Total Credits	
AUDIT COMMUNICATION SKILLS		
Evaluated by: (Name and Title)	Date	
AUDIT TRAINING COURSES		
Description: 1. 2.		

AUDIT PARTICIPATION, INITIAL QUALIFICATION*

Location	Audit	Date
1.		
2.		
3.		
4.		
5.		

EXAMINATION BY:	PASSED EXAMINATION ON (Date):
AUDITOR QUALIFICATION CERTIFIED BY: (Signature and Title)	Date Certified
AUDITOR QUALIFICATION CERTIFIED BY: (Signature and Title)	Date Certified

ANNUAL EVALUATION (Signature and Date)					

*Status reports updated and attached annually

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START

010470

July 12, 1990
Final

Meeting Minutes Transmittal/Approval
Unit Mangers Meeting: LLW Burial Ground
Richland, Wa.

Meeting Held June 29, 1990

Appvl. EPA Not Required to Sign Date: _____
Daniel L. Duncan, EPA Region X, Unit Manager

Appvl. Clifford E. Clark Date: 7-25-90
Clifford E. Clark, Unit Manager, DOE-RL

Appvl. _____ Date: _____
Randal J. Roberts, Contractor Representative, WHC

Appvl. S. M. Price Date: 7-25-90
Susan M. Price, RCRA Permitting, WHC

Appvl. Russ Brown Date: 7-25-90
Russ Brown, Unit Manger, Washington State Department of Ecology

PURPOSE: Monthly status meeting.

Meeting Minutes are attached. Minutes are comprised of the following:

Attachment #1 - Summary of Discussion and Commitments
Attachment #2 - Agenda
Attachment #3 - Attendance List
Attachment #4 - Commitments/Agreements Status
Attachment #5 - Liner/Leachate Compatibility Test Plan Presentation Overheads

AUG 1990
RECEIVED
EDMC

Distribution:

M.R. Adams	WHC	(L4-92)
M.J. Anthony	DOE	(A6-95)
S.A. Benfer	SWEC	(A4-35)
J.D. Bauer	WHC	(B3-15)
L.E. Borneman	WHC	(B2-19)
E.A. Bracken	DOE	(A6-95)
L.C. Brown	WHC	(H4-51)
R.W. Brown	WHC	(H4-55)
R. Brown	Ecology	
J.W. Cammann	WHC	(H4-54)
R.M. Carosino	DOE	(A4-52)
G.D. Carpenter	WHC	(H4-15)
C.E. Clark	DOE	(A6-95)
C. DeFigh-Price	WHC	(B2-20)
C.K. Disibio	WHC	(B3-02)
W. T. Dixon	WHC	(B2-35)
G.T. Dukelow	WHC	(R2-97)
D.L. Duncan	EPA	
K.R. Fecht	WHC	(H4-56)
C.J. Geier	WHC	(H4-57)
T.M. Hennig	DOE	(A6-80)
K.L. Hoewing	WHC	(B3-06)
R.D. Izatt	DOE	(A6-95)
G.W. Jackson	WHC	(R2-29)
R.J. Landon	WHC	(B2-19)
R.E. Lerch	WHC	(B2-35)
M. Lerchen	Ecology	
D.W. Lindsey	WHC	(R2-82)
H.E. McGuire	WHC	(B2-35)
T.M. Michelena	Ecology	
S.H. Norton	WHC	(T3-28)
J.W. Olson	WHC	(R2-82)
R.D. Pierce	WHC	(R2-80)
L.L. Powers	WHC	(B2-35)
S.M. Price	WHC	(H4-57)
L.W. Roberts	WHC	(R2-80)
R.J. Roberts	WHC	(R2-97)
F.A. Ruck III	WHC	(H4-57)
S.A. Wiegman	WHC	(B2-19)
K.A. Woodworth	WHC	(H4-55)
EDMC	WHC	(H4-51)

G.C. Henckel	WHC	(H4-55)
G.C. Evans	WHC	(H4-5)
R.J. Roberts	WHC	(R2-9)
T.L. Yount	WHC	(R3-4)
D.L. Armstrong	WHC	(R2-82)
R.D. Pierce	WHC	(R2-80)
J.R. Divine	PNL	(P8-44)

ADMINISTRATIVE RECORD (LLW Burial Ground) [Care of Susan Wray, WHC (H4-22C)]

Attachment #1
Summary of Discussion and Commitments

A. Liner/Leachate Compatibility Test Plan

Jim Divine (PNL) gave a presentation covering the test plan for synthetic liners and geo-textiles. The presentation covered the characterization of the potential leachate and the creation of a synthetic waste along with the selection of liner samples and testing time schedules. Copies of the overhead slides are appended in Attachment #5.

During the presentation, Ecology questioned if an incinerator or pretreatment plant was going to be built and permitted to treat LDRs. DOE/WHC stated that the waste will be treated and that levels will be down to treatment standards, in addition, any waste brought in from other facilities will be pre-treated prior to arrival and on site burial.

The Test Plan will be out next week after DOE has concurred with the plan. At that point it will be sent to Ecology. Ecology stated that their consultant, Brown & Caldwell, will be reviewing the Test Plan.

Action Item #1: A copy of the Liner/Leachate Compatibility Plan will be sent to Ecology after DOE review. Action DOE

Proposed time schedule:

- o WHC has authorized PNL to begin testing.
  - o Testing has started on the Geo-Textiles, progress to date; approximately 2 weeks into the first 9090 test.
  - o Presently waiting for samples of the liner for testing. As soon as they are available testing will begin.
  - o Final report on test results will be written and issued in November or December.

Progress Reports on the testing program will be given at the UMM as preliminary results become available.

WHC commented that the tentative starting schedule for the construction of the trenches and liners is May-June, 1991.

B. NODs

NOD #1, 2-1

WHC stated that their understanding of the regulations is that the existing portion of the landfill is automatically exempt from the requirements for liners. JCE 7-25-90
The existing portion is defined in the LLBG Part B Revision 0. 7-25-90 7-25-90

WHC requested clarification on Ecology's comment. Ecology stated that the WAC regulations indicate any portion of the trench currently being filled with mixed waste needs to meet the liner requirement or a waiver needs to be applied to cover this activity. WHC stated that currently no mixed waste is being disposed of at the LLWBG site. Ecology stated that a waiver will be required if disposal activities start. without informing Ecology. 7-25-90

NOD #2, 2-2

Discussed the table of projected volumes received at the site. WHC commented that the true volume forecasted is in the Part A Permit.

NOD #34, 5-3

WHC commented that the wording on the point of compliance is very important in how it is perceived. Currently the line (point) of compliance is the line of monitoring wells. DOE/WHC feels that if the point of compliance is located 500 ft beyond the line of monitoring wells, it would be evident to the public that detection of contaminates occurred 500 feet before the point of compliance. Ecology will give guidance on the wording and location of the point of compliance.

Action Item #2: Ecology will provide guidance in the location and wording for the point of compliance. Action Ecology.

NOD #94, 7A-1 through 7A-4

WHC commented that this issue will be addressed the same as in 616.

NOD #97, 98, 99

WHC stated that these comments will be covered in Chapter 9. According to EPA guidance, a risk assessment is not required, only a list of known spills at the site. Ecology commented that they thought the regulations required more than just the historic spill data and will check the new citing standards.

C. General

WHC informed Ecology that chapter 5 has been revised with the addition of new data.

WHC suggested a schedule be developed for delivery to Ecology of the following items and suggested dates:

1. Copy of a completed RCRA waiver for Trench 94 Submarine Reactor Compartment Disposal: July 25

2. Design package for MTR Trench: August
3. Chapter 5 revisions: ~~July 25~~ To be determined 8/7/25-90

Ecology's view of the SEPA requirement for the LLWBG is that SEPA requirements must be fulfilled. Their stance is that this is a site wide issue. They are looking at going the route of a DS (determination of significance) which would mean an EIS and possibly integrating it with NEPA. Ecology is currently looking into this issue internally.

Agreement **The next meeting will be held in Lacey, Washington on July 25th.**

Attachment #2
Agenda

LOW-LEVEL WASTE BURIAL GROUND
UNIT MANAGERS MEETINGS

9:00 - 11:30 a.m.
June 29, 1990
Federal Building
Room 180

I. Introductory remarks (Cliff Clark (DOE), Russ Brown (Ecology))

II. Liner/Leachate Compatibility Test (Jim Devine (PNL))

III. Discussion of NOD comments and response schedule (George Evans (WHC), Sue Price (WHC))

IV. Review of action items

Attachment #3
Attendance List

Mike Gasser	SWEC	509-376-9830
Stacey Benfer	SWEC	509-376-3217
George C. Henkel III	WHC	509-376-1994
George C. Evans	WHC	509-376-8939
Sue Price	WHC	509-376-1653
Randy Roberts	WHC	509-373-1065
Thomas Yount	WHC	509-373-3729
Dennis Armstrong	WHC	509-373-1048
Russ Brown	Ecology	206-438-7526
Cliff Clark	DOE	509-376-9333
Rick Pierce	WHC	509-373-4846
Jim Divine	PNL	
Toby Michelena	Ecology	
Thomas Yount	Ecology	

Attachment #4
Commitments/Agreements Status

ACTION ITEM	COMMITMENTS/AGREEMENTS STATUS LIST
6-28-90:1	A copy of the Liner/Leachate Compatibility Plan will be sent to Ecology after DOE review. Action DOE NEW
6-28-90:2	Ecology will provide guidance in the location and wording for the point of compliance. Action Ecology. NEW
Agreement	The next meeting will be held in Lacey, Washington on July 25th.

Attachment #5

A Presentation to the

WASHINGTON STATE

Department of Ecology

by

J. R. Divine, PhD, PE

Pacific Northwest Laboratory
Richland, WA 99352

LINER/LEACHATE COMPATIBILITY TEST
WHC PROJECT W-025, RADIOACTIVE
MIXED WASTE (RMW) DISPOSAL FACILITY

LINER/LEACHATE COMPATIBILITY TEST PLAN
"EPA 9090" TESTS

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FINGERPRINTING 7
SOIL-LINER 7
DATA ENTRY 8
SAMPLE IMMERSION TESTS 8
RADIATION TESTING 8
TESTING FACILITIES AND EQUIPMENT 9
SAMPLE HANDLING 9
VISUAL EXAMINATION 9
SAMPLE MEASUREMENTS 10
DATA REDUCTION AND ANALYSIS 11
REPORTING AND TASK MANAGEMENT 11
QUALITY ASSURANCE 12
MEASURING AND TESTING EQUIPMENT 12
TRAINING 12
INVENTORY CONTROL 12
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LINER/LEACHATE COMPATIBILITY TEST PLAN

"EPA 9090" TESTS

APPENDIX List

Of Chemicals

These pages consist of: SOW Attachment 1, pages 8 to 14 inclusive of the SOW, of the draft Statement of Work "9090 Liner/Leachate Compatibility Test, Project W-025, Radioactive Mixed Waste (RMW) Disposal Facility" sent by M R Adams, WHC, to J R Divine, PNL, January 3, 1990; and a copy of the draft letter from W G Jensen to R A Carlson, "Potential List of Constituents for EPA 9090 Liner/Leachate Compatibility Test," March 13, 1990, 13842-WGJ-90-xxx.

Att. 13842-WGJ-89-354

LLW (non-tru) Toxics from 11-08-86 through 09-30-89

Toxic Name	Toxic Weight-lbs	Weight-(1) factor	Weight-(2) factor
*** ACIDS ***			
ACETYLENE TETRABROMIDE	6.20	0.00%	0.0001%
BORON TRIFLUORIDE	0.23	0.00%	0.0000%
(6) CORROSIVE REACTOR ANALYSIS SOL	42.42	0.00%	0.0005%
ETHYLHEXYLPHOSPHORIC ACID	0.00	0.00%	0.0000%
FORMIC ACID	53.80	0.00%	0.0007%
KLEEN-O-BOWL	21.27	0.00%	0.0003%
OXALIC "	0.66	0.00%	0.0000%
PHOSPHORIC ACID	118.20	0.01%	0.0015%
PHOSPHORIC/HCL SOLUTION	41.89	0.00%	0.0005%
*** CAUSTICS ***			
ALUMINUM NITRATE	180.77	0.01%	0.0023%
AMMONIA	3.77	0.00%	0.0000%
AMMONIUM FLORO ZIRCONATE	101.00	0.01%	0.0013%
AMMONIUM FLUORIDE	40.40	0.00%	0.0005%
CALCIUM CHLORIDE	44.09	0.00%	0.0006%
CAUSTIC SOLID CRYSTALS	70.55	0.00%	0.0009%
POTASSIUM HYDROXIDE	432.55	0.03%	0.0056%
SODIUM FLUORIDE	79602.38	4.62%	1.0238%
SODIUM HYDROXIDE	11339.81	0.66%	0.1458%
*** METALS ***			
LEAD	226067.00	13.11%	2.9075%
LEAD BRICK	11169.55	0.65%	0.1437%
LEAD CHROMATE PAINT	268.08	0.02%	0.0034%
LEAD SHIELDING	472286.31	27.38%	6.0741%
*** ORGANICS ***			
1,1,1 TRICHLOROETHANE	0.00	0.00%	0.0000%
1,1,1 TRICHLOROETHYLANE	0.00	0.00%	0.0000%
HALOGENATED HYDROCARBON	64.43	0.00%	0.0008%
HDEP	0.66	0.00%	0.0000%
HEXANE	11.20	0.00%	0.0001%
HEXANOL	834.00	0.05%	0.0107%
HEXONE	1.10	0.00%	0.0000%
HOC	15.67	0.00%	0.0002%
HYDRAULIC FLUID	7107.39	0.41%	0.0914%
HYDROCARBONS	60.80	0.00%	0.0008%

- Omit chemicals present at <0.01%
- Incinerate Organics

LINER/LEACHATE COMPATIBILITY TEST
WHC PROJECT W-025, RADIOACTIVE
MIXED WASTE (RMW) DISPOSAL FACILITY

Synthetic Waste

$CuSO_4 \cdot 5H_2O$	52.56 gm
$NaNO_3$	440.25 gm
HNO_3(conc)	0.12 gm
H_3PO_4(conc)	0.11 gm
$Al(NO_3)_3 \cdot 9H_2O$	0.13 gm
$Pb(NO_3)_2$	0.10 gm
K_2CrO_4	0.10 gm
NaCl	0.23 gm
Fe_2O_3	0.10 gm
KOH	0.33 gm
NaOH	7.54 gm
Zr powder	3.25 gm
NaF	46.32 gm
Cu powder	5.69 gm
Hg (liquid)	0.15 gm
H_2O	~ 600 mL

Simulate Organic Inventory with:

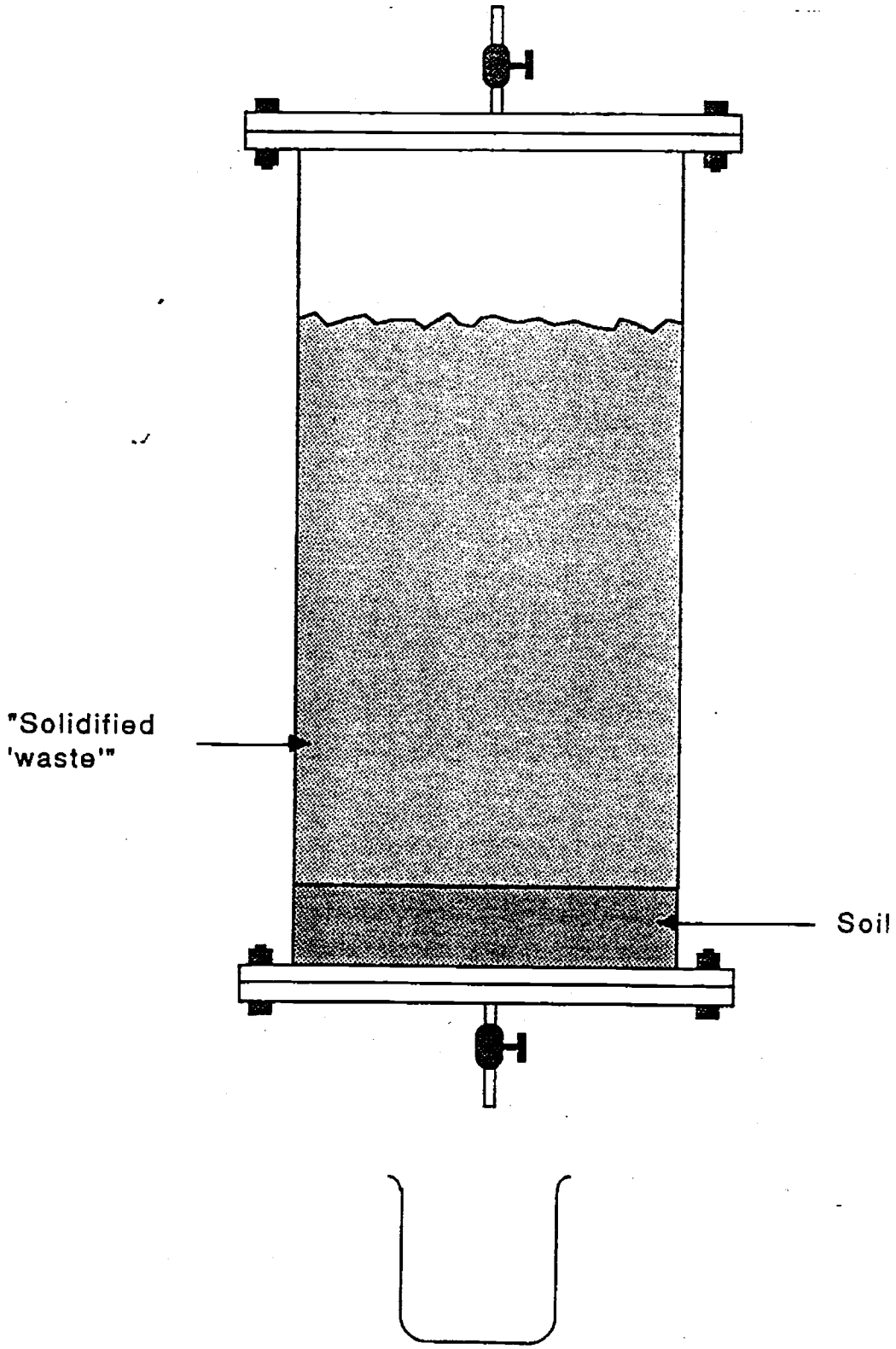
- Lubricating Oil, 0.1 g
- Benzene, 0.1 g
- Methanol, 0.11 g

Chemical Procedure

- Mixing
- "Solidification"
- Slurry
- Filter
- Analysis

Solidification

- AquaSet II™
- PetroSet™


"Solidified
'waste'"
Soil

Preparation

- Pressure filter
- Aliquot

Analytical Methods

- ICP Spectroscopy
- Ion Chromatography
- Gas Chromatography

Organic Analysis

Analyte	Source Leachate Conc.
Benzene	<0.3 µg/ml (lod)
Oil	<75 µg/ml (lod)
Methanol	350 µg/ml

Results

- 350 ppm Methanol
- 185.0 g/l $NaNO_3$
- 11.9 g/l Na_2SO_4
- 1.46 g/l NaF
- 3.45 g/l Na_2CO_3
- 2.44 g/l $NaHCO_3$

Deletion of Methanol

- MeOH will be incinerated
- MeOH has high vapor pressure
- MeOH has no effect on materials

Final Solution

- 185.0 g/l $NaNO_3$
- 11.9 g/l Na_2SO_4
- 1.46 g/l NaF
- 3.45 g/l Na_2CO_3
- 2.44 g/l $NaHCO_3$

Fingerprinting

- Differential Scanning Calorimetry
- Thermogravimetric Analysis
- Fourier Transform Infrared Spectroscopy

Distribution:

B. A. Austin	WHC	B2-35
J. D. Bauer	RL	A5-15
R. C. Bowman	WHC	H6-24
B. J. Broomfield	WHC	N3-13
R. C. Brunke	WHC	H6-23
R. M. Carosino	RL	A4-52
C. E. Clark	RL	A5-15
R. E. Cordts	Ecology	
A. K. Crowell	RL	R3-81
D. L. Duncan	EPA	HW-106
E. G. Erpenbeck	WHC	G6-47
G. C. Evans	WHC	H6-23
R. M. Gordon	RL	A6-55
R. F. Guercia	RL	A5-21
M. Jaraysi	Ecology	
G. H. Landeen	WHC	H6-23
S. J. Lijek	MACTEC	A4-35
P. J. Mackey	WHC	B3-15
M. M. McCarthy	WHC	N3-13
R. D. Pierce	WHC	N3-13
B. E. Poremba	WHC	T4-03
B. B. Powell	WHC	T4-03
S. M. Price	WHC	H6-23
H. T. Tilden II	PNL	P7-68

ADMINISTRATIVE RECORD: Low Level Burial Grounds, D-2-9
[Care of EPIC, WHC (H6-08)]

Washington State Department of Ecology Nuclear and Mixed Waste Library, P.O. Box 47600, Olympia, Washington 98504-7600

Environmental Protection Agency Region 10, Seattle, Washington 98101, Mail Stop HW-106

Please send comments on distribution list to Kathy Knox, WHC (H6-24), (509) 372-3596.

LOW LEVEL BURIAL GROUNDS
Unit Managers Meeting (Videoconference)
Federal Building, Room 784B
Richland, Washington

May 12, 1993
1:00 p.m. - 2:00 p.m.

The undersigned indicate by their signatures that these meeting minutes reflect the actual occurrences of the above dated Unit Managers Meeting.

S M Price for — Date: 8/11/93
Clifford E. Clark, Unit Manager, RL
(Represented by Sue M. Price, WHC)

[illegible] per meeting minutes — Date: 14 June 93
Daniel L. Duncan, RCRA Program Manager, EPA Region 10

Robert E Cordts — Date: 14 Jun 93
Robert E. Cordts, Unit Manager, Washington State Department of Ecology

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Low Level Burial Grounds, WHC Concurrence

[illegible] for — Date: 6/14/93
Richard D. Pierce, Contractor Representative, WHC
(Represented by Barbara Broomfield, WHC)

Purpose: Discuss Permitting Process

Meeting Minutes are attached. The minutes are comprised of the following:
Attachment 1 - Agenda
Attachment 2 - Summary of Discussion and Commitments/Agreements
Attachment 3 - Attendance List
Attachment 4 - Action Items
Attachment 5 - Low Level Burial Grounds Boundary Coordination Areas
Attachment 6 - Pilot Retrieval of Hanford Transuranic (TRU) Waste Retrieval

Attachment 1

LOW LEVEL BURIAL GROUNDS
Unit Managers Meeting (Videoconference)
Federal Building, Room 784B
Richland, Washington

May 12, 1993
1:00 p.m. - 2:00 p.m.

Agenda

1. PREVIOUS MEETING MINUTES

2. PROGRAM STATUS

   - Status of Design and Construction Schedule

3. PERMIT APPLICATION STATUS

4. RCRA TOPICS

   - Discussion of 4-9-93 NOD Response Table
   - Potential expansion of Low Level Burial Grounds to accept remediation wastes
   - Legal boundaries expanded to include toe of RCRA compliant cover and maintenance roads

5. GENERAL TOPICS

   - Discussion of transuranic waste retrieval demonstration activities
   - Action Items
     - Past Action Items
     - New Action Items
   - Schedule Next Meeting Date
     - Tentative Dates
     - Proposed Topics

Attachment 2

LOW LEVEL BURIAL GROUNDS
Unit Managers Meeting
Federal Building, Room 784B
Richland, Washington

May 12, 1993
1:00 p.m. - 2:00 p.m.

Summary of Discussion and Commitments/Agreements

1. PREVIOUS MEETING MINUTES

Mr. R. Cordts (Ecology) brought the RL and WHC approved meeting minutes for the October 26, 1992 and March 2, 1993 unit managers meeting to this meeting. Mr. Cordts approved and signed these minutes for Ecology. Mr. D. Duncan (EPA), Ms. B. Broomfield (WHC), and Ms. S. Price (WHC) indicated the meeting minutes for the April 14, 1993 meeting were satisfactory. Representatives of RL, WHC, and Ecology signed the April 14, 1993 minutes with the agreement that these minutes would be sent to EPA for signature.

2. PROGRAM STATUS

- Mr. Cordts said that he was not yet ready to send a letter to approve the design of the Project W-025 lined trench because Ecology was still reviewing the April 9, 1993 Notice of Deficiency (NOD) Response Table. Mr. G. Evans (WHC) said that WHC is revising some of the design documents based on the April 9, 1993 NOD Table. The Definitive Design Drawings, Construction Specifications, Acceptance Test Procedure, and Construction Quality Assurance Plan will be revised by June 1, 1993. Mr. Evans said that WHC is planning to begin construction of W-025 based on the schedule that had been discussed in previous meetings. Ms. Price asked Mr. Cordts if he would need any more documentation before approval could be given. Ms. Price expressed concern regarding the schedule. Mr. Cordts acknowledged WHC's concern, and indicated that completing this review was a top priority unless he received additional assignments. Mr. Duncan asked if Mr. Cordts had reviewed the list of design documents that were attached to the April 14, 1993 unit managers meeting minutes. Mr. Cordts said that he had not finished his review.

3. PERMIT APPLICATION STATUS

Mr. Evans stated that he did not think the permit application status had changed. The permit application is waiting on resolution of NOD comments and issuing the Hanford Facility Permit so the Low Level Burial Grounds (LLBG) permit application could be revised and later attached to the Hanford Facility Permit.

4. RCRA TOPICS

- Mr. Cordts said that he had almost completed reviewing the NOD Response Table and that he had not found any major problems.

- Mr. Evans introduced a new topic, the potential expansion of LLBG to accept remediation wastes. Mr. Evans explained that WHC was considering putting remediation waste in the W-025 lined trench. The quantity of waste scheduled for disposal is such that, if the new Corrective Action Management Unit (CAMU) area is not approved, there might be an advantage to expanding the LLBG rather than providing a new set of documentation for the CAMU area. Mr. Evans inquired if this alternative was being discussed within Ecology or EPA. Mr. Cordts stated that Ecology was discussing expanding the LLBG. Mr. Duncan said that this was the first that he had heard of this approach. Mr. Duncan also stated he knew that CAMU was being discussed for disposal of remediation waste, but that he was not aware of discussions to expand the LLBG.

  Mr. Evans went on to explain that the LLBG could be expanded to include an additional four square mile area as a new waste management area. This approach would automatically extend the procedures and other parts of the LLBG permit application to the new area. However, at the present time WHC is proceeding with the creation of independent documentation to establish a completely unique area.

- Mr. Evans introduced a new topic for the agenda, which was to discuss the impact of defining the legal boundaries of the LLBG such that they would include the area necessary for the toe of the RCRA compliant cover, the drainage system, and the maintenance roads. (A list of the impacted units was projected on the TV screen and included with the meeting minutes as Attachment 5.) The proposed boundaries are shown in the LLBG permit application, but they are plotted on a scaled (1:2000) topographic map, which was to be shown to Mr. Cordts following this meeting. The list of impacted areas is based on the new topographic maps.

  Mr. Evans brought this topic up for discussion because of an action item to revise the closure schedule for the LLBG. Mr. Evans stated that closing streets and railroads will impact the operation of the 200 East Area and the 200 West Area; therefore those impacts should be considered in WHC's closure schedule to accommodate the CERCLA cleanup activities, coal supplies to the power plants, operation of HWVP, etc.

  For example, the cover for the 218-W-4B burial ground would cover part of 218-W-2 burial ground, which is a CERCLA site. Mr. Evans stated that in looking at the maps that the obvious solution would be to extend the cover of 218-W-4C north to cover 218-W-3A. This would be a continuous cover with drainage to the sides and not on

to adjacent burial grounds. Mr. Evans stated that he believed work should start on these interfaces now as part of revising the LLBG closure plan.

Mr. Duncan asked if this interface had been discussed with the people managing CERCLA. Mr. Evans said that he had met with the CERCLA people yesterday. The CERCLA people are reviewing their RI/FS reports where this interface is mentioned as something which needs to be resolved. Mr. Evans stated that the CERCLA people had promised to provide him with a paragraph to include in the LLBG permit application which will reference the appropriate RI/FS.

Mr. Evans stated that he wants to mark the boundaries of the LLBG on the ground because the adjoining unit managers need to know the location of the boundaries. The LLBG forms the northern boundary of HWVP and WRAP. The unit managers for HWVP and WRAP are looking at the adjoining land as usable space.

5. **GENERAL TOPICS**

- Ms. Broomfield introduced Mr. J. Demiter (WHC), who gave a presentation on the Demonstration Activities for Transuranic (TRU) Waste Retrieval. The view graphs (Attachment 6) were shown on the TV screen. This demonstration is the first Pilot Program to retrieve a sample of TRU waste. This will be the first look at the waste at five sites. WHC will be examining container deterioration and confirming the accuracy of the recorded waste description. A training video recording was shown, which was also viewed by Mr. Duncan. The video showed the drum retrieval process. There were no comments or concerns expressed by either EPA or Ecology.

- The past action items were reviewed as follows:

10-26-92:1	OPEN.	Ecology is reviewing NOD response table.
03-02-93:1	CLOSED.	All approval signatures are obtained.
03-02-93:2	OPEN.	WHC is gathering information on which to base a revised schedule.
03-02-93:3	OPEN.	Ecology is concerned about the NEPA process. A public notification may be necessary before the letter is sent.
03-02-93:4	CLOSED.	Ecology sent the letter to Ms. C. Massimino (EPA) on April 28, 1993. Mr. Duncan requested that a fax copy be sent to him.
03-02-93:5	OPEN.	Ecology is waiting on more design information from WHC.

There were no new action items.

- The tentative date for the next meeting was set for 10 a.m. on June 17, 1993. Later this date was changed to 10 a.m. on June 9, 1993. The meeting will be held in Richland and in Seattle by videoconference.

- Ms. Price suggested the topic of CAMU implementation be discussed at the next unit managers meeting.

Attachment 3

LOW LEVEL BURIAL GROUND
Unit Managers Meeting
Federal Building, Room 784B (Videoconference)
Richland, Washington

May 12, 1993
1:00 p.m. - 2:00 p.m.

Attendance List

Name	Organization	Phone #
Robert D. Bass	WHC/IRM	376-5303
Robert E. Corbit	Ecology	206 459 6863
George C Evans	WHC Perm. Hdq	509 376 8939.
Sue Price	WHC/RCRA Permits	509 376-1653
Barbara Bloomfield	WHC/Restoration and Upgrades	509-376-4966
Roger M. Gordon	RL WMD/SWT	509-372-2139
Darrel Duncan	WHC/R.+Upgr. Proyr	509-372-1013
Jim Demiter	WHC/WASTE FORM APP.	509/376-9671
Mark Kerns	WHC/R.+Upgr. Program	509 372 1243
Ed Mertens	WHC/Restoration+Upgr Programs	509-372-1163
S. J. Lijek	MACTEC/GSSC	376-0309
Allison K Caswell	RL/DOE WMD/SWT	372-2346
Kathy Knox	WHC	372-3596

Attachment 4

LOW LEVEL BURIAL GROUNDS
Unit Managers Meeting (Videoconference)
Federal Building, Room 784B
Richland, Washington

May 12, 1993
1:00 p.m. - 2:00 p.m.

Action Items

Action Item	Description
10-26-92:1	Provide letter indicating that Ecology agrees that the definitive design package for the mixed waste trench to be built in Burial Ground 218-W-5 (Project W-025) is complete and acceptable for construction. Action by Ecology is needed by September 1993 to have time to prepare bid package for scheduled construction in Spring of 1994. OPEN
03-02-93:1	Prepare UMM minutes for 10-26-92 by 4-7-93. ACTION: S. Lijek (MACTEC) and G. Evans (WHC) CLOSED (4-14-93).
03-02-93:2	Prepare letter to Ecology by 4-23-93 that describes revisions to Figure 11-8 "Schedule for Closure of LLBG" that is in the permit application. ACTION: B. Broomfield/G. Evans (WHC) OPEN
03-02-93:3	Send letter to RL indicating that the "Request for Exemption from Lined Trench Requirements and from Land Disposal Restrictions for Residual Liquid at 218-E-12B Burial Ground Trench 94" is approved. Action by Ecology as soon as possible so proposed demonstration project can begin. OPEN
03-02-93:4	Send letter to EPA, Region 10, stating that the groundwater monitoring program for Burial Ground 218-E-12B meets RCRA requirements. Action by Ecology as soon as possible so proposed demonstration project can begin. CLOSED (4-28-93)

Attachment 4 (continued)

LOW LEVEL BURIAL GROUNDS
Unit Managers Meeting (Videoconference)
Federal Building, Room 784B
Richland, Washington

May 12, 1993
1:00 p.m. - 2:00 p.m.

Action Items

Action Item	Description
03-02-93:5	Send letter responding to RL's notification of intent to dispose of K-3 Filters in the LLBG. Action by Ecology. OPEN

LOW-LEVEL BURIAL GROUNDS
BOUNDARY COORDINATION AREAS

BURIAL GROUND LEGAL AREA	AFFECTED CONTIGUOUS AREAS
218-E-12B	Canton Avenue 12th Street 216-B-2-3 Ditch 218-E-8 Burial Ground
218-E-10	12th Street Akron Avenue Railroad to B-Plant, PUREX, HWVP, Steam Plant etc. HWVP drainage ditch and laydown area
218-W-4C 218-W-4B	Dayton Avenue 16th Street 19th Street 218-W-2 Burial Ground 216-Z-20 Ditch 216-Z-19 Ditch
218-W-5 218-W-3A 218-W-3AE 218-W-6	Dayton Avenue 27th Street Railroad to T-Plant, Steam Plant, Z-Plant, 218-W-4C, Redox, etc. Electric power line Waste Receiving and Processing facility 218-W-3 Burial Ground 218-W-2A Burial Ground 218-W-1A Burial Ground 216-T-4-2 Ditch

The legal boundaries of the LLBG are defined as 25 meters outside the concrete posts that identify the ends of burial trenches to include the 4:1 slope of the RCRA compliant covers, drainage ditches and maintenance roads.

May 7, 1993, FILE: C:\WP\PERM-REV\LGL-CONF

PILOT RETRIEVAL OF

HANFORD TRANSURANIC WASTE

DOE ORDER 5820.2A

HANFORD FINAL ENVIRONMENTAL IMPACT STATEMENT AND RECORD OF DECISION REQUIRES:

- RETRIEVAL OF TRANSURANIC (TRU) WASTE STORED SINCE 1970
- TREATING THE WASTE (AS REQUIRED) FOR CERTIFICATION
- SHIPMENT OF CERTIFIED TRANSURANIC WASTE TO THE WASTE ISOLATION AND PILOT PLANT (WIPP) NEAR CARLSBAD, NEW MEXICO
- DISPOSAL OF ALPHA-CONTAMINATED LLW PER DOE ORDER 5820.2A

OBJECTIVE

- Support permanent offsite disposal of Hanford TRU waste
  - Hanford TRU waste stored underground must be retrieved and re-packaged before shipping to WIPP
  - Accurate retrieval planning requires pilot retrieval program to physically examine waste containers and contents:
    - -- Verify and augment existing records (contents, location)
    - -- Assess container integrity

PROGRAM DESCRIPTION

Phase 1 - Existing Records Search

- Completed (1991) - documented in WHC-EP-0225, "Contact-Handled Transuranic Waste Characterization Based on Existing Records"

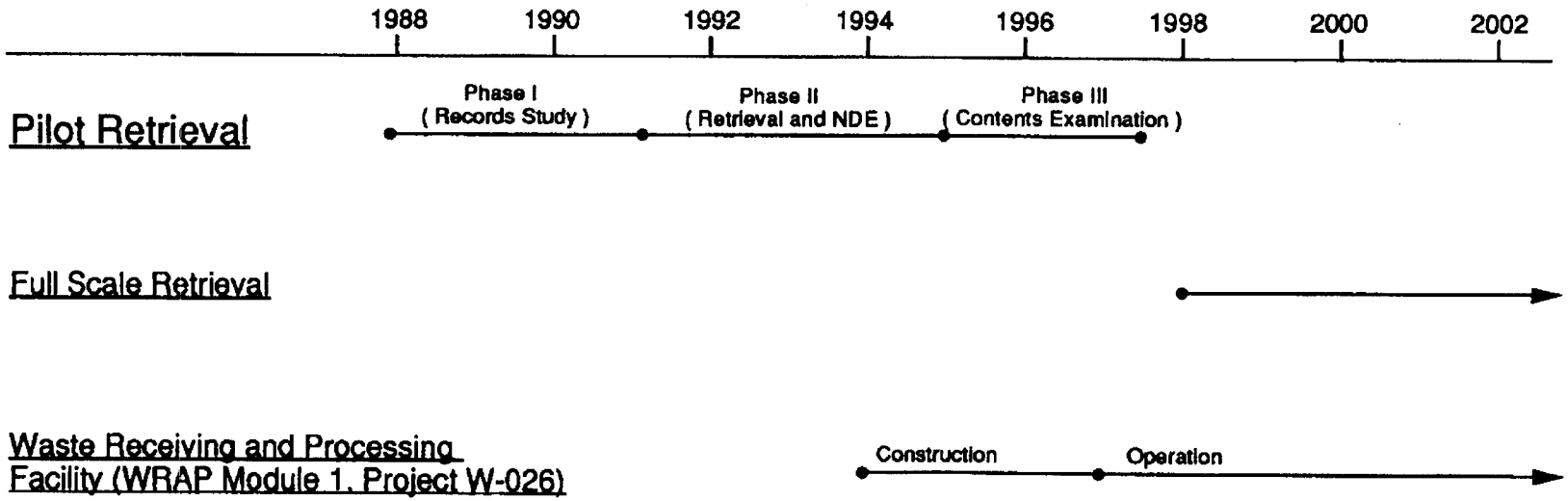
Phase II - Retrieval Pilot Program

- Vented Drums - retrieve 138 vented drums
- Unvented Drums - retrieve 104 unvented drums

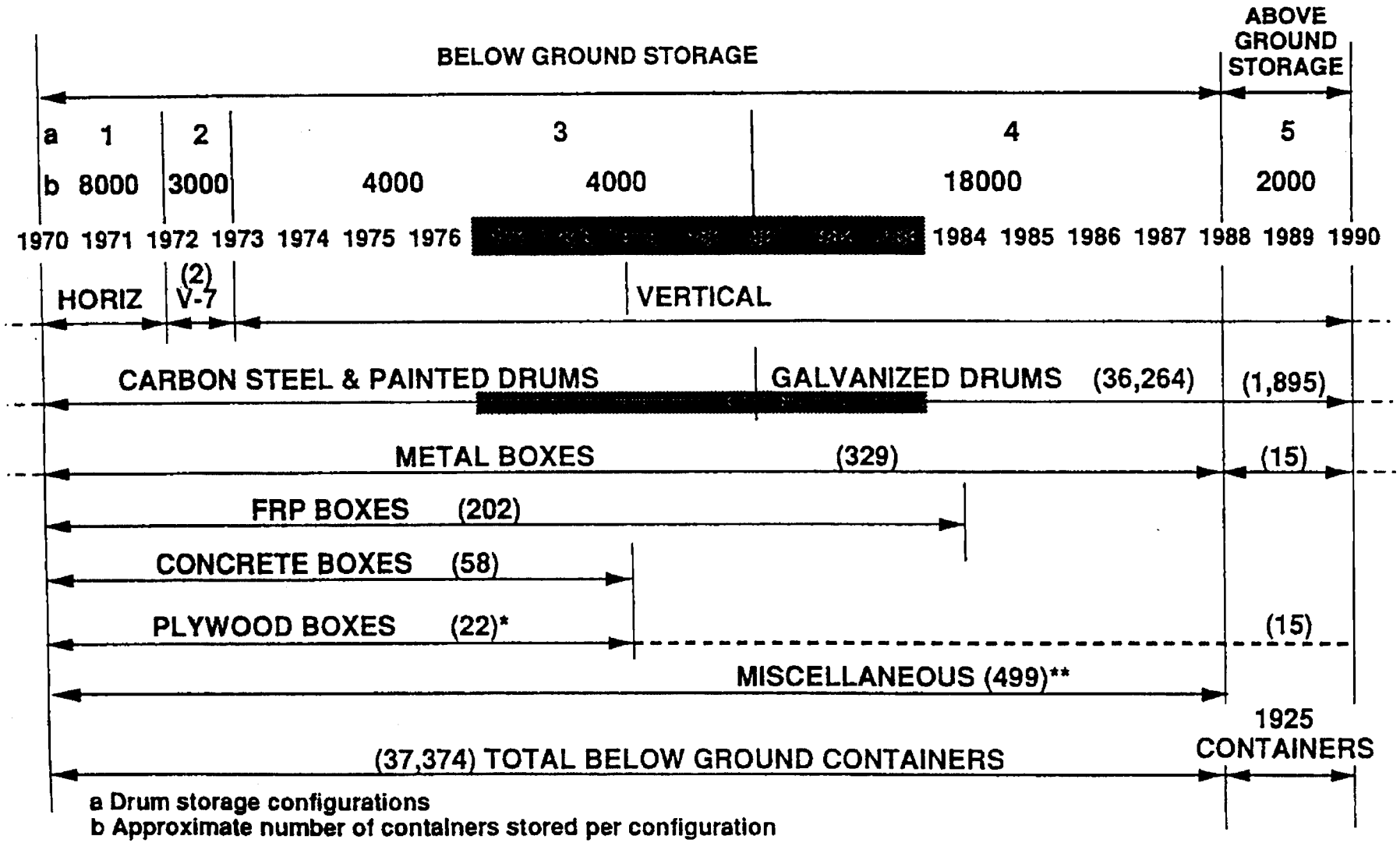
Phase III - Characterization

- Open, sort, and sample vented and unvented drums

SCHEDULE AND INTERFACES



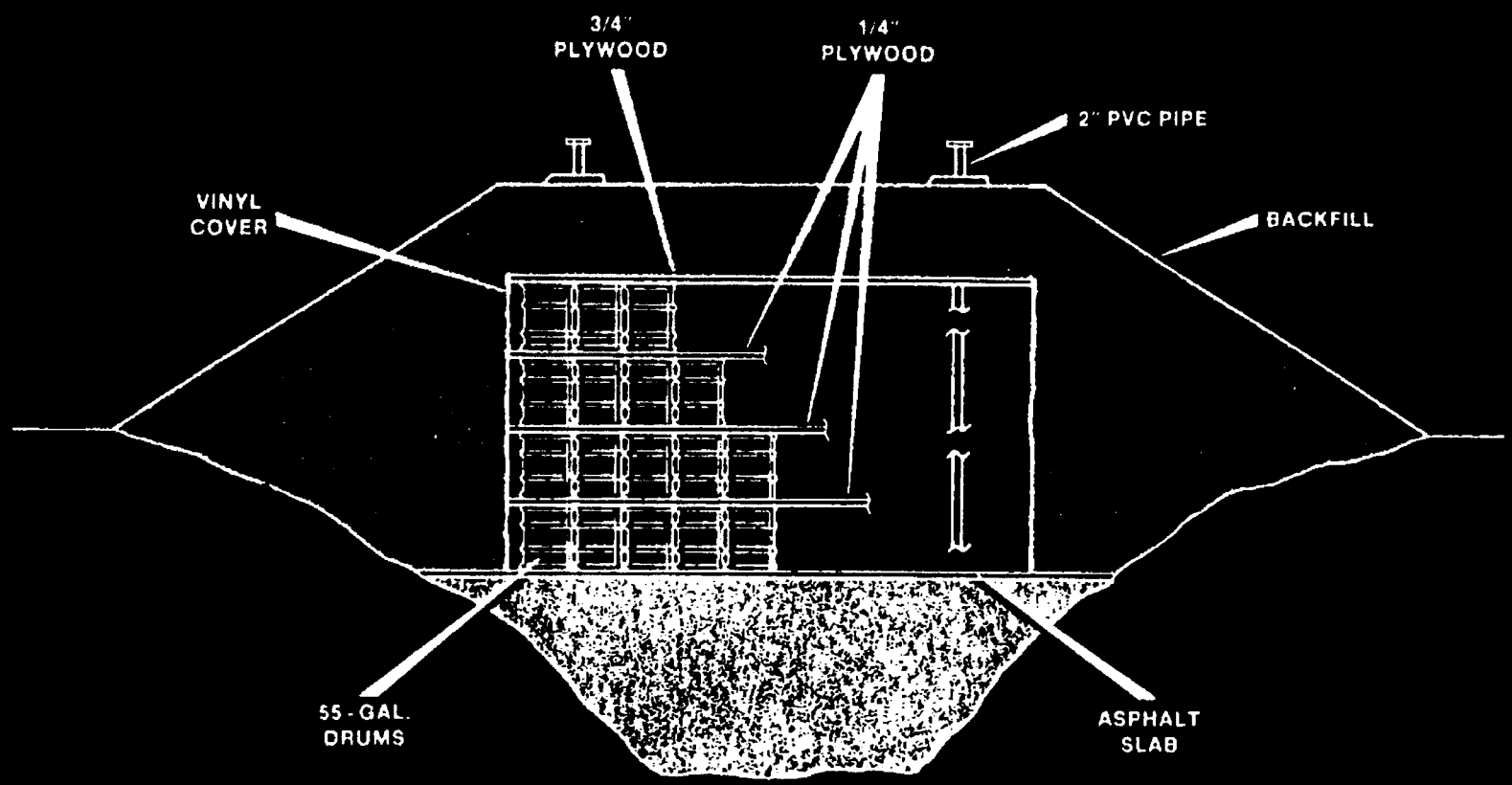
HANFORD SITE CH-TRU CONTAINER STORAGE HISTORY
JANUARY 1970 - DECEMBER 1990



a Drum storage configurations
b Approximate number of containers stored per configuration
* Excludes 15 boxes stored above ground at 212N
**Includes HEPA filter boxes, 30-gal drums, 110-gal drums, casks, Etc.

873-RJR-20009/14-91-GEM

TYPICAL POST-1970 TRU INTERIM STORAGE



VENTED DRUM SAMPLING SITES

Site No.	Trench	Coordinate	Year Of Emplacement	Number To Be Retrieved	Number Of Containers Inspected In Situ	Reason For Selection
1	218-W-4CT-04	77694-77668	80	64	64 pre-Chinook drum	Intermediate time exposure in Configuration 4; unique storage condition (flooding)
2	218-W-4CT-20	77578-77548	83	16	16 offsite galvanized drums	Short time exposure in Configuration 4; offsite generator, galvanized steel
3	218-W-4CT-20	77466-77452	80 (received) 82 (covered)	5	5 Exxon drums	Two year storage prior to cover and short time exposure in Configuration 4; Exxon generator
4	218-W-4CT-01	77533-77557	80	5	5 Z-9 drums	2 to 3 yr storage prior to cover and intermediate time exposure in Configuration 4; Z-9 Trench waste generator
5	218-W-4BT-07	77978-77953	77	48	48	Intermediate time exposure in Configuration 4

DRUM CONTENTS DESCRIPTION

- Dry Solid Materials

  - 27 % Plastic
  - 20 % Paper
  - 21 % Metal
  - 6 % Cloth
  - 8 % Rubber
  - 4 % Dirt
  - 2 % Glass
  - 12 % Absorbents, concrete, cement, wood, etc.

- No sludges or free liquids anticipated

CONTAINER CONDITIONS

- Minor corrosion (several mils) expected on drums to be examined in initial "vented drum" retrieval

  - Based on in situ ultrasonic inspection in 1982 of drums which were stored 8.5 years

  - Based on photographic inspection of drums in storage

- Only background combustible gases or hydrocarbon levels are expected

  - Based on gas monitoring in 1976 and 1992 of approximately 130 vent pipes in the TRU underground storage areas; 0% LEL (low explosive limit) found in all but one case

  - No releases to the environment are expected

CONTROLLED PROCEDURES ASSURE SAFE OPERATIONS

- Pre-excavation storage module gas sampling; continuous radioactive and hazardous condition monitoring
- Site activities controlled by hazardous waste operations plan, work plan, soil sampling plan
- Drum ultrasonic inspections to ensure conformance to Department of Transportation minimum (.042")
- Drums to be retrieved must meet other Hanford criteria for radioactivity, weight, lack of visible defects, labeling, vent clip presence
- Retrieved drums replaced with new drums, storage modules backfilled and returned to original condition
- Operational safety addressed by an addendum to the burial ground safety analysis

POST-RETRIEVAL DRUM MANAGEMENT

- Retrieved drums will be held in Resource Conservation and Recovery Act (RCRA) compliant storage at the Transuranic Waste Storage and Assay Facility

- Drums will be assayed to determine TRU content

  - Those assaying as TRU will be stored for re-packaging in WRAP 1 prior to shipment to WIPP

  - Those assaying as low level (low TRU radionuclide density) will be stored, treated and disposed in accordance with governing requirements

- Further detailed physical sorting and sampling of retrieved drum waste contents will occur in a later Pilot Retrieval program phase

Final

Meeting Minutes Transmittal/Approval
Unit Managers Meeting: Low Level Burial Grounds
(W-025 Mixed Waste Trench)

Meeting Held March 22, 1991
Westinghouse Hanford Lacey Office
Lacey, Washington

Appvl. _____ Date: 5/1/91
Clifford E. Clark, Environmental Policy and Permitting, DOE-RL

Appvl. _____ Date: _____
Daniel L. Duncan, EPA Region 10, RCRA Program Manager

Appvl. _____ Date: _____
Richard D. Pierce, Unit Manager, Contractor Representative, WHC

Appvl. _____ Date: _____
Susan M. Price, RCRA/Permitting, Contractor Representative, WHC

Appvl. _____ Date: 4/30/91
J. J. Mitczak, Unit Manager, Washington State Department of Ecology

PURPOSE:
Meeting Minutes are attached. These minutes are from the March Unit Managers Meeting held 3-22-91. 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 - Selected Items from the Design Report, Construction Quality Assurance Plan, and Proposed Part B Permit Review Schedule

Attachment #1

Low Level Burial Grounds
Unit Managers Meeting

Westinghouse Hanford Lacey Office
Lacey, Washington
March 22, 1991

Summary of Discussion and Commitments

1. Cliff Clark (DOE-RL) handed out three documents: 1) a draft of the Sitewide Soil and Groundwater Background Document, 2) a model RCRA permit, and 3) a model RCRA permit quality protocol. One copy of each was given to Ecology and to EPA. A formal transmittal of the background document will be made later.

2. Introductions were made. Tom Woebkenberg (SWEC) will be functioning as a DOE person, in waste management.

3. Joe Witczak (Ecology) commented that the design information which has been provided to date does not include information on the covers, but just for the bottom liners. He stated that they have provided the draft comments on the conceptual design, and the comments should be delivered to DOE-RL by the end of the next week. Ecology will do an internal review of the design report document, and send it out to their contractors in addition. It is expected that it will be two months before the comments are ready. It has not been determined which of the two contractors will do the review. Golder Associates prepared the design report.

4. An overview of the design for the W-025 mixed waste trench was presented by Tom Yount (WHC). The handout for the presentation is included as Attachment #5. The W-025 project is a part of the burial ground 218-W-5, located on the west edge of 200-West. The location of W-025 has been moved from the location given in the permit application, because additional space is needed for construction. The design does not include asphalt, which was included in the conceptual design. The waste filling method has been changed from the conceptual design. The load will be spread across the entire floor and will come up gradually, rather than creating point loading on the liner by filling from one end.

5. Tom Yount (WHC) discussed how the design addressed the RCRA minimum technology requirements. The requirements call for a three foot liner thickness. The design is for 3.1 feet. The additional one-tenth foot will provide assurance that dessication cracking will be avoided during construction. The 60 mil liner exceeds the RCRA requirement for 30 mil. All plastics are HDPE. The textile is polyester. A concern was raised in Grout about using polyester, due to the expected high pH. Here it is expected that the pH will be in the low 9's. This is what was tested in the 9090 tests. The 9090 test report is in draft form and is being reviewed.

The operational period was originally two years, but it is not expected that the trench will be filled to capacity within that time. WHC is looking at the additional design features which will be needed to extend the operational period.

6. Tim Greager (WHC) presented an overview of the draft Construction Quality Assurance Plan (CQAP). The handout for this presentation is included with Attachment #5. The draft CQAP is being reviewed and will be provided to the regulators later, probably late May or June.

   A discussion was held on the schedule for approvals, and the necessary meetings. Construction is already late, based on the original schedule. There is no specific milestone attached to this, but it does impact the operation of the Central Waste Complex.

   A discussion was held on the proposed operating period extension. Cliff Clark (DOE-RL) stated that they would like to keep the trench open until it is full. Richard Pierce (WHC) stated that it could be 8 to 10 years to fill the trench, and they want the flexibility to keep it open. This possible extension will be included in the design, to provide that flexibility. Joe Witczak (Ecology) stated that this trench has a bottom liner and thus the MTR requirements have been met. Since the trench will not be draining into the soil column, leaving it open for an extended time is not as much a problem as with other units that lack a bottom liner.

   Joe Witczak (Ecology) asked about the relationship of the design specifications and the built in safety factors. It was emphasized that any changes to the design would be submitted to the regulators for their approval.

   Gary Anderson (Ecology) stated that Ecology has hired an engineer to be an onsite inspector for the construction. A discussion was held on the fact that it will be very difficult to get access permission for him, because he is a citizen of Lebanon, which is a sensitive country. Current DOE guidance says that he must be accompanied by a Q-cleared person at all times, and this will place a substantial burden on DOE-RL.

7. A discussion was held on the future schedule of meetings and strategy. The W-025 trench has interim status, since it was in the initial Part A, in 1986 or 1987. This is not expansion. Construction will be started once DOE-RL has feedback from the regulators on the design.

8. Joe Witczak commented that he wanted to see a 4:1 trench slope. Tom Yount (WHC) stated that they were not yet prepared to discuss this point in detail. Currently the design report shows 3:1. In addition, Arlington, Oregon is designed at 3:1. Cliff Clark (DOE-RL) stated that DOE-RL had not had the chance to formulate a response. It was proposed that there be a separate engineering meeting to discuss this point.

9. The next meeting is scheduled for April 30th in the afternoon, in Richland. This meeting will be to discuss the NODs, and questions related to specific issues.

10. Copies of WHC comment responses related to Minimum Technological Requirements (MTR) will be provided to Dan Duncan (EPA) when they are sent to Joe Witczak (Ecology).

Attachment 2

Low Level Burial Grounds
(W-025 Mixed Waste Trench)
Unit Managers Meeting
March 22, 1991

Attendance List

NAME	ORGANIZATION	PHONE #
G. Anderson	Ecology	(206) 438-7558
C. Clark	DOE-RL	(509) 376-9333
P. Corser	Golder	(206) 883-0777
D. Duncan	EPA	(206) 553-6693
K. Davis	SWEC	(509) 376-0412
G. Evans	WHC	(509) 376-8939
T. Greager	WHC	(509) 376-0312
J. King	SWEC	(509) 376-4726
R. Pierce	WHC	(509) 376-5681
S. Price	WHC	(509) 376-1653
J. Witczak	Ecology	(206) 438-7557
T. Woebkenberg	SWEC	(509) 376-1177
T. Yount	WHC	(509) 376-0034

Attachment # 3

AGENDA

LOW-LEVEL BURIAL GROUNDS UNIT MANAGERS MEETING

MIXED WASTE TRENCH DEFINITIVE DESIGN

March 22, 1991

Lacey, WA

Introduction	C. E. Clark
Permit Application Status	R. D. Pierce
Overview of Mixed Waste Definitive Design	T. L. Yount
RCRA Design Requirements	T. L. Yount
Enhanced Operational Life	T. L. Yount
Construction Quality Assurance Plan	T. M. Greager
Project Schedule	T. M. Greager
Discussion of Draft Ecology Comments	C. E. Clark

Attachment 4

Low Level Burial Grounds Unit Managers Meeting
(W-025 Mixed Waste Trench)
Commitments/Agreements Status (Status date: 3/22/91)

ACTION ITEM	COMMITMENTS/AGREEMENTS STATUS LIST

There were no action items coming out of this meeting.

AGENDA

LOW-LEVEL BURIAL GROUNDS UNIT MANAGERS MEETING

MIXED WASTE TRENCH DEFINITIVE DESIGN

March 22, 1991

Lacey, WA

Introduction	C. E. Clark
Permit Application Status	R. D. Pierce
Overview of Mixed Waste Definitive Design	T. L. Yount
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Enhanced Operational Life	T. L. Yount
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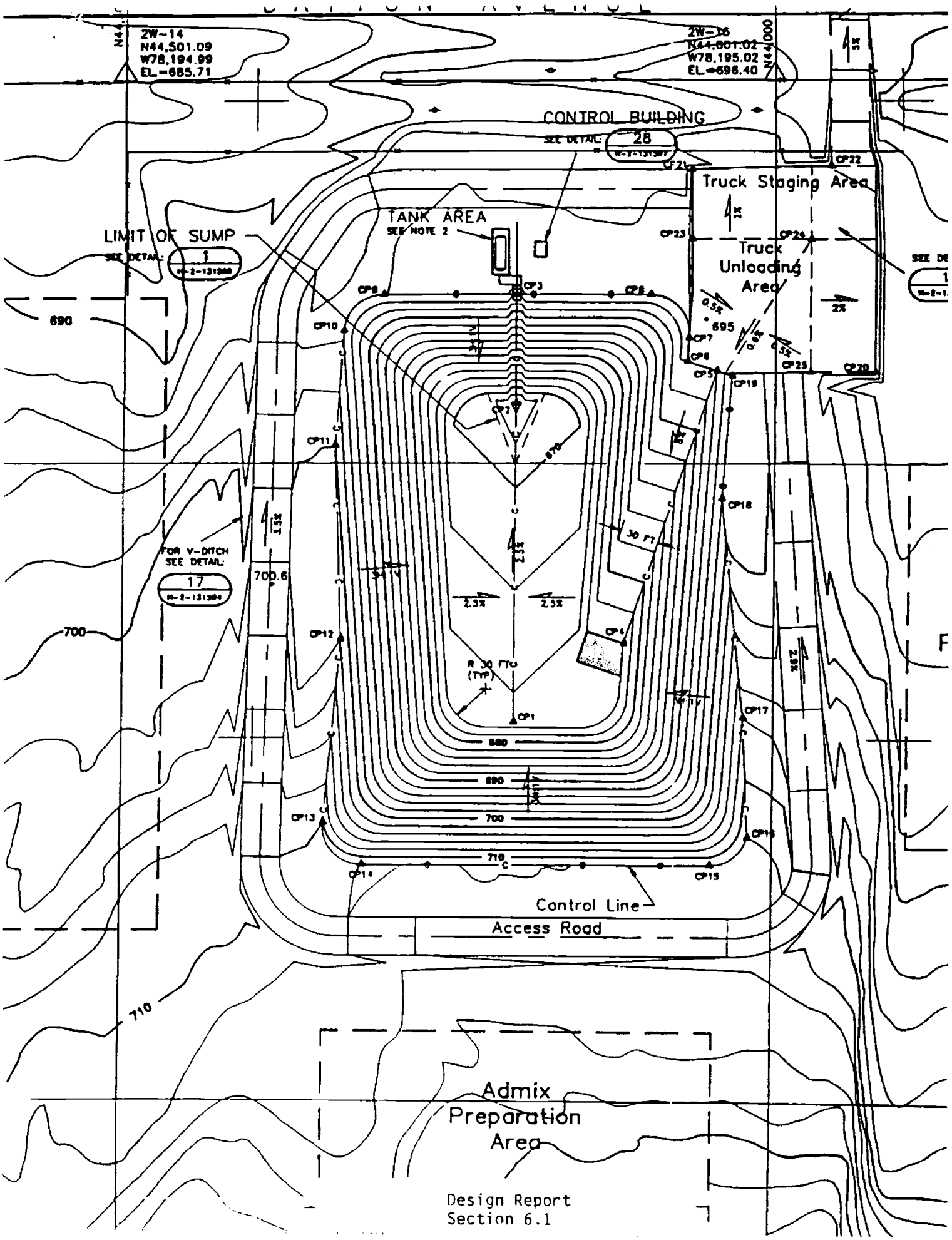
Project Schedule	T. M. Greager
Discussion of Draft Ecology Comments	C. E. Clark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EL.=685.71
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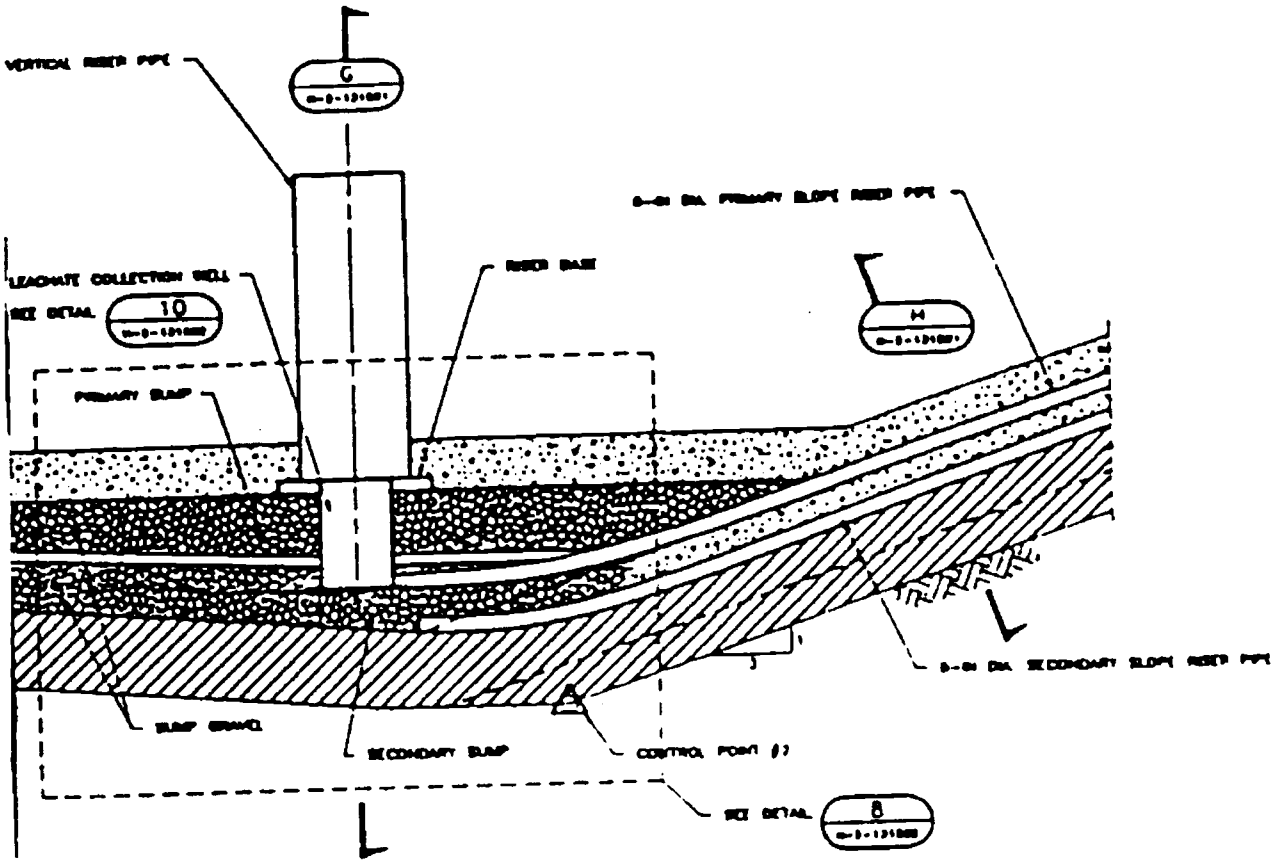
EL.=696.40
CONTROL BUILDING
SEE DETAIL
28
Truck Staging Area
Truck Unloading Area
TANK AREA
SEE NOTE 2
LIMIT OF SUMP
SEE DETAIL
1
690
700
710
700.6
695
FOR V-DITCH SEE DETAIL
17
30 FT
R 30 FT (TYP)
2.5%
2%
0.5%
Control Line
Access Road
Admix Preparation Area


VERTICAL RISER PIPE
G
LEACHATE COLLECTION WELL
SEE DETAIL
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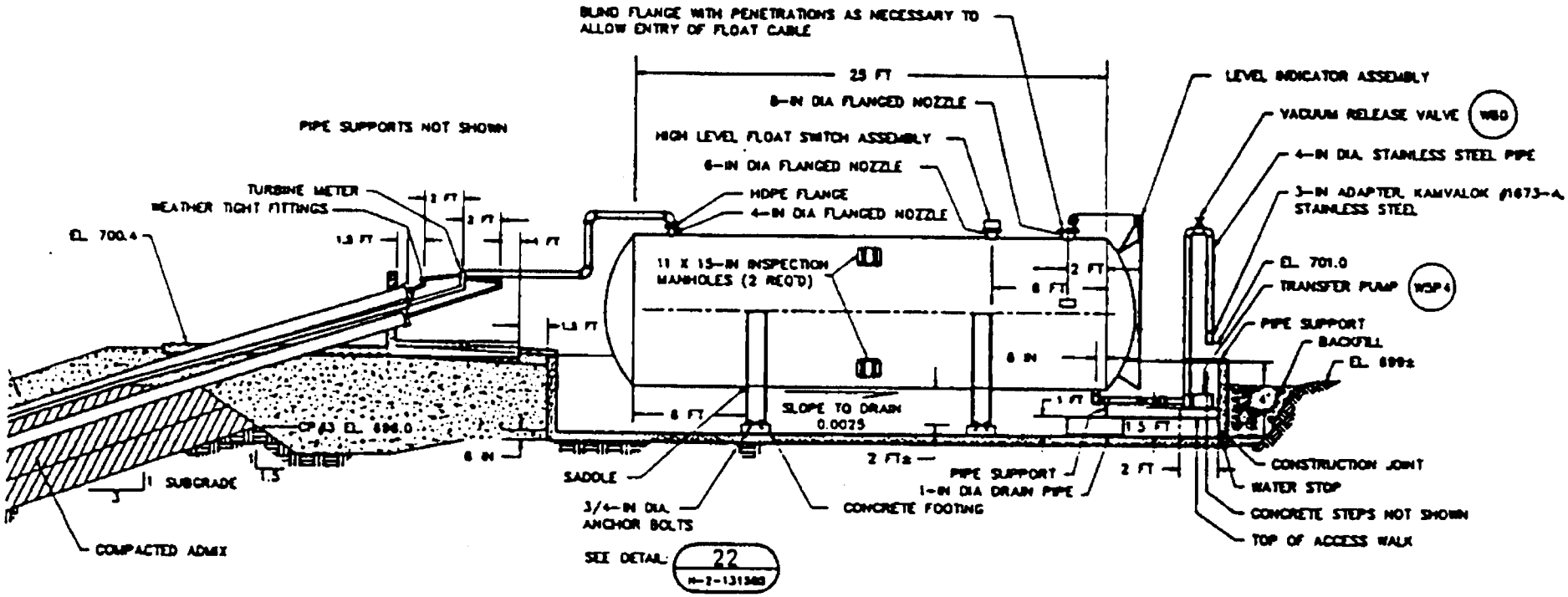
RISER BASE
PRIMARY SUMP
H
SUMP GRAVEL
SECONDARY SUMP
CONTROL POINT
SEE DETAIL
8



LEACHATE TEMPORARY STORAGE TANK & PIPING SECTION J / M-2-131585

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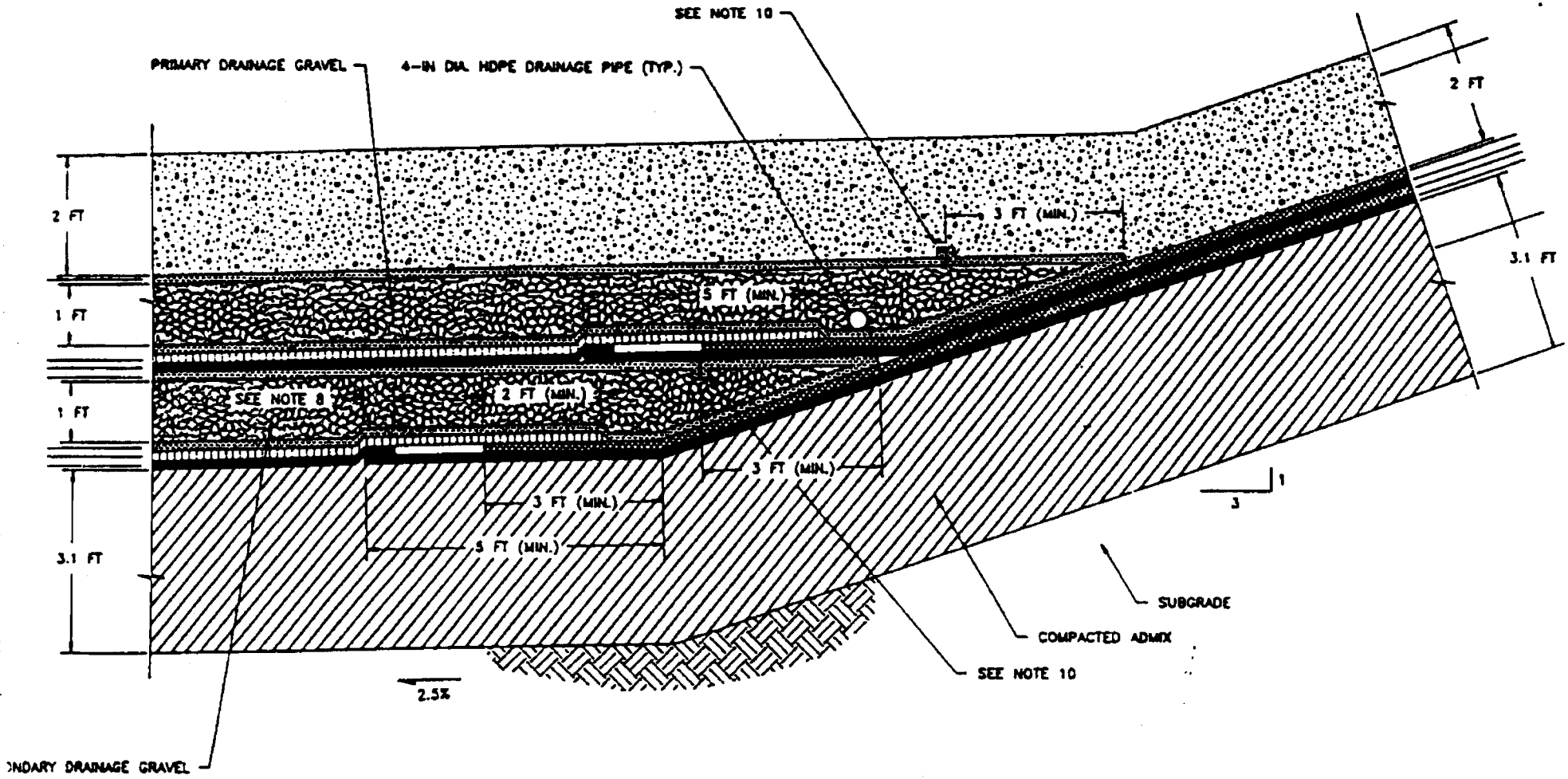

TYPICAL TOE OF SLOPE DETAIL

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H-2-131579

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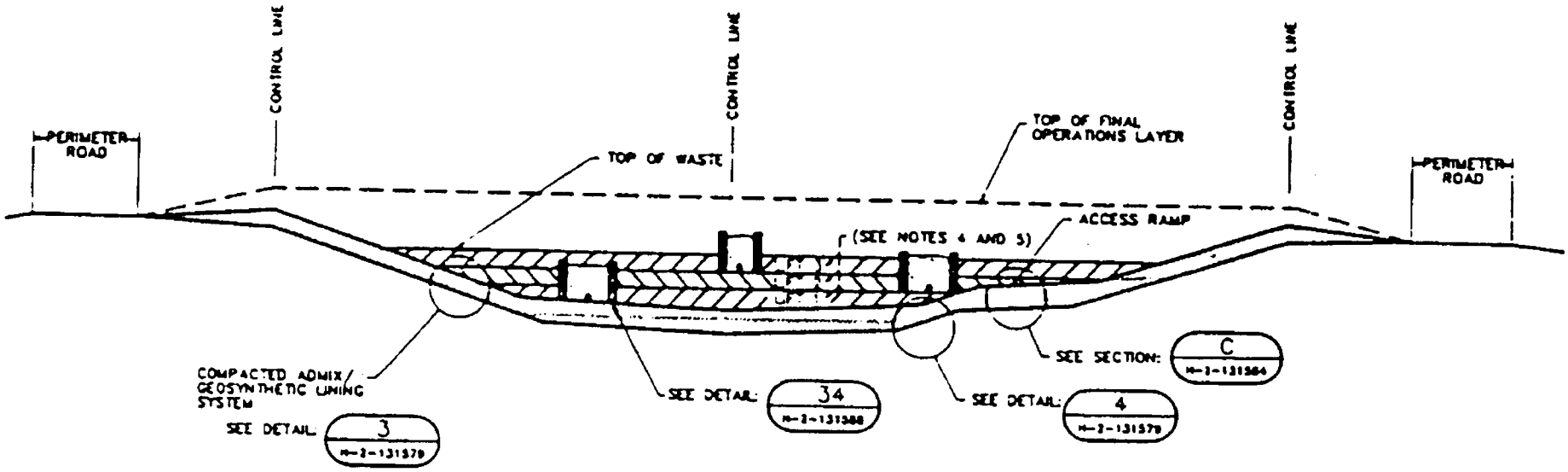
SCALE IN FEET



SECTION A M-2-131588

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SCALE IN FEET

CONSTRUCTION QUALITY ASSURANCE PLAN

- BASED ON EPA 530 SW 86 031, "TECHNICAL GUIDANCE DOCUMENT: CONSTRUCTION QUALITY ASSURANCE FOR HAZARDOUS WASTE LAND DISPOSAL FACILITIES"

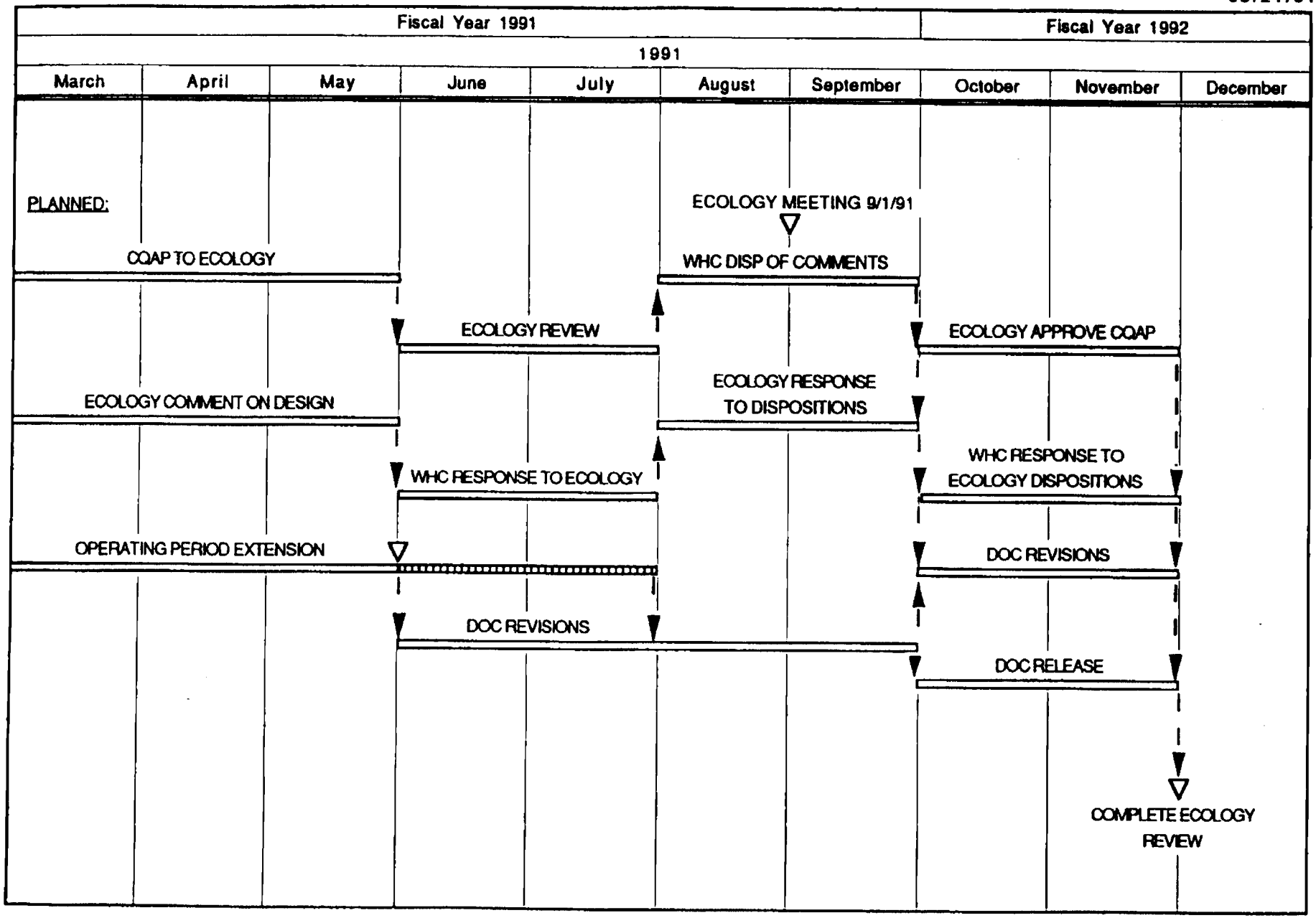
- CQAP CENTERS AROUND FIVE (5) BASIC ELEMENTS FROM EPA 530 SW 86 031:
  - RESPONSIBILITY AND AUTHORITY
  - CQA PERSONNEL QUALIFICATIONS
  - INSPECTION ACTIVITIES
  - SAMPLING STRATEGIES
  - DOCUMENTATION

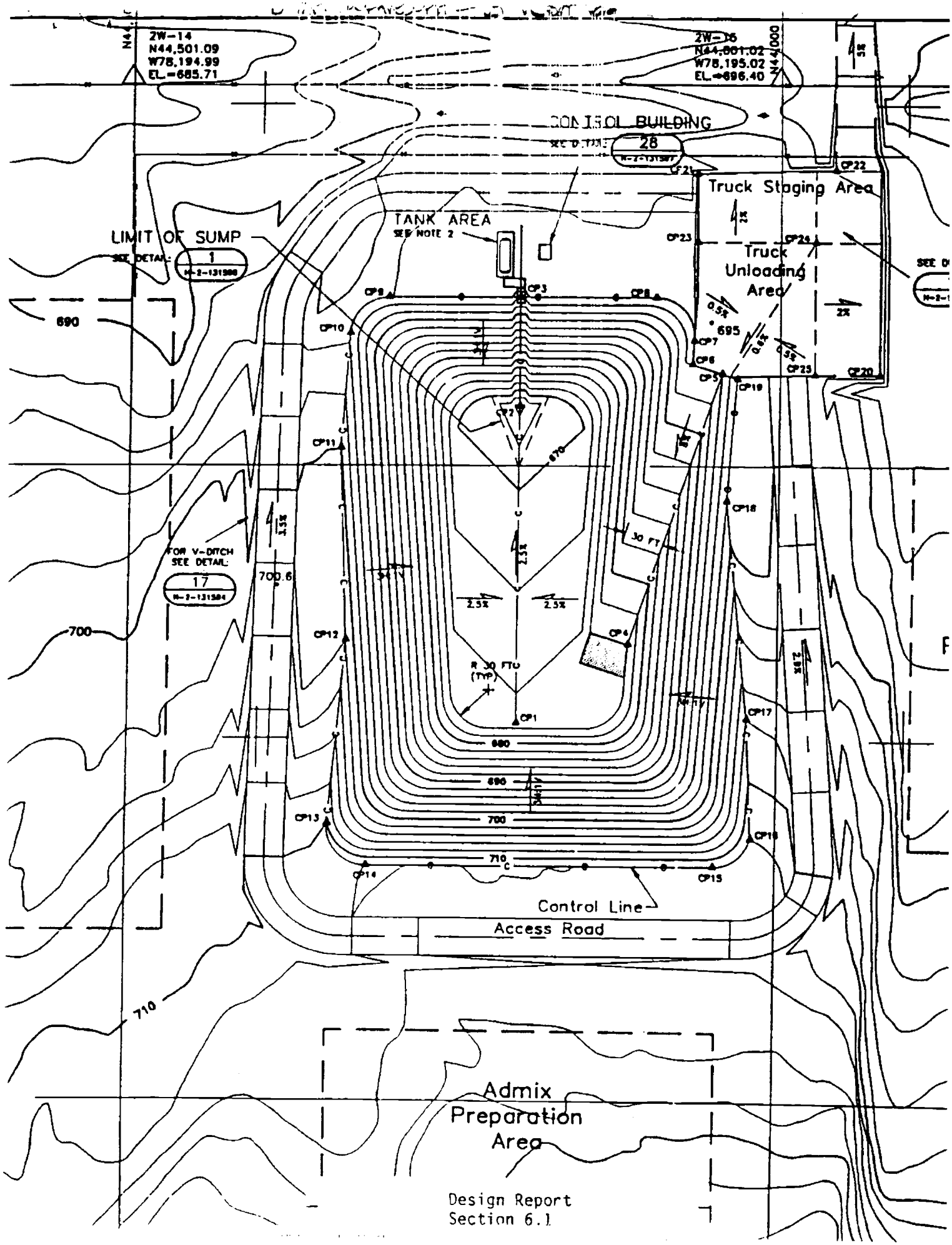
CONSTRUCTION QUALITY ASSURANCE SUMMARY TABLE
SPECIFICATION SECTION 02275
GEOSYNTHETICS

Reference Standard Subject	Frequency	Acceptance Criteria	Report Format	CQA Ref.	Specif. Sect. & Para.	IP
Document that all Repairs Have Been Successfully Made and Nondestructively Tested	Continuously	No Leaks	Geosynthetic Field Forms	4.4.2.5	02275 3-1	G/R
Identify Wrinkels or "Fishmouths" for Repair and Testing	Periodic Monitoring	Cut and Repair	Geosynthetic Field Forms	4.4.2.5	02275 3-1	G/R
Monitor the Placement of Cover Materials Over the Geomembrane	Continuously	No Wrinkles Buried	Daily Field Report	4.4.2.5	02275 3-1	G/R
Collect and Review Certificates that State the Geotextile, Geocomposite, and Geonet Delivered Have Properties Which Meet or Exceed the Guaranteed Values	Before the Material is delivered to the site	Meet or Exceed Material Specifications	Manufacturer's Certificates	4.5.2.2	02275 3-1	G/R
Verify that the Geonets are Free of Dirt and Dust	Prior to installation	Visual Observation	Daily Field Report	4.5.2.2	02275 3-1	G/R
Geotextile Conformance Testing ASTM D4632 ASTM D4533 ASTM D3786 ASTM D4833 ASTM D1777 ASTM D4491 ASTM D4751	One per 100,000 SF	Meet or Exceed Material Specifications	Lab forms	4.5.2.2	02275 2-2	G/R
Geocomposite Conformance Testing ASTM D4751 Direct Shear Testing as Specified	One per 100,000 SF	TBD by Designer	Lab Forms	4.5.2.2	02275 2-2	G/R

PROPOSED W-025 PART B PERMIT ECOLOGY REVIEW SCHEDULE

03/21/91

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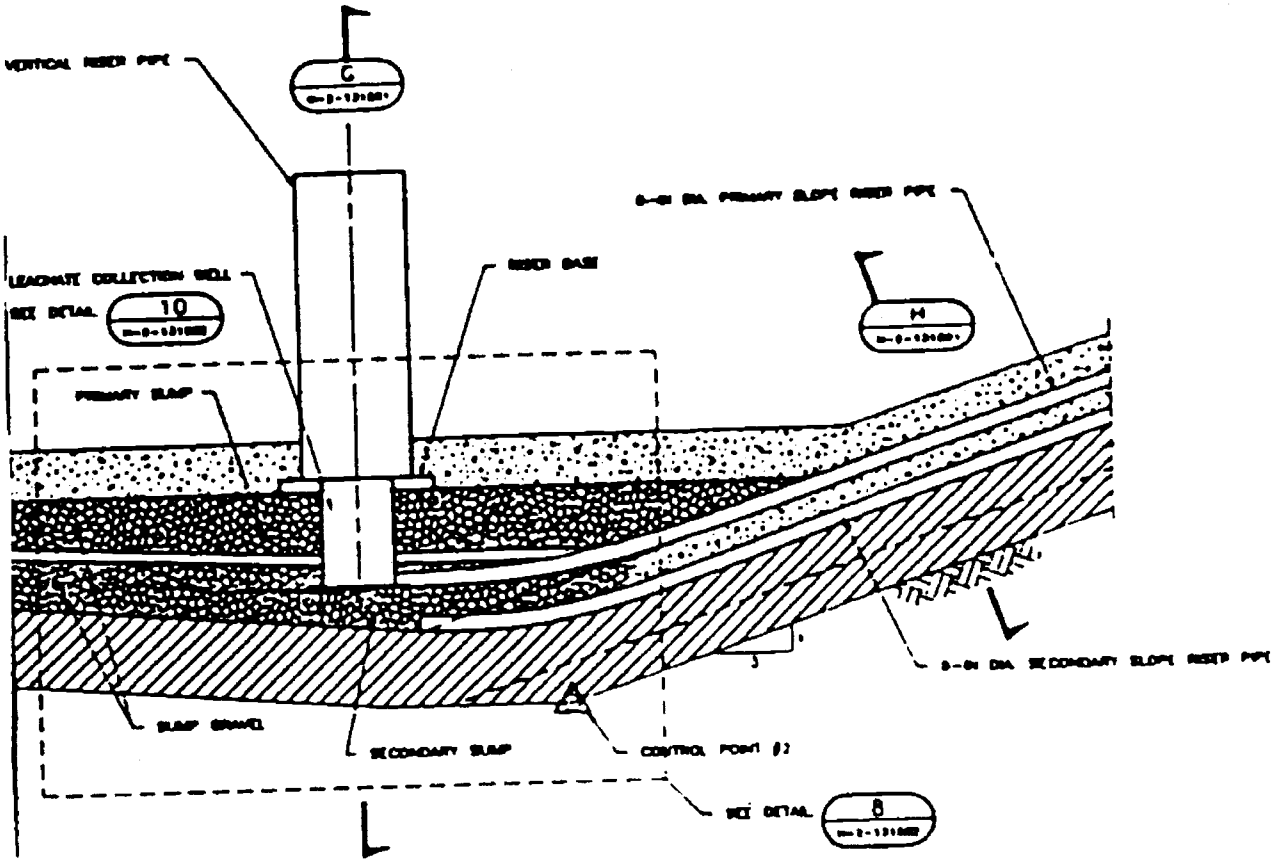
W78,194.99
EL.=685.71
2W-15
N44,601.02
W78,195.02
EL.=696.40
CONTROL BUILDING
28
Truck Staging Area
Truck Unloading Area
TANK AREA
SEE NOTE 2
LIMIT OF SUMP
SEE DETAIL:
1
690
700
710
695
700.6
FOR V-DITCH SEE DETAIL:
17
30 FT
R 30 FTO (TYP)
Control Line
Access Road
Admix Preparation Area


VERTICAL RISER PIPE
C
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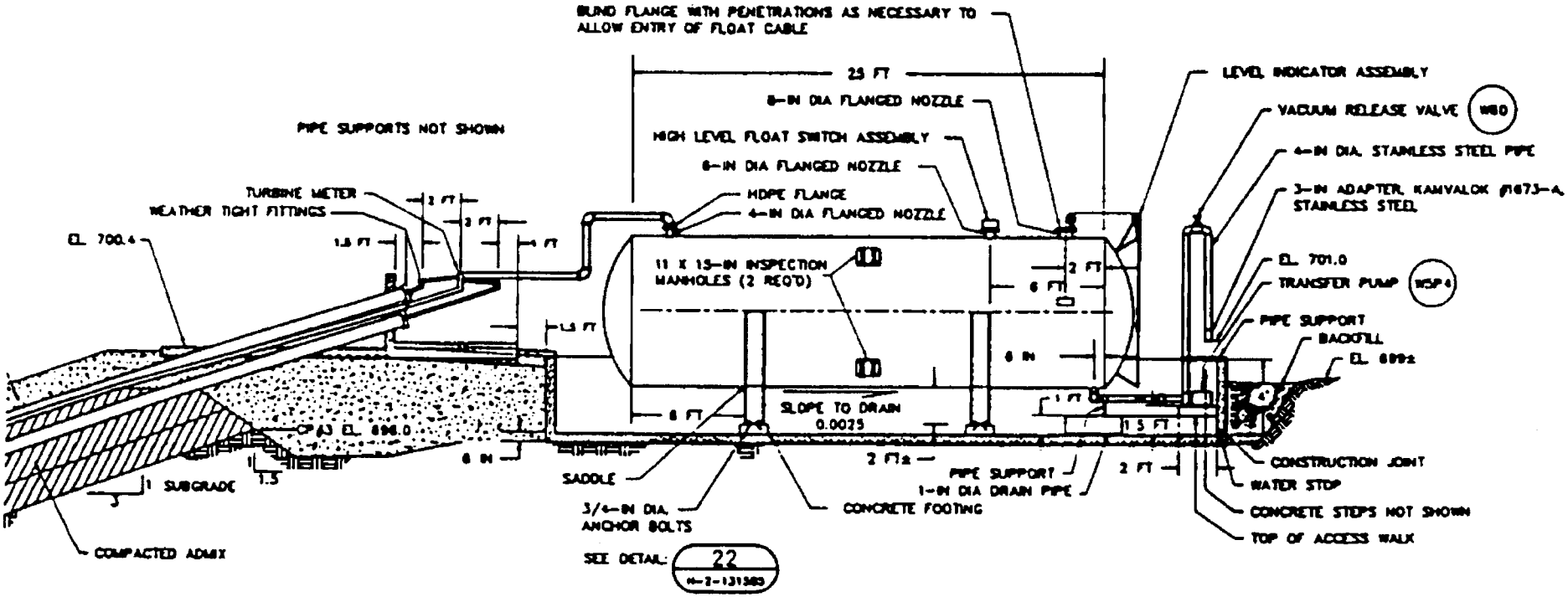
SEE DETAIL
10
RISER BASE
H
PRIMARY SUMP
SUMP GRAVEL
SECONDARY SUMP
CONTROL POINT (2)
SEE DETAIL
8



LEACHATE TEMPORARY STORAGE TANK & PIPING SECTION J M-2-131585

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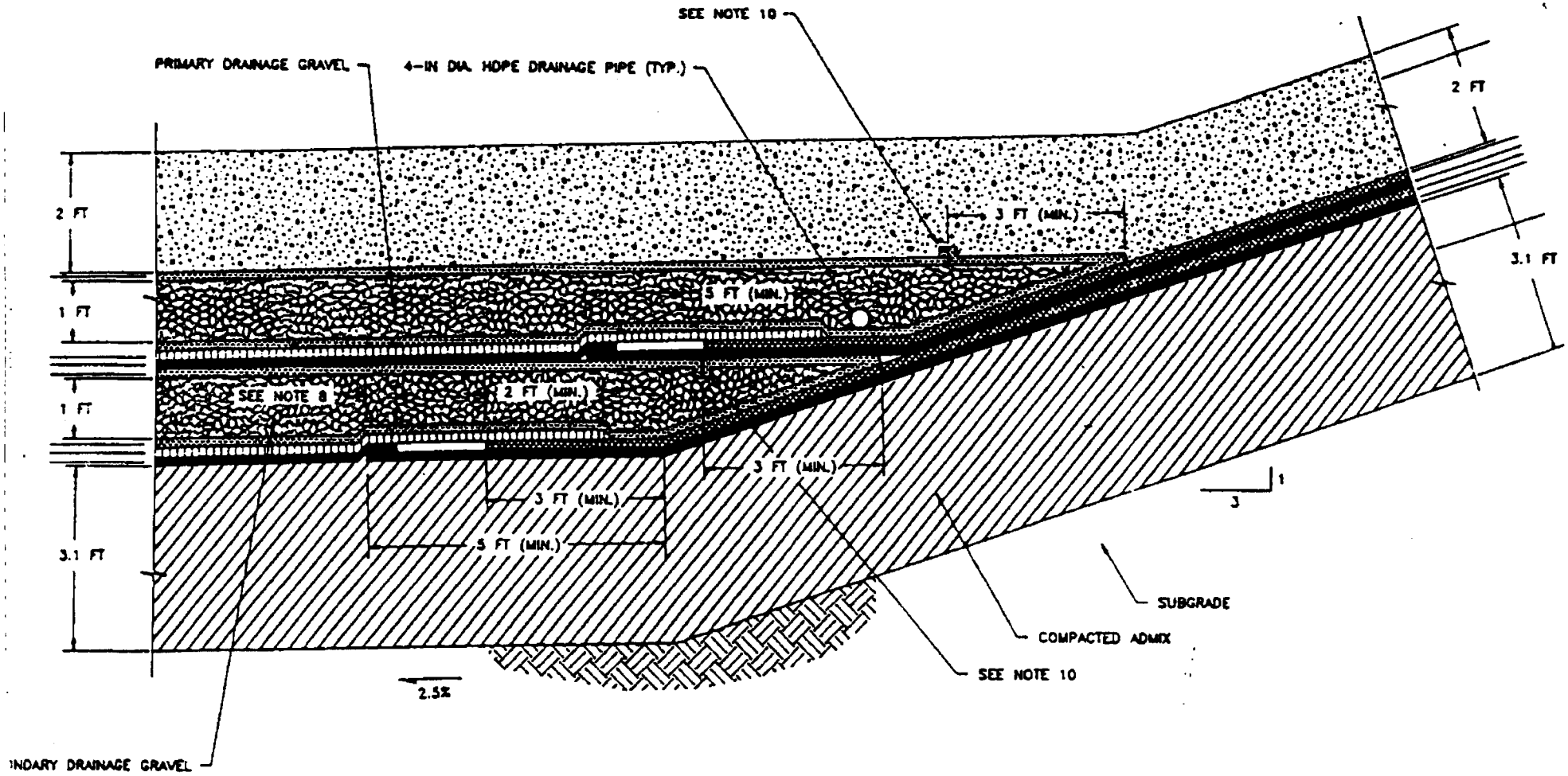

TYPICAL TOE OF SLOPE DETAIL

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H-2-131579

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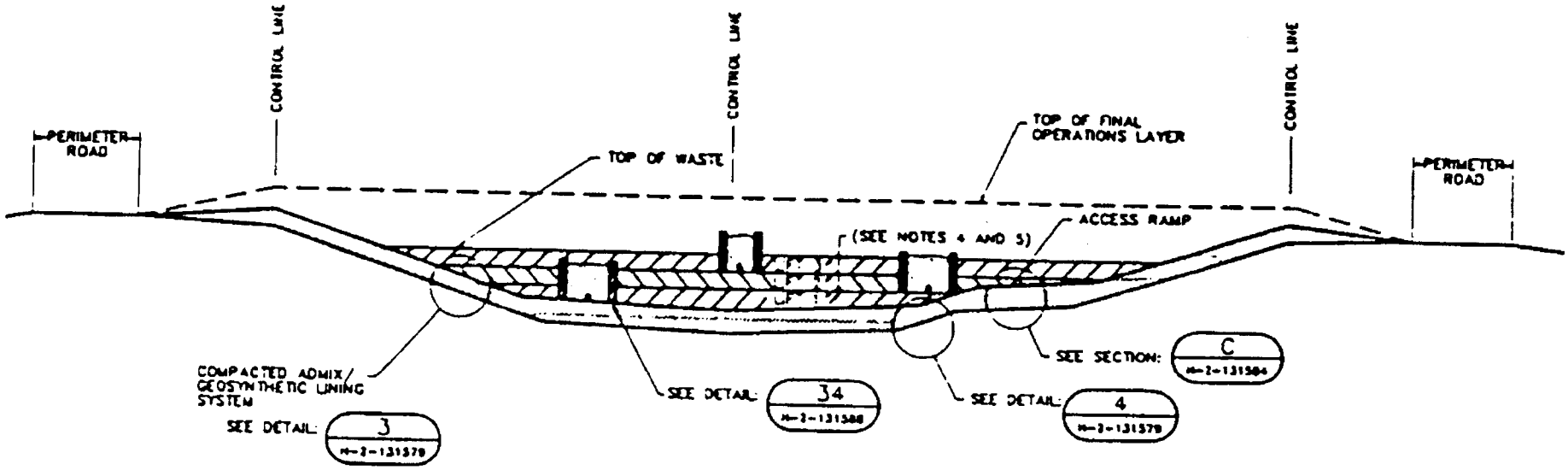

SECTION A M-2-131588

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SCALE IN FEET

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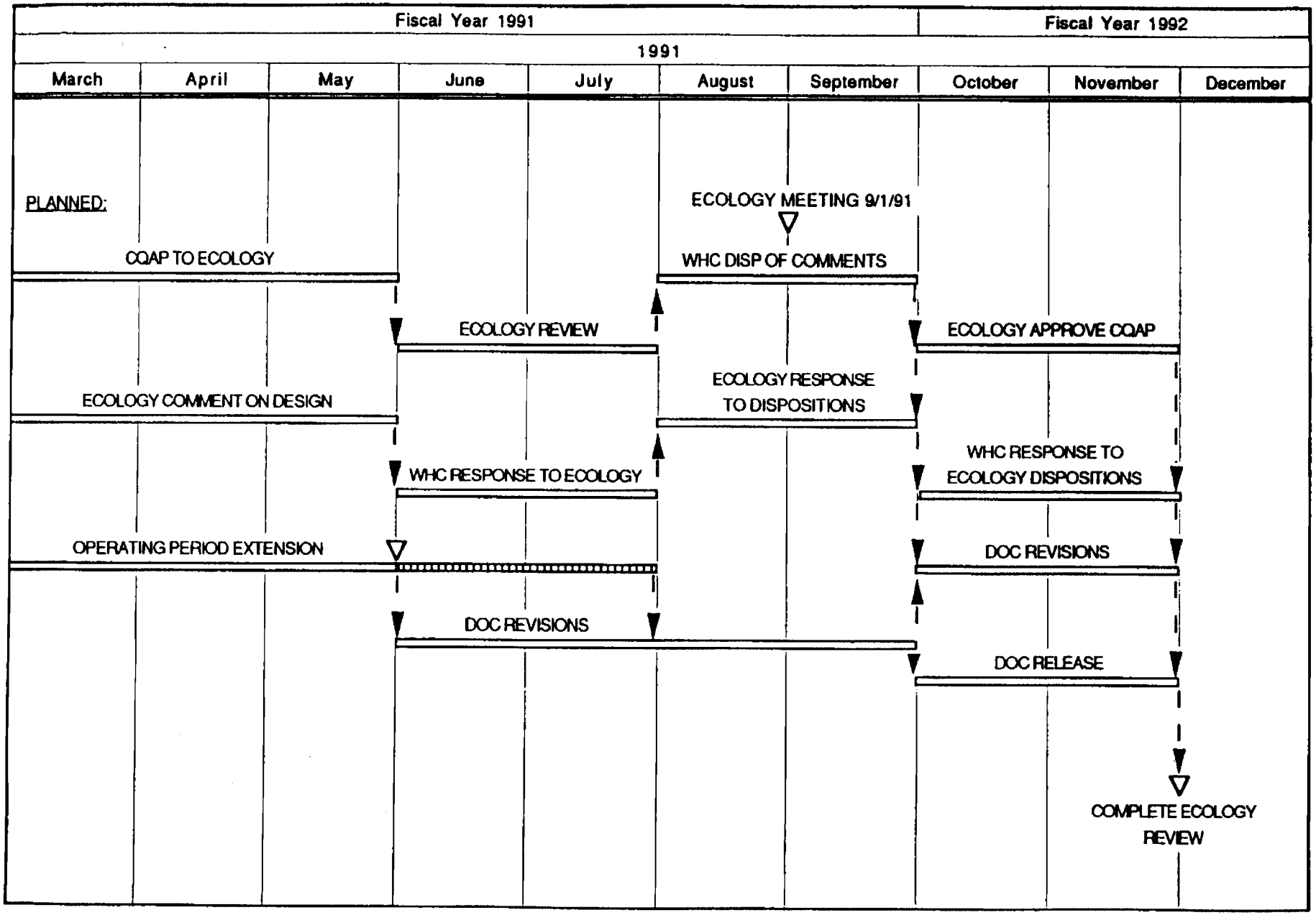
Geocomposite Conformance Testing ASTM D4751 Direct Shear Testing as Specified	One per 100,000 SF	TBD by Designer	Lab Forms	4.5.2.2	02275 2-2	G/R

Golder Associates

PROPOSED W-025 PART B PERMIT ECOLOGY REVIEW SCHEDULE

03/21/91



Distribution:

G. Anderson	Ecology
D. L. Armstrong	WHC (T3-02)
W.H. Bodily	KEH (E3-55)
R.M. Carosino	DOE-RL (A4-52)
C.E. Clark	DOE-RL (A6-95)
D.L. Duncan	EPA (HW-074)
[redacted]	[redacted]
T.M. Greager	WHC (G6-47)
E. A. Bracken	DOE-RL(A5-19)
J.D. King	SWEC (A4-35)
R.D. Pierce	WHC (N3-13)
S.M. Price	WHC (H4-57)
J.J. Witczak	Ecology
T.J. Woebkenberg	SWEC (A4-35)
T.L. Yount	WHC (G6-47)

ADMINISTRATIVE RECORD (Low Level Burial Grounds)
[Care of Susan Wray, WHC (H4-22C)]

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Environmental Protection Agency, Region 10, HW-074

START

0028156

ENGINEERING CHANGE NOTICE

Page 1 of 2

1. ECN 152876

Proj. ECN

2. ECN Category (mark one)	3. Originator's Name, Organization, MSIN, and Telephone No.	4. Date
Supplemental ☐ Direct Revision ☒ Change ECN ☐ Temporary ☐ Supersedure ☐ Discovery ☐ Cancel/Void ☐	ERIC G. ERPENBECK, SWP, G6-47; 376-8032	APRIL 24, 1991
	5. Project Title/No./Work Order No. ML6 W025/RMW LAND DISPOSAL FACILITY	6. Bldg./Sys./Fac. No. 200W/218-W-5
	8. Document Number Affected (include rev and sheet no.) WHC-SD-W025-QAPP-001, REV 0	9. Related ECN No(s). N/A
		7. Impact Level 3
		10. Related PO No. N/A

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

12. Description of Change

THIS ECN AFFECTS THE FOLLOWING DOCUMENT: WHC-SD-W025-QAPP-001, REV 0, PAGES 1-19, 50-60, AND 84-102.

THE FIRST 19 PAGES, PROCEDURE P-5.0-1, AND PROCEDURE P-10.0-1. OF THE ORIGINAL (REVISION 0) QUALITY ASSURANCE PROGRAM PLAN HAVE BEEN REVISED AND ARE ATTACHED WITH THIS ECN AS REVISION 1.

THIS DIRECT REVISION IS DUE TO A CHANGE IN PROCEDURES P-5.0-1. & P-10.0-1.

BEST AVAILABLE COPY

MAY 1993 RECEIVED EDMC

13a. Justification (mark one)	13b. Justification Details
Criteria Change ☐ Design Improvement ☐ Environmental ☐ As-Found ☐ Facilitate Const. ☒ Const. Error/Omission ☐ Design Error/Omission ☐	GENERAL RESTRUCTURING OF DOCUMENT TO COMPLY WITH CONSTRUCTION ACTIVITIES IN ACCORDANCE WITH GOLDER ASSOCIATES INC. APPROVED CONSTRUCTION QUALITY ASSURANCE PLAN.

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

E. G. ERPENBECK	G6-47	1 COPY
T. M. GREAGER	G6-47	1 COPY
J. R. McGEE	G6-47	1 COPY
T. L. YOUNT	G6-47	1 COPY
G. C. EVANS	H4-57	1 COPY
PROJECT FILES	R1-28	2 COPIES
M.S. COLLINS	A5-18	1 COPY

RELEASE STAMP

OFFICIAL RELEASE BY WHC (20)
DATE APR 25 1991
Sta. 21

A-7900-013 (11/88)

RECORD OF REVISION	(1) Document Number WHC-SD-W025-QAPP-001	Page 1

Title

Quality Assurance Program Plan for Project W-025, "Radioactive Mixed Waste Land Disposal Facility - Non-Drag-Off."

CHANGE CONTROL RECORD

(3) Revision	(4) Description of Change – Replace, Add, and Delete Pages	Authorized for Release (5) Cog./Proj. Engr.	(6) Cog./Proj. Mgr.	Date
1 RS	(7) The original QAPP (Rev. 0) has been replaced by Revision 1. ECN 152876 has been approved for this change. Pages 1-19, 50-60, and 84-102 of the original QAPP have been revised. The original QAPP, WHC-SD-W025-QAPP-001, Revision 0, was released on June 26, 1990 via EDT 125907.	Lance H. Espowitz 4-25-91	T.L. Yount	4-26-91

SUPPORTING DOCUMENT

1. Total Pages 156

2. Title	3. Number	4. Rev No.
Quality Assurance Program Plan	WHC-SD-W025-QAPP-001	1

5. Key Words

W-025 QAPP

6. Author

Name: E. G. Erpenbeck

Signature: Eric G. Erpenbeck 1-25-91

Organization/Charge Code 24950/ML6PM

7. Abstract

WHC-SD-W025-QAPP-001 contains the approved Quality Assurance Procedures imposed upon the A/E Firm Golder Associates in the performance of Definitive Design efforts for W-025.

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ENGINEERING CHANGE NOTICE

Page 1 of 2

1. ECN 152876

Proj. ECN

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

3. Originator's Name, Organization, MSIN, and Telephone No.
ERIC G. ERPENBECK, SWP, G6-47, 376-8032 81211

4. Date
APRIL 24, 1991

5. Project Title/No./Work Order No
W025/RMW LAND DISPOSAL FACILITY ML6DP

6. Bldg./Sys./Fac. No.
200W/218-W-5

7. Impact Level
3

8. Document Number Affected (include rev and sheet no.)
WHC-SD-W025-QAPP-001, REV 0

9. Related ECN No(s).
N/A

10. Related PO No.
N/A

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

11b. Work Package Doc. No.
N/A

11c. Complete Installation Work
N/A
Cog. Engineer Signature & Date

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

12. Description of Change

THIS ECN AFFECTS THE FOLLOWING DOCUMENT: WHC-SD-W025-QAPP-001, REV 0, PAGES 1-19, 50-60, AND 84-102, AND 20-26.

THE FIRST 19 PAGES, PROCEDURE P-5.0-1, AND PROCEDURE P-10.0-1. OF THE ORIGINAL (REVISION 0) QUALITY ASSURANCE PROGRAM PLAN HAVE BEEN REVISED AND ARE ATTACHED WITH THIS ECN AS REVISION 1.

THIS DIRECT REVISION IS DUE TO A CHANGE IN PROCEDURES P-5.0-1. & P-10.0-1. & P-2.0-1.

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

13b. Justification Details
GENERAL RESTRUCTURING OF DOCUMENT TO COMPLY WITH CONSTRUCTION ACTIVITIES IN ACCORDANCE WITH GOLDER ASSOCIATES INC. APPROVED CONSTRUCTION QUALITY ASSURANCE PLAN.

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

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ENGINEERING CHANGE NOTICE

1. ECN (use no. from pg. 1) 152876

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

N/A

N/A

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

SDD/DD	☐	Seismic/Stress Analysis	☐	Tank Calibration Manual	☐
Functional Design Criteria	☐	Stress/Design Report	☐	Health Physics Procedure	☐
Operating Specification	☐	Interface Control Drawing	☐	Spares Multiple Unit Listing	☐
Criticality Specification	☐	Calibration Procedure	☐	Test Procedures/Specification	☐
Conceptual Design Report	☐	Installation Procedure	☐	Component Index	☐
Equipment Spec.	☐	Maintenance Procedure	☐	ASME Coded Item	☐
Const. Spec.	☐	Engineering Procedure	☐	Human Factor Consideration	☐
Procurement Spec.	☐	Operating Instruction	☐	Computer Software	☐
Vendor Information	☐	Operating Procedure	☐	Electric Circuit Schedule	☐
OM Manual	☐	Operational Safety Requirement	☐	ICRS Procedure	☐
FSAR/SAR	☐	IEFD Drawing	☐	Process Control Manual/Plan	☐
Safety Equipment List	☐	Cell Arrangement Drawing	☐	Process Flow Chart	☐
Radiation Work Permit	☐	Essential Material Specification	☐	Purchase Requisition	☐
Environmental Impact Statement	☐	Fac. Proc. Samp. Schedule	☐	_____	☐
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	[signature]	4/24/91
Cog./Project Engr. Mgr.	[signature]	4-24-91
QA	[signature]	4-24-91
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		
QA		
Safety		
Design		
Other		

DEPARTMENT OF ENERGY		
	[signature]	3JJ91

ADDITIONAL		

9 5 1 2 9 0 1 4 7 2

SUPPORTING DOCUMENT

1. Total Pages 156

2. Title	3. Number	4. Rev No.
Quality Assurance Program Plan	WHC-SD-W025-QAPP-001	1

5. Key Words

W-025 QAPP

6. Author

Name: E. G. Erpenbeck

Signature 1-25-91

Organization/Charge Code 24950/~~ML6PM~~ ML6DP

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A-6400-073 (7/90) (EF) WEF124
Supporting Document (Cover Sheet)

RECORD OF REVISION

(1) Document Number: WHC-SD-W025-QAPP-001

Page

(2) Title

Quality Assurance Program Plan for Project W-025, "Radioactive Mixed Waste Land Dispos Facility - Non-Drag-Off."

CHANGE CONTROL RECORD

(3) Revision	(4) Description of Change – Replace, Add, and Delete Pages	Authorized for Release	
		(5) Cog./Proj Engr	(6) Cog./Proj Mgr
1	(7) The original QAPP (Rev. 0) has been replaced by Revision 1. ECN 152876 has been approved for this change. Pages 1-19, 50-60, and 84-102 of the original QAPP have been revised. The original QAPP, WHC-SD-W025-QAPP-001, Revision 0, was released on June 26, 1990 via EDT 125907. Also [illegible] have been Revised	[illegible]	[illegible]

A-7220-005

The following is a summary of instructions to be used in preparing Record of Revision page and how appropriate Engineering Change Notice (ECN) and revisions are identified.

NOTE: Prior to revision of an engineering document, all proposed changes shall have been approved by an ECN.

The Record of Revision sheet shall include the following information.

1) The engineering document number.

2) The title of the engineering document.

Change Control Record

3) The revision number of the change.

4) A description of the change, including page changes, additions, and deletions where appropriate. List the approved ECN number(s) which have been incorporated.

5) The authorizing signature of the Cognizant/Project Engineer signifying accurate editorial incorporation of the previously approved change.

6) The dated signature of the Cognizant/Project Manager authorizing subsequent release of the revised engineering document.

7) List initial issue (usually Rev 0), approval EDT, and date. No signatures are necessary.

Golder Associates Inc.
CONSULTING ENGINEERS

QUALITY ASSURANCE PROGRAM PLAN FOR PROJECT W-025, RADIOACTIVE MIXED WASTE (RMW) LAND DISPOSAL FACILITY - NON DRAG OFF

Revision -3-

prepared for the
U.S. Department of Energy - Richland Operations Office
Contract No. DE-AC06-89RL11615

by

GOLDER ASSOCIATES INC.
Seattle (Redmond), Washington
Richland, Washington

Reviewed and Approved by:

Charles W. Lockhart, Project Director — Date 4/10/91

Patrick Corser, Project Manager — Date 4-10-91

Mary Jo Gorman, Project QA Manager — Date 4-10-91

April 1991

903-1387

Revision Level	Section No.	Revision Description
3	7.2	Revisions due to change in procedure P-10.0-1.
	10.1.1	Revisions due to change in procedure P-10.0-1.
	10.1.2	Revisions due to change in procedure P-10.0-1.
3	Figure 1-1	Revised to include CQA Engineer and CQA Personnel.

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1.0 ORGANIZATION

1.1 Organizational Structure and Project Responsibilities

The overall organizational structure of the Golder Associates Inc. (Golder) project team is shown on Figure 1-1. Primary responsibilities for the implementation of the requirements of this Quality Assurance Program Plan (QAPP) reside with the Project Director, the Project Manager, and technical staff. The Project QA Manager and assigned QA staff are responsible for the overall preparation and revision of this QAPP and its implementing procedures, as well as for monitoring and verifying compliance with QAPP requirements. Additional responsibilities of key personnel are described as follows:

- **Project Director:** The Project Director has ultimate responsibility for technical and quality performance on this project, and for ensuring that all U.S. Department of Energy - Richland Operations Office (DOE-RL) quality assurance, schedule, and budgetary requirements are satisfied.

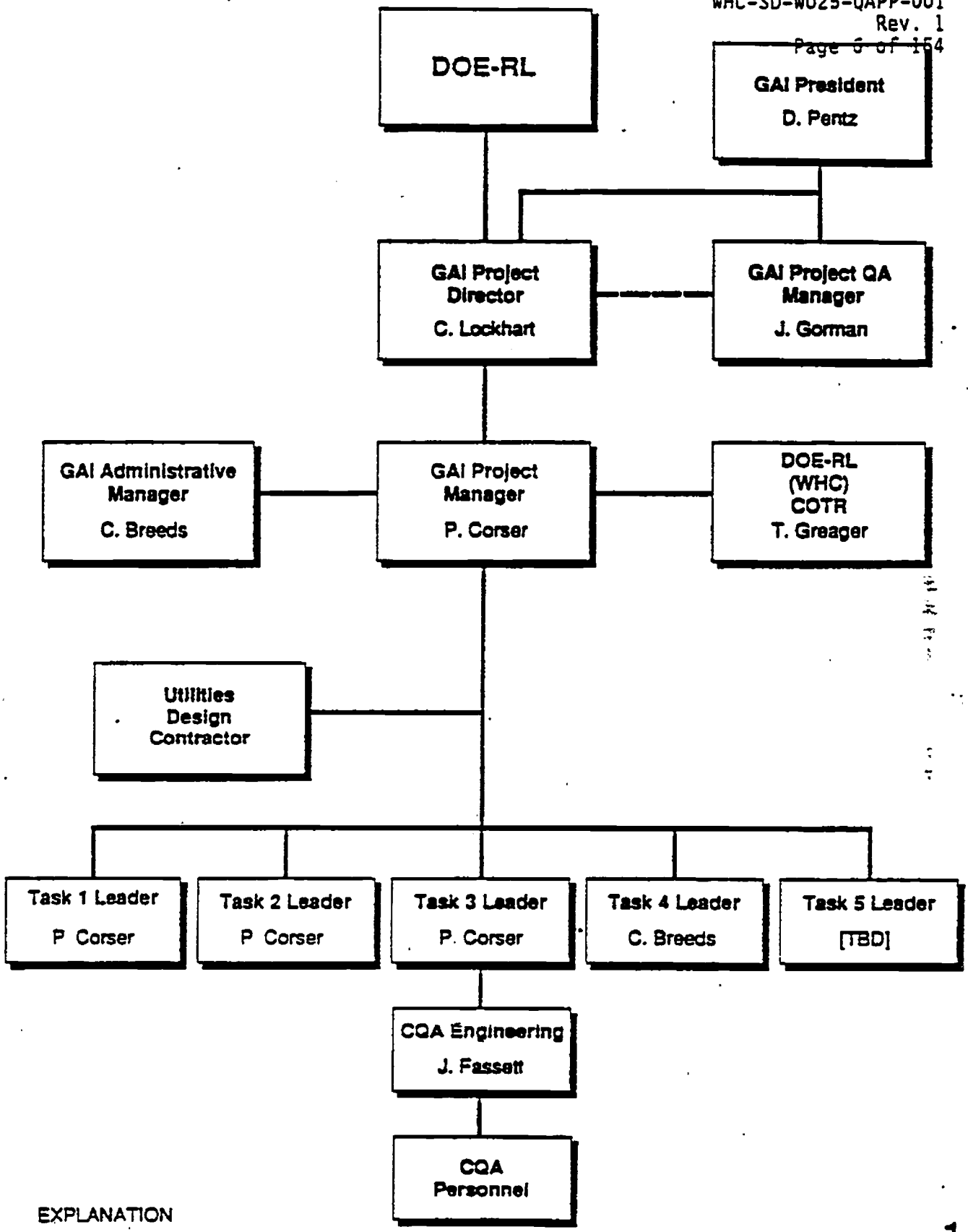
- **Project Manager:** The Project Manager is responsible for conducting technical activities in compliance with all contractual technical and quality requirements, for coordinating all technical staff activities, for continuing liaison with DOE-RL contract officer's technical representative (COTR) through the completion of all tasks, submittal of routine progress reports, and assessment of all change requests. The Project Manager may delegate specific duties in support of these responsibilities.

- **Project QA Manager:** The Project QA Manager retains overall responsibility for the preparation and update of this QAPP and its supporting plans and procedures; and is responsible for verification of compliance with QAPP requirements through the monitoring, review, inspection, surveillance, and auditing procedures described herein. The Project QA Manager shall maintain current Lead Auditor qualifications as described in Sections 2.3 and 18.0 below. Specific duties in support of these responsibilities may be delegated within the guidelines of governing procedures.

- **Health and Safety Manager:** The Health and Safety Manager is responsible for the review of site safety plans and training programs prepared by Kaiser Engineers - Hanford (KEH) in order to ensure that any field activities conducted on this project by Golder or its subcontractors are performed safely and in compliance with applicable state and federal regulations.

1.2 Subcontractor Support

Subcontractor support for this project will be provided by both Golder and DOE-RL. For all subcontractor support activities that are Golder's responsibility, activity shall be initiated by the Project Director or Project Manager in compliance with the controls for procurement



EXPLANATION

Reporting
Communicating

FIGURE 1-1
PROJECT ORGANIZATI
DOE-RL/NON DRAGOFF RWF PRO

PROJECT NO. 903-1287.100 DWG. NO. 28783 DATE 4/2/91 DRAWN LJ

Golder Associates

documents and acceptance of procured services described by Sections 4.0 and 7.0 of this QAPP.

2.0 QUALITY ASSURANCE PROGRAM

2.1 Corporate Quality Policy and QA Program Plan Description

It is Golder's corporate policy to establish appropriate QA program controls for all work related to hazardous and/or radioactive mixed waste investigations and related design/ construction activities. This QAPP documents the program controls selected or developed for project W-025, "Radioactive Mixed Waste (RMW) Land Disposal Facility - Non Drag Off." It is prepared in compliance with the applicable requirements of (1) ANSI/ASME NQA-1, Quality Assurance Program Requirements for Nuclear Facilities [American Society of Mechanical Engineers (ASME), 1986], which is the standard established for all projects conducted at the Hanford Site by DOE-RL Order 5700.1A, Quality Assurance (DOE-RL, 1983), and (2) the current version of SD-W031-QAPP-001, "Project Specific Quality Assurance Plan W-031 and W-025, Radioactive Mixed Waste Disposal Facility - Drag Off and Non Drag Off." Figure 2-1 is a matrix that cross references the basic requirements and mandatory supplements of ANSI/ASME NQA-1 and SD-W031-QAPP-001 to the specific Golder QAPP sections and supporting plans and procedures that implement the requirements. A list of implementing QA procedures is provided in Figure 2-2.

The primary objective of this QAPP is to provide a procedural framework that will ensure that the design specifications, drawings, reports, analyses, recommendations, construction QA monitoring and inspection services, and all other types of services and assistance provided by Golder meet overall contractual requirements, applicable regulatory requirements, and are consistent with established engineering practices. All contractual changes that expand or otherwise affect the scope of technical activities, quality requirements, or employee health and safety as applicable to Golder or its subcontractors, shall be reviewed and modifications or additions to this plan and its implementing procedures made wherever required.

2.2 Construction Quality Assurance Plan Development Considerations

Within the overall ANSI/ASME NQA-1 QA program structure invoked by this QA Program Plan, the requirements of Technical Guidance Document: Construction Quality Assurance for Hazardous Waste Land Disposal Facilities, EPA/530-SW-86-031, OSWER Policy Directive 9472.00-3, (U.S. EPA, 1986) shall be followed, as appropriate, in the preparation of a secondary Construction Quality Assurance Plan (CQAP) prior to initiating activities on Task III. The CQAP shall address the specific requirements for format and content defined in the EPA technical guidance document cited above, and shall be developed and implemented in compliance with the procedures and controls described by this QAPP. The CQAP shall address specific project-level requirements as appropriate for the scope of Task III, as indicated in Figure 2-1. The implementing procedures referenced in this QA Program Plan may be drawn upon as necessary or appropriate for Task III project-level activities, provided

FIGURE 2-1

NON DRAG-OFF RMW DISPOSAL FACILITY
QUALITY ASSURANCE PROGRAM REQUIREMENTS:
IMPLEMENTING PLAN SECTIONS AND PROCEDURES

Applicable 10CFR50 Appendix B Criteria	Applicable SO-W031-QAPP-001 Criteria	Title	NQA-1 Basic Requirements	NQA-1 Supplements	GAI QA Program Plan Sections	GAI Implementing Procedures and S
I	1	Organization	BR-1	1S-1	1.0	
II	2	QA Program	BR-2	2S-1, 2S-3	2.0	P-2.0-1, P-18.0-
III	3	Design Control	B-3	3S-1	3.0	P-3.0-2, P-6.0-1
IV	4	Procurement Document Control	BR-4	4S-1	4.0	P-4.0-1
V	5	Instructions, Procedures and Drawings	BR-5	--	5.0	P-5.0-1, P-6.0-1
VI	6	Document Control	BR-6	6S-1	6.0	P-3.0-2, P-5.0-1 P-17.0-1
VII	7	Control of Purchased Material & Services	BR-7	7S-1	7.0	P-4.0-1, P-10.0-
VIII	8	Identification and Control of Material, Parts and Components	BR-8	8S-1	8.0	P-3.0-2, P-10.0-
X	10	Inspection	BR-10	10S-1	10.0	P-10.0-1, P-10.(
XI	11	Test Control	BR-11	11S-1	11.0	P-3.0-2, CQAP
XII	12	Control of Measuring and Test Equipment	BR-12	12S-1	12.0	P-12.0-1, CQAP
XIII	13	Handling, Storage and Shipping	BR-13	13S-1	13.0	-----
XIV	14	Inspection, Test and Operating Status	BR-14	14S-1	14.0	P-10.0-4, CQAP
XV	15	Nonconforming Items	BR-15	15S-1	15.0	P-15.0-1, CQAP
XVI	16	Corrective Action	BR-16	--	16.0	P-15.0-1, P-18.(
XVII	17	Quality Assurance Records	BR-17	17S-1	17.0	P-17.0-1, CQAP
XVIII	18	Audits	BR-18	18S-1	18.0	P-18.01, P-18.0-

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FIGURE 2-2

PROJECT QUALITY ASSURANCE PROCEDURES

P-2.0-1,	"Training and Orientation"
P-3.0-2,	"Specific Work Instructions"
P-4.0-1,	"Procurement Document Control"
P-5.0-1	"Distribution and Control of Golder Associates Procedures"
P-6.0-1	"Engineering Drawing and Specification Control"
P-6.0-2	"Control of Correspondence and Communications"
P-10.0-1	"Technical Review"
P-10.0-3	"Surveillance Inspection"
P-10.0-4	"Receiving Inspection"
P-12.0-1	"Calibration and Maintenance of Measuring and Test Equipment"
P-15.0-1	"Control of Nonconformance Incident Reports, and Corrective Action."
P-17.0-1	"Quality Assurance Records Management"
P-18.0-1	"Audits"
P-18.0-2	"Auditor Qualifications"

that they are acceptable in the context of the Technical Guidance Document (U.S. EPA, 1986). Specific requirements for CQAP format and content shall be considered in the preparation and review of the SWIs for its development; see Section 3.0 below.

2.3 Training and Qualification of Project Personnel

All project personnel shall be trained in the specific application of this QA Program Plan and its implementing procedures, to the extent appropriate for their work activities. Technical and QA staff training shall be conducted in compliance with procedure P-2.0-1, "Training and Orientation." Auditor/Lead Auditor training and qualification shall be in accordance with procedure P-18.0-2, "Auditor Qualifications." Training records shall be maintained in corporate QA files. Subcontractor training shall be performed to the extent required by individual SWIs and/or procurement documents. Personnel qualifications shall be documented by professional resumes and other verifiable credentials. Qualification and certification requirements for Construction Quality Assurance (CQA) inspectors and receiving inspectors for Task III activities shall be defined in the CQAP and shall be completed prior to initiating task activities.

2.4 Authority of QA Personnel

QA personnel assigned to this project shall have direct access to all levels of the technical organization of Golder or any of its subcontractors; they are specifically delegated the necessary organizational independence and authority to identify conditions adverse to quality, initiate corrective action processes, and otherwise ensure proper implementation of the QA program discussed in this plan. Such authority extends to the stopping of work, if required in response to serious quality problems or extreme situations.

2.5 Management Assessments

The QA Manager shall prepare an annual report to Golder management summarizing audit observations, findings, and any nonconformance activity resulting from inspections or surveillance. The report shall summarize corrective actions taken, and shall discuss any quality problem trends observed during the previous year. In addition to the QA Manager's report, an independent assessment of the effectiveness of the QA program prepared for this project shall be made at least annually by an upper management representative designated by the Office Manager. Both final reports shall include recommendations for any additional corrective action, and shall be submitted to the Office Manager and President, with copies to the Project Director and the Project QA Manager. Management assessment reports may address multiple projects with similar requirements.

3.0 DESIGN CONTROL

3.1 Task Management Process

The structure and technical content of deliverable plans, procedures, reports, drawings, laboratory analyses, or other work products shall be controlled by the application of appropriate QA procedures. All work on this project shall be initiated and controlled by means of SWIs issued in accordance with procedure P-3.0-2, "Specific Work Instructions." SWIs shall be prepared by the Project Director or Project Manager, and shall address all required technical activities. All SWIs require approval by the Project QA Manager or a qualified designee prior to issue.

3.2 Design Input and Analysis

Basic design input parameters, including reference specifications and conceptual drawings or sketches, shall be defined in SWIs to the designers in sufficient detail to provide a consistent baseline supporting design development, analysis, review, and evaluation of future design changes. All modifications to SWIs addressing design input or analysis shall document the source and rationale for the modifications, and shall be subject to the same review and approval cycles as the initial SWI as described in procedure P-3.0-2, "Specific Work Instructions." All design analyses shall be performed in compliance with governing SWI instructions, which shall specifically require a definition of the objective of the analysis, definition of design inputs and sources, literature search results or other background data, identification of any assumptions (indicating those which must be verified in the design process), and identification and full documentation of any computer program applications made as part of the analysis. All design analyses and supporting calculations shall be recorded on standard Golder engineering paper; shall be identified by subject, project number, and analyst's name; shall be checked and approved by the reviewer named in the governing SWI; and, when complete, shall be retained in the project quality records in compliance with Section 17.0 below.

3.3 Design Review Requirements

All design deliverables shall be reviewed and approved prior to submittal to the client in compliance with P-6.0-1, "Engineering Drawing and Specification Control" and/or P-10.0-1, "Technical Review", as appropriate for the type of deliverable. Identical review requirements apply to draft documents presented for client review and final documents incorporating client comments. Reviewer selection, documentation requirements, and other detailed requirements specific to engineering drawings and specifications are controlled by use of procedure P-10.0-1, as invoked by P-6.0-1; a detailed description of the main features of the technical review process embodied in P-10.0-1 is provided in Section 10.1 below. Any special conditions, client requirements, or other applicable quality requirements that may affect the performance of the review shall be identified on the SWI initiating the activity.

3.4 Design Change Requests

All change requests applicable to Golder drawings or specifications shall be documented and dispositioned as required by P-6.0-1, "Engineering Drawing and Specification Control." Change requests applicable to client drawings and specifications applicable during Task III shall be initiated using client engineering change request procedures as outlined in the CQAP.

4.0 PROCUREMENT DOCUMENT CONTROL

All project-related procurement documents shall be prepared, reviewed, and issued as required by procedure P-4.0-1, "Procurement Document Control." Justification for selection of suppliers or consultants shall be documented by memorandum and retained in the project quality records in compliance with Section 17.0 below. Subcontractors shall be required to work under the provisions of this QAPP to the extent appropriate for the service or item being procured. QA Program Plan provisions may be invoked directly, without modification, or, at the Project QA Manager's discretion, may be interpreted to suit the complexity of the procurement and/or the subcontractor's own QA program capabilities. Subcontractor QA requirements shall be included in procurement documents or in task-initiating SWIs as discussed in procedure P-3.0-2, "Specific Work Instructions."

5.0 INSTRUCTIONS, PROCEDURES, AND DRAWINGS

QA and technical requirements for all activities affecting quality shall be specified by means of SWIs, the QAPP, the CQAP, individual QA procedures, and/or technical procedures. Preparation, review, approval, distribution, and revision control of SWIs is addressed by P-3.0-1, "Specific Work Instructions"; similar controls applicable to the QA procedures listed in Figure 2-2 and any technical procedures that may be required by the CQA plan are controlled by procedure P-5.0-1, "Distribution and Control of Golder Associates Procedures." The work plan, the QAPP, and the CQAP shall be reviewed as noted in 10.1.1, and shall be approved by the Project Director, the Project Manager, and the Project QA Manager. They shall be subject to the distribution and revision controls described in Sections 8.4 and 8.5 of P-5.0-1. Preparation, review, approval, distribution, and revision control of engineering specifications and drawings shall be as specified by procedure P-6.0-1, "Engineering Drawing and Specification Control", with the exception that drawing format shall be in compliance with DOE-RL standards as specified by the client's COTR.

6.0 DOCUMENT CONTROL

Once client approval has been received, the work plan, this QAPP, the CQAP, and their implementing procedures shall be subject to the controlled distribution requirements contained in P-5.0-1, "Distribution and Control of Golder Associates Procedures." Controlled copies shall be distributed in accordance with procedure P-5.0-1 to designated client

representatives and to all Golder and subcontractor project personnel performing or supervising work. SWIs are subject to similar distribution control requirements as defined in P-3.0-2, "Specific Work Instructions." Copies of the current EPA and American Society for Testing and Materials (ASTM) methods applicable to Golder geotechnical laboratory testing shall be retained in the Golder Geotechnical library, available for laboratory use as required.

All project correspondence or meeting notes that 1) require Golder, Golder subcontractor, or DOE-RL action; 2) provide information necessary for performing the technical scope of work; or 3) modify or significantly affect the existing technical scope of work, shall be documented, distributed, and systematically filed in the project QA records in compliance with procedure P-6.0-2, "Control of Correspondence and Communications" and P-17.0-1, "Quality Assurance Records Management." All telephone contacts that in any way modify or affect the technical scope, budget, schedule, or contractual quality requirements shall be confirmed by letter correspondence. All letter correspondence to DOE-RL shall be reviewed and signed by the Project Director or Project Manager, and shall be retained as project QA records.

7.0 CONTROL OF PURCHASED MATERIAL, ITEMS, AND SERVICES

Golder procurement activities will be confined to those services, materials, items, and equipment that are required to support the technical responsibilities defined by the contract task descriptions. As part of its responsibilities under Task II, Golder will produce baseline engineering drawings and specifications. The client will assume responsibility under its own quality program for drawing and specification change control, updates, and translation into various procurement documents. Quality program controls applicable to Golder procurements are described below.

7.1 Subcontractor Evaluation

All subcontractors shall be evaluated prior to contract or purchase order award; with the single exception discussed in Section 1.2 above, selection shall be based on sole source justification, technical evaluation, QA program evaluation, and/or competitive bid as described in procedure P-4.0-1, "Procurement Document Control." Justification for selection of suppliers or consultants shall be documented by memorandum and retained in the project quality records in compliance with Section 17.0 below. All subcontractors shall be required to work under the provisions of this QAPP to the extent appropriate for the service or item being procured. Subcontractors shall comply with the specific QA requirements clauses included in their procurement documentation and/or accompanying SWIs.

7.2 Acceptance of Procured Services

If a subcontracted service results in a report, formal comments, analyses, or other work product, acceptance of the service will normally be by completion of at least one technical review in accordance with procedure P-10.0-1, "Technical Review", as described in Section

10.0 below. Additional reviews may be required at the discretion of the Project Manager. If appropriate for a particular task, subcontractors may be requested to perform an internal independent technical review in compliance with the specific QA requirements of the applicable procurement document and/or initiating SWI. If such an option is permitted, the subcontractor shall submit the completed document with all required review documentation for final review by the Project Manager prior to submittal to the client.

7.3 Acceptance of Procured Items

Acceptance of procured items shall be based on the requirements defined by procedure P-10.0-4, "Receiving Inspection."

8.0 IDENTIFICATION AND CONTROL OF MATERIAL, PARTS, AND COMPONENTS

Procured items shall be physically marked or tagged with the Golder purchase order number, purchase order item number, date of acceptance, and acceptance stamp as required by P-10.0-4, "Receiving Inspection." If field sampling activities by Golder or subcontractor personnel are required as part of a particular task, sample identification and any chain of custody control requirements shall be as defined by governing SWIs (and/or the CQAP if performed as part of Task III).

9.0 CONTROL OF PROCESSES

The structure and technical content of all deliverable plans, procedures, reports, drawings, or other work products is controlled through the application of the controls defined in this QAPP and the procedures referenced herein. The specific processes of construction monitoring and inspection required under Task III shall be as specified by the provisions of the CQAP and its implementing procedures, as noted in Section 2.2 above.

No special processes (i.e., processes requiring prequalification of equipment, personnel, and procedures) are anticipated for any task under the current contractual scope of work. Should requirements for the use of such processes arise, however, this QAPP and/or the CQAP shall be revised to include appropriate procedural controls, either as a project-specific plan appendix or as a separate procedure developed and approved in compliance with P-5.0-1, "Distribution and Control of Golder Associates Procedures."

10.0 INSPECTION

10.1 Technical Review

10.1.1 General Requirements

All deliverable plans, procedures, reports, drawings, comment responses, recommendations, or other work products produced as a contractual deliverable shall be subject to independent technical review in accordance with P-10.0-1, "Technical Review", by qualified individuals who have not been directly responsible for the preparation of the document being reviewed. Technical reviews are in-depth critical reviews that verify the accuracy of calculations, examine the applicability of references, and verify technical adequacy. All calculations shall be checked, dated, and initialled by both the preparer and the checker prior to presenting the resulting document for review. The Project Manager or designated Task Manager shall specify reviewer assignments and any additional review instructions in the SWI initiating the activity. Reviewer assignments, any additional review instructions, and the required review level shall be identified in the SWI initiating the activity. Comments made as part of the review process are either mandatory or nonmandatory; all mandatory comments shall require formal documentation of comment resolution as required by the procedure.

10.1.2 Subcontractor Technical Review Requirements

Subcontractor authors may be required to participate in the technical review process as described in 10.1.1 above. Alternately, subcontractors may be requested to perform internal independent technical reviews, if appropriate for a particular task or activity as noted in 7.2 above. In the latter case, technical review requirements shall be based on interpretations or extractions of P-10.0-1 requirements, tailored for the specific needs of the task by the QA Manager as part of the procurement document/SWI review process. If such an option is permitted, the subcontractor shall submit the completed document with all required review documentation for final review by the Project Manager prior to submittal to DOE-RL. The Project Manager may request additional reviews in compliance with P-10.0-1 requirements, or may document approval by the letter transmitting the document to the client.

10.2 Surveillance Inspection

Procedure P-10.0-3, "Surveillance Inspection", provides guidance for conducting surveillance inspections of field, office, and laboratory testing operations to verify compliance with governing plans and procedures; surveillance inspections may be requested at the discretion of the Project Director, Project Manager, Project QA Manager, or the client's COTR. The procedure assigns specific responsibilities for schedule development and inspection, and requires the resolution and corrective action of all observed nonconformances in accordance with procedure P-15.0-1, "Control of Nonconformances, Incident Reporting, and Corrective Action." Provisions are included in the procedure for issuing stop work orders if required.

10.3 Receiving Inspection

Receiving inspection in compliance with procedure P-10.0-4, "Receiving Inspection", shall be performed on all items procured for this project that are directly related to the quality of deliverable work products, testing, or field activities. Receiving inspection of liner materials shall also be performed on behalf of the client under Task III; specific inspection duties over and above P-10.0-4 requirements shall be enumerated in the CQAP. All receiving inspection shall be performed by inspectors designated and certified by the Project QA Manager and Project Manager. All designated inspectors shall receive formal training in the requirements of P-10.0-4 and the CQA, as appropriate, in compliance with P-2.0-1, "Training and Orientation."

11.0 TEST CONTROL

Acceptance test plans and procedures, the CQA developed for Task III activities, and/or other test plans and procedures required as part of particular task activities shall, as appropriate, require the incorporation of, or references to, detailed technical instructions for test performance. At a minimum, test plans or procedures shall consider the following items:

- Test prerequisites, such as instrumentation and calibration requirements, applicable design requirements, equipment precision and accuracy requirements, cautionary information regarding potential sources of error or inaccuracy, a total equipment list, test personnel qualification requirements, test schedule requirements, environmental considerations, and data collection or storage requirements;

- Definition of quantitative and qualitative completion or acceptance/rejection criteria;

- Definition of any DOE-RL (WHC) and/or Golder inspection, hold, witness, or surveillance points. At a minimum, in compliance with SD-W031-QAPP-001 requirements, the CQAP prepared under Task III shall include mandatory client witness points for bentonite installation, liner installation and welding, electrical system testing, nondestructive examination of piping welds, pressure testing of the leachate collection system, and acceptance testing; mandatory client surveillance points shall be established for asphalt pavement installation, heat trace testing, leachate collection system pipe welding, and leachate collection tank integrity testing;

- Methods for documenting or recording test data and results; and

- Methods for evaluating test data or test reports.

All geotechnical laboratory test procedures shall be in compliance with the latest edition of EPA or ASTM methods as invoked by SWI or CQAP requirements.

12.0 CONTROL OF MEASURING AND TEST EQUIPMENT

All measuring and test equipment owned or leased by Golder that is used in field or geotechnical laboratory investigations shall be controlled in compliance with procedure P-12.0-1, "Calibration and Maintenance of Measuring and Test Equipment", and the requirements of the CQAP or applicable SWIs.

13.0 HANDLING, STORAGE, AND SHIPPING

All handling, storage, and shipping requirements applicable to procured items shall be as defined in applicable procurement documents in compliance with P-4.0-1, "Procurement Document Control." Similar requirements applicable to measuring and test equipment shall be contained in individual equipment files as described in P-12.0-1, "Calibration and Maintenance of Measuring and Test Equipment." Any specific requirements for geotechnical laboratory custody controls and special handling and storage requirements shall be included in the SWIs initiating the activity.

14.0 INSPECTION, TEST, AND OPERATING STATUS

Items, materials, and references procured by Golder shall be accepted by receiving inspection and shall be marked or identified with acceptance tags as described in P-10.0-4, "Receiving Inspection." Rejected items will be tagged as described in procedure P-15.0-1, "Control of Nonconformances, Incident Reporting, and Corrective Action." Facility construction inspection and completion status reports under Task III shall be logged and documented as described in the CQAP; see Section 2.2 above.

15.0 NONCONFORMING ITEMS

Procedure P-15.0-1, "Control of Nonconformances, Incident Reporting, and Corrective Action", establishes a system for the identification and reporting of nonconformances related to the use of approved procedures, drawings, or specifications. It provides for identification of causes, disposition and implementation of corrective action measures that may be required to reduce or preclude future occurrences and will apply to all technical activities that are completely within Golder purview. Deficiencies and nonconformances may be observed as a result of receiving inspection or surveillance inspection activities as discussed in Section 10.0 above. For Task III, defects observed as a result of routine construction inspection shall be documented and distributed for immediate correction as required by the CQAP; client nonconformance reporting procedures shall be invoked when such defects are not corrected within the conditions and guidelines established by the CQAP.

16.0 CORRECTIVE ACTION

As discussed in Section 15.0 above, procedure P-15.0-1, "Control of Nonconformances, Incident Reporting, and Corrective Action", provides for the identification of causes, disposition and implementation of corrective action measures that may be required in order to reduce or preclude future nonconformances. Corrective action requirements related to audit findings or observations are addressed in procedure P-18.0-1, "Audits." Corrective action requirements related to defects observed during routine construction inspections shall be defined in the CQAP.

17.0 QUALITY ASSURANCE RECORDS

17.1 General Requirements

Project QA records shall be retained and managed as required by procedure P-17.0-1, "Quality Assurance Records Management." For the purposes of this project, the function of Record System Administrator shall be assumed by the Redmond Office Project Secretary. Duplicate records are required; storage facilities shall meet the duplicate storage requirements defined in the procedure. The project QA records file organization shall be defined in the form of a records index, and shall be prepared by the Redmond office Project Secretary with guidance from the Project Manager and Project QA Manager. The project file organization shall be organized to accommodate expansion. Additional sections and subheadings may be added as required due to increased activity or requirements for more specific detail in individual tasks. The records index shall be actively updated; corrections and additions may be made by hand, but shall be formally updated on at least a monthly basis. An updated copy of the index shall be routed to the Project QA Manager whenever it is formally updated. When specified by the client, "permanent" or "nonpermanent" records classification shall be noted on the records index and maintained on the index through records turnover.

17.2 Working Files

Working documents may be retained at the Golder project office, other Golder offices, or subcontractor facilities within the allowances of P-17.0-1. Working file organization is at the discretion of the activity, but must contain all SWIs, all procurement or contractual documentation, and any other documentation specifically required by the SWIs or procurement documents. Standard metal filing cabinets shall be used for temporary storage of working documents.

17.3 Records Turnovers

Records turnovers shall be performed at the direction of the client's COTR. The Project Manager shall inform the Project Secretary of any records turnover requirements. The Project Secretary shall update the project QA records index, remove the original records

from storage, and place them in order in individual records boxes. Box indexes and labels shall be prepared, based on the updated index. The Project QA Manager or designee shall review the completed turnover package, and, if acceptable, seal boxes pending turnover to the client. Shipping instructions shall be provided by the Project Manager.

18.0 AUDITS

One comprehensive internal audit shall be performed by Golder in the first quarter of project activity; additional audits may be performed at the request of the Project Director, Project Manager, Project QA Manager, or client's COTR. All audits shall be performed in accordance with procedure P-18.0-1, "Audits" by a Lead Auditor and audit team qualified in compliance with procedure P-18.0-2, "Auditor Qualifications."

CONTROLLED DOCUMENT

Golder Associates Inc.

Quality Assurance Procedure

Number: P-2.0-1
Title: TRAINING AND ORIENTATION

Prepared By:	Approved	Approved	Effective Date	Rev. Level
4-2-90	4/2/90		9/3/90	7
5-17-91	5/17/91		5/17/91	8

Record of Revision

Revision Level	Page Number	Section Number	Revision
8	1 and 2	5. and 8.1	revised to allow QA Manager or designated project personnel to perform training and orientation

1. PROCEDURE

The purpose of this procedure is to provide guidelines for conducting and documenting training and orientation of project personnel in the contents of the general requirements, plans, procedures, and instructions invoked to control or direct project quality.

2. APPLICABILITY

This procedure applies to all Golder Associates personnel performing or managing activities under project-specific Quality Assurance Program Plan (QAPP) requirements.

3. DEFINITIONS

None.

4. REFERENCES

4.1 Golder Associates Quality Assurance Procedure P-3.0-2, "Specific Work Instructions."

4.2 Golder Associates Quality Assurance Procedure P-5.0-1, "Distribution and Control of Golder Associates Procedures."

5. DISCUSSION

Training and orientation of project personnel is a shared responsibility of Project and QA management. Whenever this procedure is invoked by project-specific QAPP, the QA Manager or designated project personnel shall provide personnel newly assigned to the particular type of project a general orientation in the regulatory background and hierarchy of the plans and procedures selected to control project activities. They shall also provide specific training in the requirements of the applicable QAPP and referenced QA procedures that are applicable to the work that will be performed by the trainee(s). Technical direction is provided in the Specific Work Instructions (SWIs, see procedure P-3.0-2, "Specific Work Instructions") prepared for each task; additional detailed training in the requirements of SWIs and in any Technical Procedures shall be provided by the Project Manager or designated project personnel. In all cases, training methods, levels, and documentation requirements shall be suitable to the scope and complexity of the technical objectives of the project or task, and shall accommodate variations in individual trainees' education, experience, and level of previous training.

6. RESPONSIBILITIES

6.1 QA Manager (or designee)

The QA Manager is responsible for providing a general orientation in the regulatory background and hierarchy of project-controlling plans and procedures; for training of all project staff in the proper use and application of QA procedures and project-specific QAPPs; for selecting training methods appropriate for the complexity of the plan or procedure, the type of personnel assignment, previous training and experience, client requirements, and other factors; and, for reviewing training session records prior to routing to QA and project files.

6.2 Project Manager (or designed Task Leader)

The Project Manager is responsible for providing technical direction to project staff through the use of SWIs; for providing additional training in technical requirements when required by task complexity; for providing training in the individual technical procedures invoked by SWIs or the QAPP; for selecting technical training methods appropriate for the complexity of the task or technical procedure, the type of personnel assignment, previous training and experience, client requirements, and other factors; for forwarding all technical training memoranda, meeting notes, or records to the QA Manager for review; and, for notifying the QA Manager of any changes or additions to project staff or their functional assignments.

7. MATERIALS

7.1 Controlled Document Transmittal/Reading Training Memorandum (Exhibit A)

7.2 Personnel Training Record forms (Exhibit B)

8. PROCEDURE

8.1 Orientation

Orientation sessions shall be held by the QA Manager or designated personnel when the Project Manager advises that technical personnel have been newly hired, or have been assigned to a particular type of project for the first time.

As a general guideline, orientation sessions should address Golder's corporate quality policy, background regulatory information, applicable regulations and standards likely to be encountered by the employee, the general responsibilities of project personnel for implementing QA program requirements in their work, a general discussion of the role of QAPPs and their implementing QA and technical procedures, and a general discussion of proper recordkeeping practices. Orientation sessions should be documented using training record forms as discussed in 8.4.3 below.

8.2 QA Training

QA training activities shall be initiated whenever new or revised QA procedures or plans are issued, whenever SWIs invoking QA plan or procedure requirements are issued to untrained personnel, whenever requested by a Project Manager, or whenever deemed necessary by the QA Manager. Methods, content, and documentation shall be in accordance with the requirements and guidelines of Section 8.4 below.

8.3 Technical Training

Technical procedure training shall be initiated whenever new or revised technical procedures are issued, whenever SWIs invoking technical procedure requirements are issued to untrained personnel, or whenever requested by the Project Manager. Methods, content, and documentation shall be in accordance with the requirements and guidelines of Section 8.4 below.

Additional technical training shall be performed whenever (at the discretion or request of the Project Manager or designed Task Leader) the complexity of a work assignment requires additional detailed instruction to emphasize, clarify, or elaborate upon the requirements of the SWI. Training sessions shall be held as discussed in 8.4.3 below.

8.4 Training Methods

The following training methods shall be used singly or in combination based on: the complexity of plans, procedures, or instructions and their relationship to project quality; the type of personnel assignment; previous training and experience of the trainee or trainees; specific client requirements as expressed in the QAPP; and other factors. General guidelines for methods selection are provided for each type.

8.4.1 Reading Training

Project personnel shall be required to read and acknowledge their understanding of all formally distributed QAPPs, QA procedures, technical procedures, or project-specific activity plans. Since all such documents will be under controlled distribution in accordance with requirements or procedure P-5.0-1, "Distribution and Control of Golder Associates Procedures", documentation of completion of reading training is provided by signature on the Controlled Document Transmittal/Reading Training Memorandum (see Exhibit A).

Reading training generally may stand alone as a training method when recipients have been under controlled distribution for previous versions, when revisions are minor, when the recipient has participated in the development or revision of the procedure, or when procedure usage by the recipient is likely to be minimal.

8.4.2 Training Memoranda

Explanatory memoranda should generally be issued with distributed documents when procedures or plans are newly issued, or when personnel have not been trained in previous versions, or when major revisions have been made, or when deemed necessary by the QA Manager or Project Manager due to interpretation problems in actual use. Such memoranda should summarize the major points of the procedure or plan with emphasis on any new requirements or changes. Acknowledgement of understanding of the requirements of individual procedures and training memoranda shall be documented by signature on the transmittal/training memo (Exhibit A). Copies of the memorandum and the signed memo shall be retained in corporate QA files and project files when appropriate.

8.4.3 Training Session

Training sessions should generally be held when QAPP or procedure changes are major in nature, when they result from significant nonconformances or audit findings or observations, or whenever additional training relative to SWI requirements has been deemed necessary by project management. Training sessions should be documented on a Personnel Training Record (see Exhibit B) or by a memorandum to file supplying the same information.

8.5 Subcontractor or Consultant Training

Unless otherwise directed by the Project Manager and QA Manager, subcontractor or consultant training shall be provided by detailed instructions appended to their work packages, or, if appropriate, by controlled distribution of appropriate plans and procedures. In such cases, subcontractor or consultant understanding and acceptance of such plans and procedures shall be documented by signature on the transmittal/training memo (Exhibit A). Copies of the signed memo and any accompanying memoranda shall be retained in corporate QA and project files.

TO: Otterson, Joey DATE: 03/27/90

FR: GLENN MILLS LOCATION: Seattle

RE: CONTROLLED DOCUMENT TRANSMITTAL / READING TRAINING MEMORANDUM

_____ ACKNOWLEDGEMENT OF RECEIPT AND TRAINING

Attached is your controlled copy of the referenced document(s). Read each document and destroy any previous revisions in your possession. Please sign below acknowledging receipt and completion of reading training. If you have any questions, contact Glenn Mills at (206) 883-0777.

_____ ACKNOWLEDGEMENT OF RECEIPT

Attached is your controlled copy of the referenced document(s). Please sign below acknowledging receipt. If you have any questions, contact Glenn Mills at (206) 883-0777.

Signature _____ Date _____

DOCUMENT	REVISION LEVEL
TP-1.2-3	0

cc: Corporate QA personnel files
Project file

Return signed transmittals to:

GOLDER ASSOCIATES INC.
QUALITY ASSURANCE GROUP
4104 148TH AVE. N.E.
REDMOND, WA 98052

P-2.0-1 EXHIBIT B

Golder Associates, Inc.

PERSONNEL TRAINING RECORD

Training Session Date:_____ Trainer:_____

Reference Requirements, Procedures, Plans or Instructions:_____

_____

_____

Attendees:

Name (print)	Signature	Name (print)	Signature
Name (print)	Signature	Name (print)	Signature
Name (print)	Signature	Name (print)	Signature
Name (print)	Signature	Name (print)	Signature
Name (print)	Signature	Name (print)	Signature

Summary:_____

_____

_____

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_____

_____

_____

Reviewed by:_____ Date:_____

cc: QA files
Project file _____
Job/Task No.

Golder Associates Inc.

Quality Assurance Procedure

Number: P-3.0-2
Title: SPECIFIC WORK INSTRUCTIONS

Prepared By:	Approved	Approved	Effective Date	Rev. Level
[illegible] 4-2-90	[illegible] 4/3/90	[illegible]	4/3/90	6

9 1 2 9 0 5 0 3

RECORD OF REVISIONS

Revision Level	Page No.	Section No.	Revision
6	1	4.0	deleted uncited references per latest revision P-5.0-1
	2	6.4	minor editorial correction
	3	8.1	deleted requirement for work start date
	5	8.6	minor editorial correction

1. PURPOSE

This procedure provides methods for documenting and initiating work using Specific Work Instructions (SWIs).

2. APPLICABILITY

SWIs shall be prepared under the requirements of this procedure for:

- All work associated with the production of contract deliverables.
- Letters or other communications that contain data, evaluations, results of analyses, recommendations, or other information which will be used in site characterization, design, testing, or performance assessment activities.
- Provision of formal comments to the client.
- Initiation or procurement activities, including renegotiation of consulting agreements. (Note: Project Managers may issue Purchase Orders directly, without preparing SWIs.)
- Initiation of field activities.
- Any other situation requiring, at the Project Manager's discretion, a documented means of assigning work.

3. DEFINITIONS

3.1 Specific Work Instructions (SWI)

SWIs are controlled documents that describe the scope of work or activities to be performed, and provide specific direction to the extent necessary to achieve the desired results. SWIs serve as the basic authorization to perform work and shall be issued to all assigned field, laboratory, and office personnel prior to the commencement of work. Requirements for the use of specific procedures or specifications are included; due dates and time charging instructions may also be provided when appropriate.

4. REFERENCES

None.

5. DISCUSSION

SWIs provide the means for ensuring that personnel performing work are assigned appropriate project and task numbers; that appropriately detailed guidance for performing the work is provided; that special requirements or considerations affecting the performance of the work are identified; and, that internal and subcontractor interfaces are identified where necessary.

6. RESPONSIBILITIES

6.1 Project Manager

The Project Manager (or designee) is responsible for the initiation and approval of SWIs for applicable project activities.

6.2 QA Manager

The QA Manager (or designee) is responsible for reviewing and approving SWIs to ensure compliance with client requirements, and to ensure that applicable procedures and documentation for the control of quality-related activities have been incorporated.

6.3 Project Secretary

The Project Secretary is responsible for issuing a control number for each SWI, keeping a current SWI log, filing the SWI in the project QA records, and distributing the SWI as required by this procedure.

6.4 Technical Staff

Individuals issued SWIs are responsible for completing assigned tasks in accordance with the guidelines provided. SWIs shall be retained in the individual's work area; superseded revisions of SWIs shall be discarded or marked "Superseded." Questions regarding SWI interpretation shall be addressed to the Project Manager or QA Manager as appropriate.

7. MATERIALS

SWI Forms (See Exhibit A)

8. PROCEDURE

8.1 Preparation

SWIs may be typed or handwritten, using the form shown in Exhibit A. The Project Manager or designated preparer shall fill in all applicable portions except for the control number and file number. The required information for each blank is listed below, keyed to the numbers in the blanks in Exhibit A.

1. **Project:** Enter the client and project name.

2. **Date:** Enter the distribution date.

3. **Revision:** Enter the revision number.

4. **Author:** Enter Originator's name.

5. **To:** Enter the name of the individual(s) assigned work.

6. **Subject:** Enter the title of the applicable task, if appropriate.

7. **Job Number:** Enter the Golder Associates job and task number that the work shall be charged to.

8. **Scope or Work:** Briefly state the general scope of activities or purpose of the work assignment.

9. **Specific Instructions:** Provide detailed instructions for completing the task; include references to technical procedures to be used, equipment requirements, references to be investigated, or similar details. Provide attachments as required. If known, include the manhours allotted for the activity and the required completion date.

10. **Reporting Requirements:** Describe type of report required, if appropriate, and provide the name of the individual who should receive the report.

11. **Subcontract Interface:** Provide the name of subcontractor contacts as appropriate.

12. **Special Handling Requirements:** Enter shipping requirements, temperature requirements, special process requirements, special sample processing or special routing or mailing requirements for reports.

13. **Applicable Specifications and Procedures:** Enter any QA procedures, technical procedures, or other applicable work-controlling documents.

8.2 Control Number System and Log

SWIs shall be controlled through the use of unique numbers and revision levels. The Project Secretary shall assign a control number to the SWI in sequential order based on the previously assigned number and enter the number where designated by Block 14 of Exhibit A. A log shall be maintained for all issued SWIs that identifies the number, revision, originator, recipient(s), and subject. A copy of the first page of each SWI shall be retained in a master reference file attached to the log.

8.3 File Number

The Project Secretary shall assign the file location for the SWI as required by the current project QA records index. The number shall be entered where designated by Block 15 of Exhibit A.

8.4 Approval

Completed SWIs shall be forwarded to the QA Manager and Project Manager for review and approval. The QA Manager shall review the SWI to assure compliance with client requirements and to ensure that references to applicable procedures and documents have been incorporated. The Project Manager shall review the SWI for compliance with project needs, content, and completeness of the instructions. Minor corrections of SWI text prior to approval may be made by hand, provided that the change is initialed and dated by the reviewer. The QA Manager and Project Manager shall indicate approval by signing and dating the SWI.

8.5 Distribution

The Project Secretary shall forward copies of approved SWIs to all of the individuals named in Block 5 of Exhibit A, the QA Manager or Coordinator and the Project Manager. The original SWI shall be retained in the Project QA records files.

8.6 SWI Revisions

Whenever an SWI is revised, the revised version shall go through the same approval process as the original. Revisions may be marked on the original SWI by drawing a single line through the old information, adding the changes, and identifying each change by a small delta enclosing the revision number. If revisions are marked on the original, approval of each change must be indicated by initials and date. As an alternative, a separate revised SWI may be prepared. The original document (unless marked up as the revision,) and the corresponding entry on the SWI log shall both be marked as superseded to prevent inadvertent use of outdated documents.

P-3.0-2

SWI

SPECIFIC WORK INSTRUCTIONS

No.: 14.

Project: 1.

Date: 2. Revision: 3. Author: 4.

To: 5.

cc: QA Coordinator File No.: 15.

Subject: 6. WBS No. or Job No.: 7.

Scope of Work: 8.

Specific Instructions: 9.

Reporting Requirements: 10.

Subcontract Interface: 11.

Special Handling Requirements: 12.

Applicable Specs. and Procedures: 13.

QA Approval/Date: Project Manager Approval/Date:

Golder Associates

9 1 1 2 3 2 1 5 6 0 1

Golder Associates Inc.

Quality Assurance Procedure

Number: P-4.0-1
Title: PROCUREMENT DOCUMENT CONTROL

Prepared By:	Approved	Approved	Effective Date	Rev. Level
M.J. Cutler 2/2/90	2/2/90	2/2/90 FOR CW LOCKHART	2/2/90	10

RECORD OF REVISIONS

P-4.0-1

Revision Level	Page Number	Section Number	Revision Description
10	1	3.3	clarified review requirement
	3	6.4	deleted section; mandatory President review not required
	5, 6	8.4	expanded discussion of inspection requirements, clarified
	6	8.5	add reference to inspection plans

1. PURPOSE

The purpose of this procedure is to control the procurement of all items, materials, and services and to ensure the quality of such procurements when they have a direct effect on project work.

2. APPLICABILITY

This procedure applies to two general categories of procurements:
1) support-related procurements, which are routine and have no direct influence on project work, and 2) project-related procurements, which do have a relationship or effect on the quality of work. Although applicable to both categories, most of the requirements of this procedure address the project-related category, which may include consulting services, subcontractor services, laboratory services, equipment, materials, or other items.

3. DEFINITIONS

3.1 Procurement Document

A procurement document is a written contract that identifies and/or defines the terms, conditions, technical requirements, and quality requirements which items or services must meet in order to be considered acceptable by the purchaser. A procurement document may be in the format of a consulting agreement, subcontract, or Purchase Order(PO).

3.2 "Project-Related" Procurement Document

A project-related procurement document is directly related to the quality of the end item or work product, requiring in-depth review by QA and project personnel to ensure that all applicable requirements are properly identified to the supplier or consultant. As defined above, the procurement document may be in the form of a consulting agreement, subcontract, or PO.

3.3 Support-Related Procurement Document

A support-related procurement document, usually a PO, has no direct relationship to project quality. As an example, POs for drafting or duplicating services are considered to be support-related. QA reviews are not required.

3.4 Requests for Quotation (RFQs)

A Request for Quotation (RFQ) is a document provided to a prospective supplier or consultant containing all the intended provisions of a procurement document, and is subject to the same approval cycles. Changes resulting from a prospective supplier's bid response must be incorporated into the procurement document and be subjected to review and approval prior to issue.

3.5 Source Selection

Source selection is the process by which potential suppliers of services or equipment are identified, evaluated and selected. Project-related procurements must receive sole source, technical, or QA evaluations prior to selection. Support-related services do not require such evaluation.

3.6 Sole Source

Sole source selection is one option in the source selection process; it involves selection of a supplier or contractor based on the uniqueness or recognized reputability of the item or service offered without a formal evaluation of alternative sources. Sole-source selections for project-related procurements require documentation of the justification.

4. REFERENCES

4.1 Golder Associates QA Procedure P-3.0-2, "Specific Work Instructions"

5. DISCUSSION

This procedure provides a uniform method of assuring that all applicable requirements have been met on procurement documents. The level of control required depends on whether or not the procurement has a direct relationship to project quality. The procedure defines the differences between project-related and support-related procurements, describes the required content of project-related procurement documents, defines the review process that ensures inclusion of Quality Assurance (QA) requirements, and provides the methods to be used for controlling procurement document changes.

6. RESPONSIBILITIES

6.1 Project Manager

The Project Manager is responsible for 1) initiating the procurement process, either by direct preparation or by issuing Specific Work Instructions (SWI's, see procedure P-3.0-2), 2) coordinating the preparation and approval of documents between the Contracts Administrator and the QA Manager, and 3) providing the technical specifications for the RFQ or procurement document. The Project Manager is also responsible for ensuring that all required legal and contractual requirements are incorporated into any RFQ for subcontracted services or materials, subcontracts or consulting agreements that result from RFQs, and all extensions or modifications of subcontracts or consulting agreements. If another individual is delegated responsibility for performing any part of the procurement process, the Project Manager shall document the request by means of an SWI.

6.2 QA Manager

The QA Manager reviews procurement-initiating SWIs, RFQs, and any subsequent changes (with the exception of the purely administrative changes noted in 8.4) to ensure that all customer quality requirements are met and to add subcontractor quality requirements appropriate for the procurement.

6.3 Office Manager

The Office Manager or designated Administrative Manager reviews and authorizes all procurement documents (consulting agreements, subcontracts, POs and their extensions or revisions).

7. REQUIRED MATERIALS

None

8. PROCEDURE

Figure 8-1 is a matrix that relates responsibilities and methods for each type of procurement document to each stage of the development of the procurement documentation. The following sections correspond to the developmental stages of the procurement as they are listed in the Figure.

8.1 Initiation

Consulting agreements or subcontracts (and requirements for RFQ preparation if competitive bid techniques are used), as well as project-related or support-related POs, may be initiated directly by the Project Manager or may be delegated by SWI.

8.2 Definition of Requirements

The requirements for project-related procurements shall be generally defined by the initiating SWI or, when requested, by the detailed RFQ. Procurement requirements shall be explicitly included in the documentation, and shall follow the guidelines of section 8.4 below as appropriate. Additional requirements may be added as part of the QA review process described in 8.5 below.

8.3 Source Evaluation and Selection

8.3.1 Evaluation and Selection Methods:

Suppliers, consultants, and subcontractors shall be evaluated and selected by methods appropriate for the category of the procurement and its scope or complexity. It is the responsibility of the Project Manager to determine whether the services are support or project-related. The Project Manager shall select the evaluation method most appropriate for the procurement, consistent with client requirements. In general, project-related procurements will use one or more of these techniques, while support-related procurements will use only the sole source, technical evaluation, or competitive bid techniques. Available methods are as follows:

- Sole Source: Sole source selection may be based on the technical recognition of a supplier's particular expertise and reputation. The Project Manager shall document sole source justification for all project-related procurements and route copies to project and QA files.

- **Technical Evaluation:** Potential contractors or vendors may be selected based on a review of their technical qualifications; a trial purchase may be issued at the Project Manager's option. Acceptable performance may result in a technical recommendation approving the supplier for future use. Documentation of technical evaluations and/or acceptable performance on a trial purchase order shall be routed to the project files and QA files if appropriate for the type of procurement.

- **QA Evaluation:** When requested by the Project Manager, the QA Manager may make evaluations by review of supplier's quality program or procedures or by on-site survey of a supplier's technical and quality capabilities. Copies of the QA evaluation or survey report shall be routed to the project and QA files.

- **Competitive Bid:** Selections made by issuing RFQs and evaluating competitive proposals must be carefully coordinated to ensure that all legal, contractual, and QA requirements are properly included in the RFQ. Results of the evaluation process and reviews of bidder qualifications shall be routed to project and QA files.

8.4 Preparation of Procurement Documentation

Consulting Agreements, Subcontracts, and project- or support-related POs shall be directly prepared by the Project Manager or as delegated by SWI. All procurement documents shall provide the following types of information as appropriate for the item or service procured.

- **Scope of Work:** The document shall provide a statement of the scope of the work to be performed by the supplier, consultant, or subcontractor.

- **Contractual Requirements or Addenda:** All necessary contract documents shall be included in the procurement package. Such documents may include standard terms and conditions, or representations and certifications of the knowledge and acceptance of various federal, state, or local statutes and regulations.

- **Technical Requirements:** All necessary technical requirements, such as compliance with design drawings, design specifications, procedures, codes, traceability requirements, or regulatory requirements shall be defined. Controlled copies of drawings and specifications shall be transmitted with the procurement documents wherever required.

- **QA Requirements:** All project-related procurement documents shall contain a clause requiring the supplier to provide unhampered access to his facilities for the purposes of source inspection, surveillance inspection, or audit. Inspection requirements or other quality requirements appropriate for the item or service shall be included by other appropriate quality clauses or by reference to

separately prepared inspection plans; the level of detail required in such clauses shall be commensurate with the type of procurement, supplier quality capabilities, quality history, and other factors.

- **Documentation Requirements:** The procurement document shall specify any documentation or reporting requirements applicable to the supplier, consultant, or subcontractor. Documentation requirements may be expressed by individual quality clauses or in the body of the procurement document, and shall define required due dates, retention times, and disposition upon completion of the contract.

- **Nonconformances:** When appropriate for the type of procurement; definition of and requirements for reporting of nonconformances shall be included in a specific clause.

- **Spare and Replacement Parts:** When complex equipment is procured, the procurement document shall require the supplier to identify appropriate spare and replacement parts and define any appropriate calibration, retesting, or other activity required for ordering, servicing or repair of the equipment.

8.5 Review and Approval

All procurement documents shall be reviewed by the Project Manager to ensure the inclusion of provisions that will ensure that the items or services to be provided will meet all Golder and client requirements. Project-related procurement documents also require the review and approval of the QA Manager in order to ensure that all required quality provisions are included. If warranted by the complexity of the procurement, inspection plans shall be prepared that identify the specific characteristics to be inspected and the inspection method required. Plans shall be prepared in checklist format, shall be sequentially numbered and identified to the Golder job and task number, and shall be reviewed and approved by the QA Manager prior to use. Inspection plans shall not be provided to the supplier or subcontractor, shall be identified by number in the body of the procurement document, and shall be forwarded to the project QA records when complete. See procedure P-10.0-4, "Receiving Inspection" for additional details on inspection plan use.

Objective evidence of review and approval shall be provided by the Project Manager and QA Manager's signatures on the procurement document.

8.6 Authorization and Final Approval

All procurement documents require authorization by the Office Manager or designated Administrative Manager prior to issue.

8.7 Change Control

All changes made as a result of an RFQ response or precontract negotiations shall be incorporated into the final procurement document prior to issue; the changes shall be evaluated in terms of effect on the original technical, quality, and other requirements. Modifications to design or procedures shall be evaluated, and technical and QA requirements shall be modified as necessary prior to issue. All subsequent changes shall be subject to the same review and approval cycle as used in the preparation of the original documents, with the exception that any revisions made purely for administrative or budgetary reasons shall not require QA review.

8.8 Records Requirements

Procurement-related records shall be retained to the extent appropriate for each procurement type. Project records should contain the following types of documentation:

- Final-approved procurement documents, with all revisions and attachments
- Initiating SWIs
- RFQs and competitive bid responses
- Competitive bid evaluation information
- Sole source justification (if performed)
- Technical justification (if performed)
- QA evaluation (if performed)

Corporate QA files shall contain copies of all QA evaluations, by supplier or consultant.

FIGURE 8-1

Procurement Activity	Responsibilities and Method		
	Consulting Agreement	Project-Related PO	Support
Initiation	PM or as authorized by SWI	PM initiates, or delegates via SWI	PM in autho
Definition of Requirements	RFQ or SWI specification by PM or as authorized by SWI	By PM - initiated SWI or PO attachment	PM or PO or
Source Selection	Sole source or technical evaluation by PM; or by QA evaluation; and/or by competitive bid	Sole source or technical evaluation by PM; or by QA evaluation; and/or by competitive bid	Best p directi
Preparation of Procurement Documentation	PM or as authorized by SWI	PM or as authorized by SWI	PM or
Review and Approval	PM and QA	PM and QA	PM
Authorization or Final Approval	OM or designee	OM or designee	OM o
Changes	Same requirements except admin changes are exempt from QA review	Same requirements except admin changes are exempt from QA review	Same

CONTROLLED DOCUMENT

Golder Associates Inc.

Quality Assurance Procedure

Number: P-5.0-1
Title: DOCUMENT PREPARATION, DISTRIBUTION, AND CHANGE CONTROL

Prepared By:	Approved	Approved	Effective Date	Rev. Level
M. Otterson 7-11-90	7/11/90	7/11/90	7-12-90	10

RECORD OF REVISIONS

Revision Level	Page No.	Section No.	Revision
10	throughout		Revised to address QA and other technical plans and to add Interim Change Notice procedures.

1. PURPOSE

This procedure establishes uniform methods for preparation of technical and Quality Assurance (QA) procedures, and project-specific QA plans. Provisions are also made for the control of the distribution and revision of procedures and plans.

2. APPLICABILITY

The procedures and format described herein are applicable to all Golder Associates Inc. technical and QA procedures, and QA plans. Other types of technical plans, e.g., technical work plans and test plans, may be distributed and revised in accordance with this procedure at the discretion of the QA Manager.

3. DEFINITIONS

3.1 Technical Procedure

A technical procedure is a document that specifies or describes in detail how a technical activity is to be performed. Technical procedures include methods to be employed, equipment or materials to be used, and a planned sequence of operations. Technical procedures are designed to either provide or require a test data sheet, test log, or other work completion records that will provide objective evidence that work was performed in compliance with approved instructions and with appropriate quantitative or qualitative acceptance criteria. To the extent possible, technical procedures shall be written in such a manner as to permit their use on any project. Unique project requirements may be provided for by a project-specific addenda to standard procedures.

3.2 Procedure

A procedure is a document that outlines detailed activities required for implementation of a quality assurance program.

3.3 Quality Assurance (QA) Plan

A QA plan is a program- or project-specific quality planning document that describes the project organization, specifies project QA requirements, and identifies the applicable Golder Associates Inc. procedures, national standards, regulatory guides, codes, or other regulations that affect or direct the performance of project activities.

4. REFERENCES

None.

5. DISCUSSION

Technical procedures, QA procedures, and QA plans shall be prepared, identified, distributed and controlled by the methods and format described in this procedure. Distribution control requirements may also be applied to other types of work-controlling plans (such as test plans or technical work plans) at the discretion of the QA Manager. Revisions of all procedures and plans require the same level of review and approval as the original documents. The author originating a technical or QA procedure or QA plan is responsible for soliciting internal review comments. The author is responsible for resolving comments and obtaining all required approvals.

6. RESPONSIBILITY

6.1 Authors

Authors of technical and QA procedures and QA plans are responsible for obtaining informal reviews from technical or QA staff as appropriate, and for routing procedures and plans through the final review process. Authors are also responsible for resolving all comments resulting from the final review process and for forwarding reviewer comments to the corporate QA files.

6.2 QA Manager

The QA Manager is responsible for reviewing and approving all technical and QA procedures, QA plans, and revisions for compliance with applicable requirements prior to submittal for final approval. The QA Manager is also responsible for systematic controlled distribution of all plans and procedures subject to the requirements of this procedure.

6.3 Senior Technical Staff

Senior staff with experience appropriate for the discipline involved shall participate in the final review and approval of technical procedures, or procedure revisions which may be necessary for compliance with specific client requirements.

6.4 Office Manager

The Office Manager is responsible for performing final review and approval of all QA procedures and revisions.

6.5 Project Manager

The Project Manager is responsible for performing final review and approval of program- or project-specific QA plan and revisions.

6.6 Users

Users of procedures and plans are responsible for maintaining copies of all issued controlled documents, and for returning them when requested. Users are responsible for understanding and implementing the provisions of the distributed procedures and plans, and for participating in training sessions or completing reading training assignments for new and updated procedures and plans.

7. EQUIPMENT OR MATERIALS

- Controlled Document Transmittal/Reading Training Memorandum (Exhibit A)
- Interim Change Notice (ICN, Exhibit B).

8. PROCEDURE

8.1 Document Preparation

8.1.1 Preparation of Technical and QA Procedures

Technical and QA Procedures shall be prepared in accordance with the following guidelines:

- Purpose: Briefly describe the specific purpose of the procedure.
- Applicability: Identify the work activities and/or groups to which the procedure applies.

- Definitions: Define words and phrases having special meaning within the procedure.

- References: List all cited reference documents, such as other related Golder Associates Technical or QA procedures, applicable regulatory guidelines, codes, or standards.

- Discussion: Include a brief, general explanation of the use of the procedure.

- Responsibility: Identify the organizational positions and responsibilities of the individuals charged with the implementation of the procedure.

- Equipment or materials: Identify any equipment, materials, or special forms necessary to support the activity described.

- Procedure: Describe the specific step-by-step procedure or instructions to be followed. When appropriate, provide a flow chart as an exhibit to enhance user understanding.

The procedure shall contain all information necessary for proper implementation. Such information might include data sources, computer programs to be used, specific QA hold points, documentation requirements, and acceptance, rejection, and/or completion criteria.

Each of the subject headings listed above should be developed to the extent appropriate for the procedure. If no detailed discussion is required, "none" shall be placed under the heading.

The author of the procedure shall determine which groups or individuals may be affected by the procedure and shall obtain informal comments prior to presenting a final draft for review.

8.1.2 Preparation of QA Plans

The content and format of QA plans shall be in accordance with the contractual QA specifications, and will normally be prepared in compliance with one or more standard QA program guidance documents. If no guidelines for QA plan preparation are specified in the contract, QA plan format shall be as directed by the QA Manager.

8.2 Document Identification

8.2.1 Identification of QA Procedures

New QA procedures shall be dated and assigned unique letter-number designators by the QA Manager. The complete letter-number designator for a QA procedure shall include the following:

- The letter "P"
- The applicable basic requirement number as identified by the QA Manager or applicable quality policy directives
- A secondary series number

As an example, the first QA procedure for document or drawing control would be as follows:

Quality Assurance procedure prefix

Series number

P-6.0-1

Basic requirement number for drawing control

The first revision of this procedure would be indicated as P-6.0-1, Rev. 1.

8.2.2 Identification of Technical Procedures

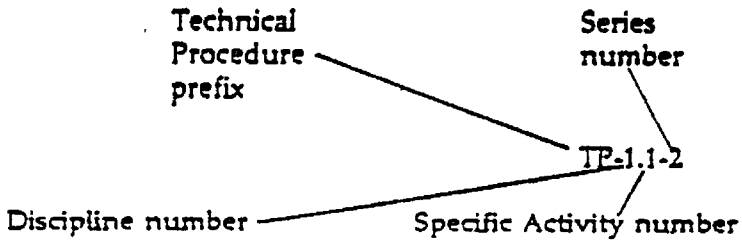
New technical procedures shall be dated and assigned unique letter-number designators by the QA Manager. The letter-number designator for a technical procedure shall include the following:

- The letters "TP"
- The applicable discipline number and specific activity number
- A secondary series number

The following discipline numbers are established for identification of Technical Procedures.

Discipline Description	Number
Field Investigations	1.0
Special Studies	2.0
Laboratory Testing	3.0
(Reserved)	4.0
Data Gathering	5.0
Preparation of Maps or Specialized Graphics	6.0
Geologic Analysis	7.0

Specific activities for each discipline shall be numbered consecutively as technical procedures are written. For example, the second Technical Procedure written for surveying activities supporting field investigations would be as follows:



The first revision of the technical procedure would be noted as TP-1.1-2, Rev. 1.

8.2.3 Identification of QA Plans

The cover sheet of each QA plan shall include the title of the plan, the revision level, the client, the client contract number, the Golder Associates job number, and approval signatures (see section 8.3.3). No unique document number is required.

8.3 Document Review and Approval

8.3.1 Technical Procedures Review and Approval

The author of a technical procedure shall obtain at least one informal review for technical content by appropriate personnel prior to initiation of the formal review cycle. The author shall then route the procedure to the QA Manager and an appropriate senior technical staff member for review and approval. Subsequent comments shall be resolved by the author to the reviewers' satisfaction. A cover sheet indicating the current revision level shall be routed

with the final draft for approval signatures. All review comments made during final review shall be retained in the Corporate QA files and shall be identified to the individual reviewer.

8.3.2 QA Procedure Review and Approval

The author of a QA procedure shall route the procedure to the QA Manager and the Office Manager for review and approval. Subsequent comments shall be resolved to the reviewers' satisfaction. A cover sheet indicating the current revision level shall be routed with the final draft for approval signatures. Any review comments made during final review shall be retained in the Corporate QA files and shall be identified to the individual reviewer.

8.3.3 QA Plan Review and Approval

QA plans shall be reviewed and approved in accordance with the contract QA specifications, or, if no guidelines are specified in the contract, as directed by the QA Manager. At a minimum, however, all QA plans shall be reviewed and approved by the Project Manager and the QA Manager.

8.3.4 Client Approval Considerations

The QA Manager shall determine when client approval of new documents or revisions is required. When client approval is required, the QA Manager shall make the necessary submittals and coordinate resolution of any client comments.

8.4 Distribution

All procedures, QA plans, various technical plans, as required, and subsequent revisions and interim changes, shall be issued either as controlled documents or for information only, as determined by the QA Manager. In all cases, the first page of the issued document shall be marked or stamped to indicate whether it is controlled or for information only. The QA Manager shall supervise distribution of copies of documents to all affected individuals and departments, and shall supervise external distribution to field offices, subcontractors, consultants, or clients. Each controlled document shall be distributed with a controlled document transmittal/reading training memorandum (see the example in Exhibit A) indicating which document and revision level was issued. The individual receiving the document shall follow the instructions of the checked requirements, sign the memo, and return it to the QA Manager for filing in Corporate QA personnel files. Appropriate procedures and plans shall be distributed to personnel prior to the initiation of work. Task Leaders or Project Managers shall provide definition of distribution needs when required. All documents shall be returned to the QA Manager upon termination of employment or upon request if there is no longer a requirement for their use.

8.5 Document Revisions

8.5.1 Technical and QA Procedure Revisions

All QA procedures currently distributed for project use shall be reviewed on at least an annual basis. Technical procedures shall be reviewed at least biennially. The QA Manager is responsible for coordinating the review of QA and technical procedures. All or portions of any required revision may be delegated by the individual responsible for review. Revised procedures shall be reviewed in the same manner as the previous version per the requirements of paragraph 8.3. Reviewers shall assess changes that may be required by the latest editions of applicable national standards, regulatory guides, codes or other regulations. Reviewers shall evaluate suggested changes that may have accumulated during the previous year, and incorporate if appropriate.

8.5.2 Plan Revisions

Requirements for periodic QA plan review may be included in each individual plan. At a minimum, however, QA plans shall be revised as necessary to accommodate changes in contract requirements, or changes in applicable standards, regulatory guides, codes, or other regulations. If necessary, QA plans and other technical work plans or test plans controlled by this procedure may be revised on an interim basis. Interim changes to plans shall be documented on an Interim Change Notice (Exhibit B). All ICNs and plan revisions shall be approved in the same manner as the original plan. Each ICN shall be assigned a unique sequential number, and shall be clearly identifiable to the associated plan and revision level. Interim changes shall be incorporated into subsequent revisions of plans as appropriate. ICNs shall be listed with the applicable plan on the Master Plan Index (see section 8.6).

8.5.3 Revision Level Identification

Each page of a revised procedure or plan shall contain the page number, date, and the most current revision number. The revised sentence or paragraph of each page of a revised document shall be indicated with a vertical line in the right hand margin. Revisions shall be numbered and the revision history documented on the record of revisions page of each document. A controlled copy shall be transmitted to each individual or organization on controlled distribution as described in section 8.4. Records of all previous versions of procedures and plans shall be maintained in the Corporate QA files. All recipients of a revised document shall immediately remove the obsolete document from their personal notebook and destroy it or return it to the QA Manager with the signed document distribution and reading training memorandum.

8.6 Master Procedure and Plan Indexes

A master procedure index and a master plan index shall be maintained under the supervision of the QA Manager. The procedure index shall include all active procedures by number and title and the current revision of each. The plan index shall include all active, controlled plans by title, the current revision of each, and all outstanding Interim Change Notices for each plan. The indexes shall be updated with each status change (i.e., updating revisions, adding newly approved documents, or removing documents determined to be obsolete), and shall include the index issue date. The indexes may be updated by hand on an interim basis, but shall be formally updated at least quarterly. A copy of each issue shall be forwarded to the QA Manager.

Exhibit A

TO: Otterson, Joey DATE: 07/05/89

FR: GLENN MILLS LOCATION: Seattle

RE: CONTROLLED DOCUMENT TRANSMITTAL / READING TRAINING MEMORANDUM

__v__ ACKNOWLEDGEMENT OF RECEIPT AND TRAINING

Attached is your controlled copy of the referenced document(s). Read each document and destroy any previous revisions in your possession. Please sign below acknowledging receipt and completion of reading training. If you have any questions, contact Glenn Mills at (206) 883-0777.

_____ ACKNOWLEDGEMENT OF RECEIPT

Attached is your controlled copy of the referenced document(s). Please sign below acknowledging receipt. If you have any questions, contact Glenn Mills at (206) 883-0777.

Signature Date

DOCUMENT	REVISION LEVEL
P-10.0-1	10

cc: Corporate QA personnel files
Project file

Return signed transmittals to:

GOLDER ASSOCIATES INC.
QUALITY ASSURANCE GROUP
4104 148TH AVE. N.E.
REDMOND, WA 98052

Exhibit B

INTERIM CHANGE NOTICE

Job No._____ ICN No._____

Plan Title _____

_____

Plan Revision_____ Page _____ Section _____

Description of Change:

Approvals

_____ _____
Name Title Date

_____ _____
Name Title Date

_____ _____
Name Title Date

_____ _____
Name Title Date

Please file this Interim Change Notice with your controlled copy of the referenced plan.

Golder Associates

Golder Associates Inc.

Quality Assurance Procedure

Number: P-6.0-1
Title: ENGINEERING DRAWING AND SPECIFICATION CONTROL

Prepared By:	Approved	Approved	Effective Date	Rev. Level
MJ Otteman by [signature] 2/2/96	[signature] 2/2/96	[signature] for C.W. Lockhart 2/2/96	2/2/96	3

RECORD OF REVISIONS

P-6.0-1

Revision Level 3

Page Number	Section	Revision
7	8.7	Added 8.7.1, revised to clarify document storage considerations.

1. PURPOSE

This procedure describes the standard format, review and approval process, and distribution control methods for Golder Associates Inc., engineering drawings and specifications.

2. APPLICABILITY

This procedure applies to the preparation and control of engineering drawings prepared by both computer-aided and manual drafting techniques, and to engineering specifications.

3. DEFINITIONS

3.1 Engineering Drawing

An engineering drawing is a detailed graphic representation that defines the physical and operational design of a facility, structure, system, or component. An engineering drawing is governed by the requirements of this procedure when one or more of the following criteria are met:

- manufacturing details, views, dimensions, tolerances, or parts lists are provided
- three-dimensional, orthographic, or other representations that provide dimensions or direct instructions, that will be used to control assembly or interfaces with other systems, structures, or components
- the representation is subject to detailed design changes due to changing interface requirements with other systems, structures, or components

Engineering drawing criteria are not intended to apply to geologic maps, conceptual representations, planning documents, textual presentations, or sketches within test plans or test procedures. Review and approval of maps is controlled by procedure P-10.0-2, "Technical Review of Maps". Other representations are reviewed and approved within the context of their parent documents as required by QA procedure P-10.0-1, "Technical Review."

3.2 Engineering Specification

An engineering specification is a controlled document defining the complete design requirements of a system, system element, component, or equipment item. The engineering specification contains all detailed design information as well as technical information required for procurement including requirements for supplier acceptance testing and documentation. It may also contain information relative to handling and storage, shelf life, installation, pre-installation checkout testing, and routine maintenance.

3.3 Computer Aided Design (CAD) System

A computer aided design system is a computer system dedicated to the design and production of detailed graphic presentations, including engineering drawings.

3.4 Drawing/Specification Change Request (DSCR)

A drawing/specification change request is a standard form used to provide the details of a drawing or specification change. The DSCR must be reviewed and approved by the Project Manager, the QA Manager, and designer prior to release. DSCR's are uniquely numbered and, when incorporated, will be referenced in the revision change block on the drawing or first page of the engineering specification.

3.5 Drawing/Specification Transmittal

A drawing/specification transmittal is a standard form issued by the Document Custodian to transmit and confirm receipt of drawings, specifications, or DSCRs.

4. REFERENCES

4.1 Golder Associates QA Procedure P-3.0-2, "Specific Work Instructions"

4.2 Golder Associates QA Procedure P-10.0-1, "Technical Review"

4.3 Golder Associates QA Procedure P-10.0-2, "Technical Review of Maps

4.4 ANSI Y-14.1, "Drawing Sheet Size and Format"

5. DISCUSSION

Golder Associates' engineering drawings and specifications are produced in a standard format that identifies the revision level and approval for each revision, revision history, and project applicability. Once a drawing or specification is formally approved, it is a controlled document and all subsequent changes must be initiated by a Drawing/Specification Change Request (DSCR). Each drawing/specification revision and DSCR must be approved prior to issue. Upon approval, a DSCR is considered part of the controlled drawing/specification to which it applies and work must be performed in accordance with the change.

6. RESPONSIBILITIES

6.1 Project Manager or Designee

The Project Manager (or Designee) is responsible for issuing SWIs which initiate drawing/specification preparation and review activities and for review and approval of drawings/ specifications and changes thereto.

6.2 Designer

The Designer is responsible for developing drawings/specifications based on SWI request, resolving and incorporating review comments, and initiating or approving DSCRs.

6.3 Illustrator

The illustrator is the CAD or drafting technician who is responsible for translating conceptual drawings, design, or other information to reproducible master drawings in the general format indicated herein. The illustrator is also responsible for incorporation of all changes as required by approved DSCR's.

6.4 Document Custodian

The Document Custodian is responsible for maintenance of the drawing/specification issue and control system, issuing Drawing/Specification Transmittals and maintaining controlled storage of the latest approved version of the master drawing and, for drawings prepared using the Computer-Aided Design (CAD) system, magnetic disk or tapes.

6.5 Quality Assurance Manager (or Designee)

The Quality Assurance Manager is responsible for reviewing and approving drawings/specifications and DSCRs.

7. EQUIPMENT OR MATERIALS

None.

8. PROCEDURE

8.1 Preparation and Approval of Master Drawings

The Project Manager initiates the production of a drawing by issuing a Specific Work Instruction (SWI) in accordance with P-3.0-2. The SWI shall assign responsibility for the design, as well as the review and approval of the drawing.

Attachment A is a graphic representation of the drawing preparation, review and approval cycle described below.

8.1.1 Drawing Preparation

Based on SWI request, the drawing designer shall provide conceptual drawings, sketches, or other instructions to the illustrator for the production of preliminary drawings. Drawing content shall meet the requirements identified on the initiating SWI. Level of detail shall be commensurate with the intended use of the drawing. Information such as dimensions, tolerances, parts lists, installation sequences, and other completion or acceptance criteria shall be included as appropriate. When the preliminary drawing is developed to the satisfaction of the designer, it shall be marked "Preliminary Draft", and at the discretion of the designer, circulated for informal comments. Informal comments need not be resolved and may be

incorporated at the designer's discretion. When a draft has been prepared to the satisfaction of the designer, the illustrator and designer shall sign it in the space provided. This draft is considered the review draft.

8.1.2 Review and Approval of Drawings

The draft shall be issued for review as designated on the SWI. Copies for review shall be marked "Review Draft". All reviews shall be conducted in accordance with QA procedure P-10.0-1, Technical Review. As a minimum, a review by the Project Manager and QA Manager (or their designees) is required. The Project Manager may assign additional reviewers based on the complexity of the drawing, system interface requirements, or other concerns. Comments shall be documented on a Review Comment Form (RCF) and marked directly on the review draft by the reviewer. The review draft and RCF shall then be returned to the designer for resolution and comment incorporation. When all review activities are completed, the master drawing shall be routed to the reviewers for approval signatures. If Client approval is required by contract, it shall be obtained after all Golder approval signatures have been applied to the drawing. All SWIs, review drafts and associated RCFs shall be routed to the project files.

8.1.3 Drawing Format

Drawing format and sizes shall be in general accordance with ANSI Y14.1 guidelines, with zone designators and title and revision block layout typically as shown in Attachment B. All drawings shall carry Golder Associates job numbers, Work Breakdown Structure (WBS) numbers if provided by the client, and a project-unique drawing number assigned by the Project Manager. Revision levels shall be uniquely identified by sequential number or letter designations. Revision history shall be incorporated into the drawing in the revision block shown in zone D1/D2 of the example shown in Attachment "B".

8.2 Preparation and Approval of Master Engineering Specifications

The Project Manager initiates the production of a specification by issuing a SWI. The SWI shall assign preparation, as well as review and approval responsibilities.

Attachment C is a graphic representation of the specification preparation and review cycle described below.

8.2.1 Specification Preparation

Based on the scope of the SWI, the designer shall develop a preliminary draft document. Specification content shall meet the requirements identified on the initiating SWI. Level of detail shall be commensurate with the intended use of the specification. Information such as: supplier qualifications; procurement requirements; equipment testing, handling, and storage details; installation and maintenance requirements; and acceptance or completion criteria shall be included as appropriate. The document shall be marked "preliminary draft" and, at the discretion of the designer, shall be circulated for informal comments. Informal comments need not be resolved and may be incorporated at the discretion of the designer. When the specification has been prepared to the satisfaction of the designer, he shall sign the cover sheet in the space provided. This draft of the specification is considered the review draft.

8.2.2 Review and Approval of Specifications

The draft shall be issued for review as designated on the SWI. Copies issued for review shall be marked "Review Draft". All reviews shall be conducted in accordance with QA procedure P-10.0-1, Technical Review. As a minimum, review by the Project Manager and the QA Manager is required. However, the Project Manager may assign additional reviews based on the complexity of the specification, or other concerns. Comments shall be documented on an RCF and marked directly on the review draft by the reviewer. The review draft and the RCF shall then be returned to the designer for resolution and incorporation of comments. When all review activities are complete, the master specification shall be routed to the reviewers for approval signatures. If Client approval is required by contract, it shall be obtained after all Golder approval signatures have been applied to the specification. All SWIs, review drafts and associated RCFs shall be routed to the project files.

8.2.3 Specification Format

The specification cover sheet shall contain, as a minimum, the Golder Associates job number and a project unique specification number assigned by the Project Manager. It shall also contain the revision level, identified by sequential letter or number designators, revision history and approval signatures.

8.3 Drawing/Specification Change Requests

All drawing and specification changes shall be initiated by a Drawing/ Specification Change Request form (DSCR, see Attachment D). Change requests must contain a complete and clear description of the change, in the form of a sketch if appropriate. A DSCR may be initiated by the designer or other project personnel. Each request must be approved by the same groups or individuals who approved the drawing or specification being changed. If the

DSCR was not initiated by the designer, the designer's signature is also required. After the DSCR is approved, it is considered part of the controlled drawing, and work must be performed in accordance with the change.

8.4 Drawing/Specification Revisions

Drawing/specification revisions are the result of approved DSCRs. Drawings/ specifications shall be revised exactly as described on the DSCRs. All incorporated DSCRs shall be noted in the revision block. Changed areas in the drawing/specification shall be marked by a small delta enclosing the new revision level designator. The revised master shall be reviewed and approved in accordance with sections 8.1.2 and 8.2.2 above, by the same groups or individuals who approved the previous revision.

8.5 Issue and Control Requirements

Engineering drawings, specifications and DSCRs are controlled documents and copies shall be marked as such when issued. Unauthorized copies of controlled documents are not permitted. "Information only" copies may be requested through the Document Custodian. An active distribution control system shall be maintained by the Document Custodian to assure that each document holder is issued the appropriate DSCRs and revisions. Base drawings/specifications are issued to personnel as directed by the Project Manager. When revisions or DSCRs occur, the Document Custodian shall issue them to document holders via a Document/Specification Transmittal form (see Attachment E). Document holders shall sign for receipt of the documents and return the Transmittal to the Document Custodian. Superseded drawings, specifications, and DSCRs shall be destroyed or returned to the Document Custodian, with one exception: superseded documents with handwritten working information may be retained only if plainly marked "Superseded - For Information Only".

8.6 Procurement Considerations

All engineering drawings or specifications issued to suppliers or subcontractors shall be controlled as indicated in 8.5. Documents that are included in bid packages are not controlled and will be marked "Information Only." These documents will be upgraded to controlled documents only if a procurement follows bid activity.

8.7 Document Storage

8.7.1 Work in Process

The designer and illustrator are responsible for storage and safekeeping of all work in process. During non-working hours, all work in process shall be protected from damage and tampering; computer disks containing work in process shall be stored in a fire-resistant file room.

8.7.2 Drawing/Specification History File

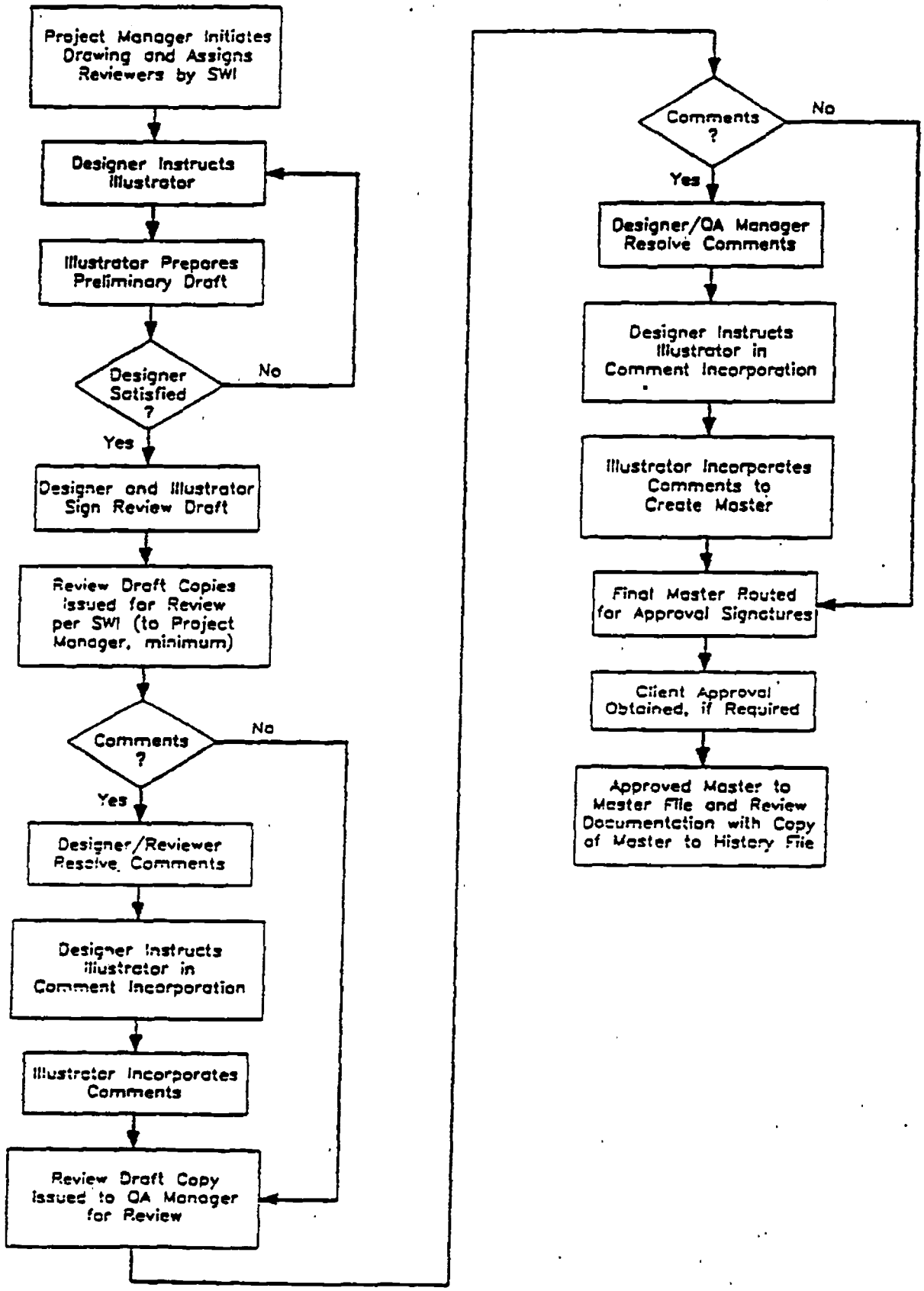
A Drawing/Specification History File shall be established for completed documents within the Project QA Records files. All review documentation shall be stored in the History File, along with a copy of the approved drawing/specification marked "File Copy - For Information Only". A copy of each subsequent DSCR shall also be marked as a file copy and added to the History File. When a DSCR is incorporated, the original shall be marked "incorporated" and filed with the documentation for the drawing/specification into which it was incorporated.

8.7.3 Master File

Approved masters, associated magnetic media, if applicable, and outstanding DSCRs shall be stored under the direct control of the Document Custodian in a Master File. The Master File is an active file which shall contain only current drawings/specifications and DSCRs. The Master File shall be the basis for all controlled drawing/specification distribution, and shall be located in an access-controlled fire-resistant file room.

8.8 Master Drawing/Specification List

8.8.1 A master drawing list and a master specification list shall be maintained by the Document Custodian. The lists may be issued on a project-specific basis, or may be all inclusive, but shall include all approved drawings/specifications by number and title, the current revision of each, and the date of drawing or specification approval. The list shall be updated with each status change, (i.e., updating drawing or specification revisions, adding newly approved drawings or specifications, or removing drawings or specifications determined to be obsolete), and shall include the list issue date. Master lists may be updated by hand on an interim basis, but shall be formally updated at least quarterly. A copy of each issue shall be forwarded to the appropriate Project Manager.



LOGIC CHART FOR DRAWING PREPARATION AND APPROVAL
QA PROCEDURE

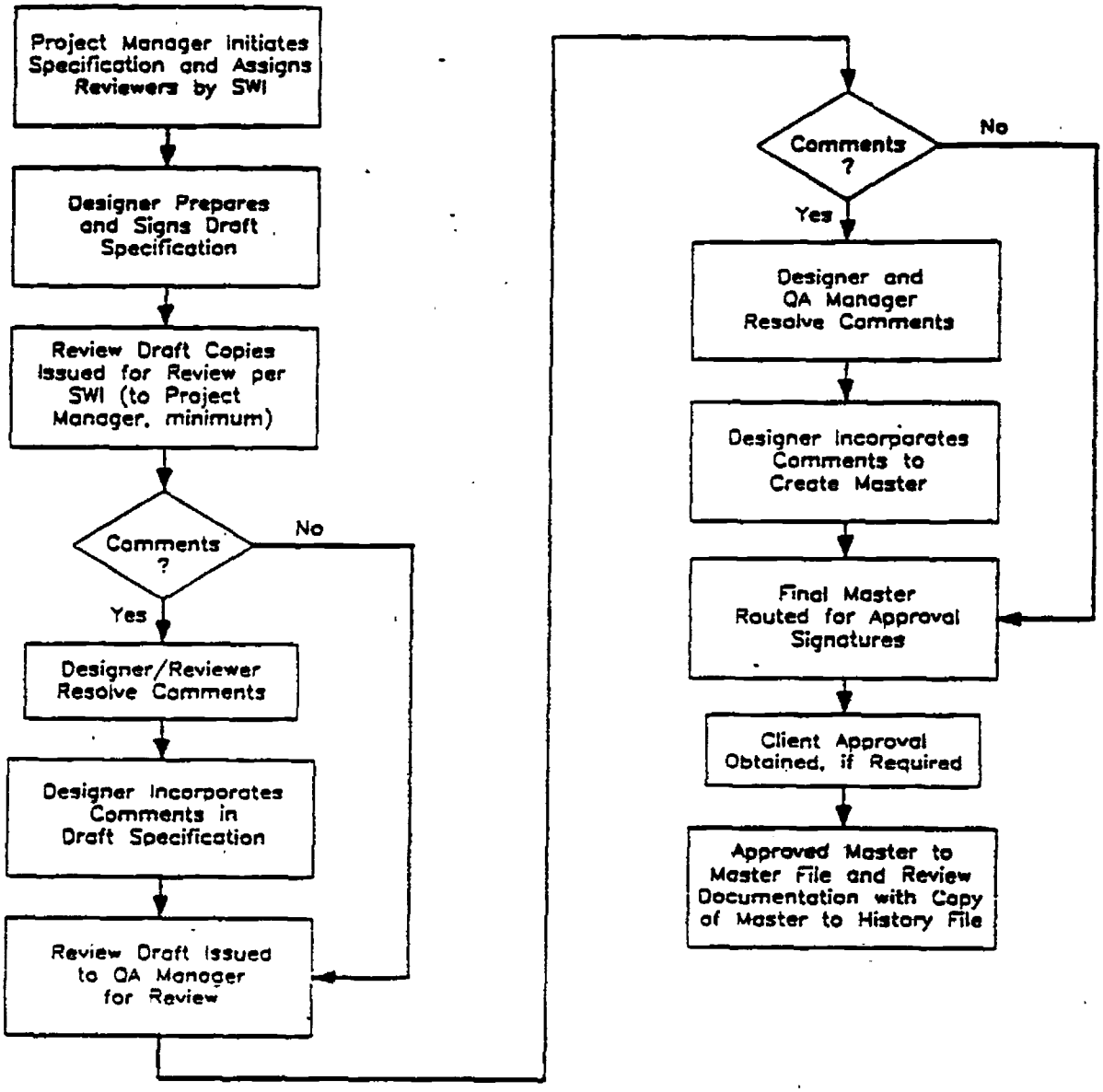
NO. 993-1024 DWG. NO.5649 DRAWN SL APPROVED GM Golder Associates

Attachment B Rev. Page 10

P-6.0-1

EXAMPLE

Golder Associates



LOGIC CHART FOR SPECIFICATIO
PREPARATION AND APPROVA
QA PROCEDUR

JOB NO. 993-1024 DWG. NO.5650 DRAWN SL APPROVED GM

Golder Associat

DRAWING/SPECIFICATION CHANGE REQUEST

DSCR

Page 1 of _____ No.: _____

Drawing/Spec. No.: _____ Revision: _____

Project/Task No.: _____

Requested by: _____

Description of Change:

EXAMPLE

Approved by:

Project Manager: _____ Date: _____

QA Manager: _____ Date: _____

Designer: _____ Date: _____

Other: _____ Date: _____

Comments: _____

P-6.0-1 Attachment E

DRAWING/SPECIFICATION TRANSMITTAL

DISTRIBUTED TO: _____ DATE: _____

PROJECT NUMBER: _____

Document Number	Revision	Previous Revision: (Check one) Destroyed	Returned

ACKNOWLEDGED BY HOLDER: (SIGNATURE) _____ DATE: _____

Return to:

Golder Associates Inc.

Quality Assurance Procedure

Number: P-6.0-2
Title: DOCUMENTATION AND CONTROL OF CORRESPONDENCE AND COMMUNICATIONS

Prepared By:	Approved	Approved	Effective Date	Rev. Level
4-3-90	4/4/90		4-3-90	4

RECORD OF REVISION
P-6.0-2
REVISION 4

Page	Section	Revision
1	4	deleted uncited reference
Throughout		editorial

1. PURPOSE

This procedure defines the methods for documenting and controlling all incoming, outgoing and internal correspondence and communications; including the documentation of project-related meetings and telephone conversations.

2. APPLICABILITY

This procedure applies to all project-related incoming and outgoing corresponding or communications. It also applies to all meetings or telecons that may affect project activities in any of the following ways:

- GAI, client, or subcontractor action or response is required.,
- information necessary to the management or the conduct of project activities is transmitted, or
- the scope of project activities is modified

3. DEFINITIONS

None.

4. REFERENCES

None.

5. DISCUSSION

All project-related incoming, outgoing, and internal communications and correspondence shall be appropriately documented, distributed, and filed. This requirement applies to all formal communications, such as letters and transmittals, and the documentation of informal communications (such as meeting notes), notes from telephone conversations, and electronic mail (telex or telefax). In all cases the information shall be routed through the appropriate Project Secretary for proper handling, logging, distribution, and filing in the project QA records. All correspondence and records of communications become a part of the project QA records under the controls provided by this procedure.

6. RESPONSIBILITY

6.1 Project Secretary

The Project Secretary is responsible for issuing control numbers for all incoming and outgoing correspondence and communications, logging the communication, copying, and distributing the documents to required individuals and the correspondence project QA files.

6.2 Technical Staff

All technical staff are responsible for documenting project-affecting telephones calls and meetings, and for routing all incoming, outgoing, and internal project correspondence and communications to the Project Secretary for proper handling, and distribution.

7. EQUIPMENT OR MATERIALS

None.

8. PROCEDURE

8.1 Documentation of Telephone Calls and Meetings

All project-affecting telephone calls or informal meetings (as defined in 2.0) shall be documented on a Golder Associates Telecon/Contact Memorandum form (see Exhibit A) or memo to file. The originator shall designate the desired distribution and forward the document to the appropriate Project Secretary for logging, copying, and distribution to all required individuals and the project QA records.

8.2 Routing of Correspondence/Telecons/Meeting Notes

All incoming and outgoing correspondence affecting a project (as defined in 2.0) shall be routed as soon as possible through the appropriate Project Secretary for logging, copying, and distribution to all required individuals and the project QA records. Internal correspondence shall also be routed through the secretary for copying and distribution as appropriate.

8.3 Assignment of Control Numbers and Filing

Unless otherwise directed in individual project QA programs plans, incoming or outgoing letters, telecopier messages, transmittals or project-affecting telecons shall be assigned a unique code number by the Project Secretary. The numbering system shall begin with a project-unique letter designator, as determined by the Project Secretary, followed by sequentially assigned numeric digits. An "I" for incoming and an "O" for outing may also be used to assist with correspondence identification.

8.3.1 The assigned number shall be recorded on the first page of the communication and in the appropriate (incoming or outgoing) communication log. The Project Secretary shall maintain the appropriate logs and sequence of numbers for each type of communication defined in 8.3.2. Several types of communications may be combined in a single log, as long as the retrievability of the information is assured. The logs shall be clearly labeled as to type, and shall be maintained by the Project Secretary.

8.3.2 Files shall be maintained for all of the following types of incoming and outgoing project-related correspondence and communications:

- Letters
- Telecopier/Telex messages
- Telephone Conversations/Informal Meeting Notes (Telecon/Contact memos)
- Transmittals

Golder Associates

TELECON/ CONTACT MEMORANDUM

☐ Personal Visit
☐ Telephone: ☐ Incoming ☐ Outgoing

ROUTE TO:
Files
☐ Project
☐ Business Development
☐ Mailing List

Company Name: _____
Address: _____
_____

Job No. _____

Person: _____
Telephone: _____
Job/subject: _____

Date: _____
Time: _____

Remarks: _____

Action/Next Contact: _____

BY: _____

CONTROLLED DOCUMENT

Golder Associates Inc.

Quality Assurance Procedure

Number: P-10.0-1
Title: TECHNICAL REVIEW

Prepared By:	Approved	Approved	Effective Date	Rev. Level
9-18-90	9/18/90		9-18-90	-11-

P-10.0-1

Revision Level 11

RECORD OF REVISIONS

Page	Section	Revision Description
Throughout		Completely rewritten

1. PURPOSE

This procedure establishes the requirements for formal evaluation of the technical and quality related aspects of written documents presented to the client as work products or contract deliverables.

2. APPLICABILITY

This procedure is applicable to all Golder Associates Inc. reports, recommendations, test data summaries, procedures, plans, or other technical documents that are produced as contract deliverables. The procedure may also be invoked for other types of documents as required by project specific QA Program Plans, or when specifically requested by management. Typical documents requiring technical review include: project-specific scoping documents, test procedures, and plans; formal review comments related to client or sub-contractor documents; project management plans; project-specific QA Program Plans; letter reports; or any other deliverable document that contains data, evaluations or recommendations.

3. DEFINITIONS

3.1 Author

The author is defined as the individual or individuals responsible for the original writing of the document being reviewed.

3.2 Technical Review

A technical review is an independent, documented, in-depth critical review of a document to verify calculations, examine the applicability and technical adequacy of references and source documents, examine the validity of the technical approach, ensure the completeness and accuracy of data, and to ensure conformance with applicable client requirements, Specific Work Instruction (SWI, see P-3.0-2, "Specific Work Instructions") requirements, and/or any applicable regulatory guidelines. The scope of a technical review may be focused on specific issues or areas of a document as directed by the Project Manager through the SWI process.

3.3 Technical Reviewer

In a technical review, an individual reviewer is assigned the responsibility for independently checking, reviewing, or otherwise verifying that document content is correct and accurate. Reviewers are designated by the Project Manager by means of SWIs. Technical reviewers should have qualifications similar to those of authors, but shall have no direct responsibilities for the production of the document being reviewed. The Project Manager may assume the role of technical reviewer provided that independence requirements are met.

3.4 Mandatory Comment

Mandatory comments in a technical review identify areas in a document that, in the opinion of the reviewer, require a change in order to achieve technical acceptability. **Formal resolution of all mandatory comments is required in accordance with the guidelines of this procedure prior to delivery of the document to the client.**

3.5 Non-mandatory Comment

A non-mandatory comment is defined as a comment made in a technical review that corrects punctuation, or offers improvements in understanding or corrections of syntax, but does not affect the technical content of the reviewed document. Non-mandatory comments may be documented on the Review Comment Form (RCF; see Attachment A, pages 2 and 3, and Section 3.6 below) if comment discussion is necessary to understanding, or by marking the reviewed text of the document, or both. Non-mandatory comments shall be incorporated at the discretion of the author or authors of the document. Documentation of comment resolution and acceptance is not required for non-mandatory comments.

3.6 Review Comment Form (RCF)

The RCF (see Attachment A, pages 2 and 3) is used for documenting independent technical review activity. When grouped with the associated review and resolution drafts of a document and approved by QA, the RCF provides traceability of all formal mandatory review comments and the comment resolution process.

3.7 Review Draft

The review draft is the version of the document presented by the author or authors for technical review. If calculations are included in the review draft, or required as back up documentation, they shall be evaluated by an independent checker prior to being submitted for review.

3.10 Final Draft

The final draft is the approved updated document with all changes incorporated as a result of the comment resolution process.

4. REFERENCES

Golder Associates Inc. procedures P-3.0-2, "Specific Work Instructions", and P-17.0-1, "Quality Assurance Records Management."

5. DISCUSSION

Technical reviews shall be initiated by the Project Manager by means of SWIs. Each review shall be documented on a Review Comment Form (RCF). All comments recorded on the RCF during review must be categorized by the reviewer as either mandatory or non-mandatory. Non-mandatory comments may be resolved at the author's discretion, and resolution need not be documented on the RCF. All mandatory comments must be formally resolved, and subsequent revisions to the document must be traceable to the comments. Informal review comments may be freely solicited for a document prior to initiation of the review process described by this procedure; however, once the formal review process has started, informal changes to the document are not allowed unless they are purely editorial.

6. RESPONSIBILITIES

6.1 Author or Authors

The author is responsible for:

- producing documents in full compliance with SWI guidelines;
- ensuring that draft documents are as complete as possible prior to entering the review process; and for
- resolving all mandatory comments with technical reviewers, the Project Manager, and/or QA.

6.2 Technical Reviewer

The technical reviewer is responsible for:

- performing critical reviews of documents as directed by governing SWIs and this procedure;
- providing documented mandatory comments and actively participating in the process of resolution as described by this procedure; and for
- providing non-mandatory comments to the author or authors where appropriate for improvements or corrections in syntax, punctuation, or usage.

6.3 Project Manager (or designated representative)

The Project Manager is responsible for:

- initiating document preparation and establishing the scope of technical review activities through the SWI process;
- selecting independent technical reviewers based on qualifications and experience;
- defining any required emphasis or special considerations for individual reviews in the governing SWI;
- ensuring that adequate review time is scheduled to complete the review;
- at the Project Manager's discretion, approving the results of technical reviews and providing additional comments as required; and
- resolving comment resolution conflicts between the author and reviewer.

6.5 QA Manager (or designated representative)

The QA manager is responsible for:

- reviewing and approving the technical review process to verify incorporation or resolution of all mandatory comments; and
- ensuring that applicable QA requirements have been adequately and appropriately addressed.

7. EQUIPMENT OR MATERIALS

Review Comment Forms (RCFs, see Attachment A).

8. PROCEDURE

8.1 Technical Review

Technical review shall be performed as described in the steps listed below:

Step 1: Draft documents shall be completed in accordance with the governing SWI and presented to the independent reviewer designated therein. The reviewer shall either be named on the same SWI or be designated by a separate SWI; the number of the SWI governing the review of the document shall be noted on the RCF form, along with other pertinent information as indicated on page 1 of

Attachment A. If calculations are included in the document, or required as back up documentation, they shall be evaluated by an independent checker prior to initiation of the review cycle. Calculation sheets shall be initialled and dated by both the preparer and the checker, and shall be forwarded to the reviewer along with the review draft.

Step 2: The independent reviewer shall perform a technical review of the draft document. The draft shall be marked "Review Draft" along with the reviewer's name and the review date. The reviewer shall ensure that calculations have been checked, examine the technical approach, evaluate the adequacy of references, evaluate the effectiveness of the use of figures and tables, and perform other review activities appropriate for the type of document, or as specifically directed by the governing SWI.

Step 3: The reviewer shall document all comments on an RCF as described on page 1 of Attachment A. All comments shall be numbered and categorized as mandatory or non-mandatory. Text sections affected by comments shall be numbered in the review draft to correspond with the RCF comments, with the exception that, at the discretion of the reviewer, minor non-mandatory comments that do not require additional explanation or discussion may be marked directly in text without separate treatment on the RCF. The actual review draft shall be retained as part of the project quality records.

Step 4: The reviewer and author shall resolve all of the reviewer's mandatory comments; a concise but complete description of the resolution of each comment shall be recorded on the RCF. All "leave as is" resolutions require rationale. Text sections to be revised should be referenced. The reviewer shall initial each mandatory comment on the RCF to indicate acceptance of the comment resolution prior to word processing update of the document. Non-mandatory comments may be resolved at the author's discretion.

Step 5: The document is updated to include all necessary input for word processing. It is preferred that word processing input resulting from the resolution of comments be marked on a copy (not the original) of the review draft; however, providing none of the reviewer's comments are obliterated, the original review draft may be used for word processing input.

Step 6: The author and the reviewer shall ensure the correct incorporation of comments in the updated draft after word processing. If the document is acceptable, the author and reviewer shall sign the RCF to indicate approval. If, at any time, the reviewer has additional comments, the reviewer must document each comment on the RCF, annotate the original reviewed text accordingly, and review an updated draft prior to signing the RCF.

Step 7: The Project Manager may request involvement in the review cycle by so stating on the SWI initiating the review. If Project Manager involvement is required, the author shall forward the as-reviewed draft, the RCF, and the updated draft to the Project Manager for approval. If the Project Manager has additional comments, they shall be documented on the RCF, categorized as mandatory or non-mandatory and resolved as in Step 4 above. If there are no additional comments, or if the document is acceptable after incorporation of comments, the Project Manager shall sign the RCF to indicate approval. If the Project Manager has not specifically requested involvement in the review cycle via the governing SWI, this step shall be bypassed.

Step 8: The QA Manager (or designee) shall review the review draft, the updated draft, and the RCF for compliance with this procedure and for any special QA concerns. If the review package is acceptable, the RCF shall be signed (Step 10). If the package is not acceptable, Step 9 applies.

Step 9: If QA comments must be resolved, QA shall document comments under the review comment section of the RCF as described in Step 3 above. The RCF shall be routed back to the author who shall resolve the mandatory QA comments. The resolution shall be documented as indicated in Step (4) above. QA shall initial each mandatory comment to indicate acceptance of the resolution, and a corrected draft shall be submitted to word processing for updating.

Step 10: If the document is acceptable after word processing, QA shall sign the accepted RCF. The signed RCF, the original review draft(s), and the final draft shall be retained as permanent quality records. The document may then be released for submittal to the client.

8.2 Quality Records

Documentation supporting the technical review process shall consist of the as-reviewed draft, the final draft, and the completed RCF form. All review documentation shall be routed to project QA files in compliance with P-17.0-1 "Quality Assurance Records Management".

Instructions for Completing RCFs

The instructions listed below correspond to the numbers in the blanks on the example RCF. Personnel responsible for entering the required information on the form are indicated in parentheses.

1) Project Name: (Author) Insert the commonly understood name of the project.

2) Project No.: (Author) Insert the Golder Associates Inc. job and task number.

3) Page: (Reviewers) Pages are consecutively numbered by individual reviewers; total number of pages is added by QA when RCF is finally approved.

4) Document Title: (Author) Insert the document title.

5) Review Date: (Reviewer) Insert the date the review is performed.

6) Author(s): (Author) Identify the author or authors of the document under review.

7) Reviewer(s): (Author) Enter the name of the reviewer, as specified in the governing SWI.

8) SWI No: (Author) Enter the SWI number initiating the review of the document.

9) Comment No.: (Reviewers) Enter the number of each comment, as identified in the reviewed draft.

10) Page, Line, Para.: (Reviewers) Enter the page, paragraph number, and line of each comment.

11) Mandatory/Non-mandatory: (Reviewers) Check the appropriate column for each comment.

12) Review Comment: (Reviewers) Enter the review comment.

13) Comment Resolution: (Author) Enter the resolution of each comment as agreed upon between the author and the reviewer.

14) Resolution Accepted: (Reviewer) Initial and date each resolved comment.

15) Approval: (Authors, Reviewer, Project Manager, QA Reviewer) Sign and date approval in spaces provided.

9 3 1 3 9 0 0 1 5 5 4

Golder Associates

REVIEW COMMENT FORM (RCF)

Project Name (1) Project No. (2)

Document Title (4) Review

Author(s) (6) Reviewer (7) SWI No.

Comment No.	Page, Line, Para., Section No.	Mandatory	Non-mandatory	Review Comment	Comment Resolution
(9)	(10)	(11)	(11)	(12)	(13)

APPROVAL

(15) Author(s) Date

(15) Quality Assurance

9 1 1 8 9 7 0 7 3 6 5

Golder Associates

RCF CONTINUATION SHEET

Document Title _____ Project No. _____

Reviewer _____ Re

Comment No.	Page, Line, Para., Section No.	Mandatory	Non-mandatory	Review Comment	Comment Resolution

CONTROLLED DOCUMENT

Golder Associates
CONSULTING GEOTECHNICAL AND MINING ENGINEERS

TITLE			EFFECTIVE DATE	REV. LEVEL
P-10.0-3 SURVEILLANCE INSPECTION				-0-
PREPARED BY	APPROVED	APPROVED		
7/14/86	7/14/86	8/12/86	8-12-86	Ø
8/10/87	8/11/87	8/13/87	8/13/87	1
6/9/89	6/9/89	6/13/89	6/13/89	2

Revision Level	Page No.	Section No.	Revision Made P-10.0-3
2	All	All	Editional corrections throughout to reflect organizational changes, modifications to related procedures.

1.0 PURPOSE

This procedure defines the requirements for conducting surveillance inspections of in-process project activities, including field operations and laboratory testing.

2.0 APPLICABILITY

This procedure shall be used by all Golder Associates Inc. Quality Assurance (QA) personnel requested to perform surveillance inspection of field, laboratory, or other in-process activities requiring compliance with established procedures or methods.

3.0 DEFINITIONS

3.1 Surveillance Inspection: The documented act of monitoring or witnessing the performance of work in process to verify that activities are being conducted in accordance with approved procedures, methods or instructions.

4.0 REFERENCE

4.1 Golder Associates QA Procedure P-15.0-1, "Control of Nonconformances, Incident Reporting, and Corrective Action".

5.0 DISCUSSION

Surveillance inspection is a management tool that may be used during the course of project activities to verify that work in process is being performed in accordance with specified procedures, methods, or instructions. Surveillance inspections are also used to identify and correct both real and potential deficiencies at the earliest possible opportunity to minimize any adverse impacts on the quality and validity of work. The types of activities subject to surveillance inspection include development of procedures, study plans, or other project documents; field activities including instrument installations, testing, and sampling; laboratory activities, including testing and calibration of measurement and test equipment; and subcontractor or consultant activities in any of the areas mentioned above.

6.0 RESPONSIBILITY

6.1 QA Manager: Responsible for establishing surveillance requirements and policies in compliance with client QA requirements and Golder Associates Inc. corporate quality policy. Designates inspection responsibility to qualified personnel who are independent from the work being examined; all designated inspectors are trained in the requirements of this procedures. Responsible for directing the performance of surveillance inspections and when necessary, coordinating schedules with Project Managers, Task Leaders, and Laboratory Managers.

6.2 Designated Inspector: The designated inspector has primary responsibility for conducting surveillance inspections in accordance with this procedure. The designated inspector is responsible for: confirming surveillance inspection schedules with the QA Manager; when appropriate, making detailed arrangements to witness specific portions of an activity; documenting inspection results; reporting of nonconformances; and verifying that corrective actions for dispositioned nonconformances have been properly implemented.

6.3 Project Managers, Task Leaders or Laboratory Managers: Project Managers, Task Leaders, or Laboratory Managers are responsible for coordinating surveillance schedules with QA Manager and the designated inspector. In case of a stop work order, they are responsible for halting operation in a logical and orderly manner that will protect data already obtained, or prevent further damage. They are also responsible for ensuring that corrective actions for dispositioned nonconformances are properly implemented.

7.0 EQUIPMENT OF MATERIALS

Approved QA, technical, testing, or laboratory plans and procedures; project schedules; reference materials as required; Surveillance Inspection Report (SIR) forms (see Exhibit A).

8.0 PROCEDURE

8.1 Surveillance Inspection Scheduling: All project activities, including document preparation, field testing, and laboratory work may be subjected to surveillance inspection at any point during the activity. It is the intent of this procedure that the surveillance inspection be conducted without significantly interfering with the planned course of the activity. Surveillance inspections in no case shall compromise safety considerations or adversely affect the gathering of data. Reasonable advance notice shall be provided to the Project Manager, Task Leader, or Laboratory Manager prior to inspection activities, who shall provide schedule information, procedure documentation, or such other support as may be required. Frequency and scheduling of surveillance inspections shall be determined by the QA Manager based on project schedules, type of activity, and results of past surveillance inspections or audits.

8.2 Inspection Guidelines: At a minimum, surveillance inspection shall verify compliance of the activity with applicable plans, procedures, methods, and Specific Work Instructions.

The following additional items shall be considered during surveillance inspections of laboratory or field testing activities:

- Equipment or instrumentation calibration status and general condition;
- Status or stage of completion of the test or activity must be apparent from test data sheets or logs;

- Test operations and sequencing for the phase of the activity observed must comply with approved procedure requirements;
- The actual starting and stopping times of the surveillance shall be noted on the SIR form;
- Test data sheets and records required by the test plans or procedures must be filled out properly, to the extent necessary for the phase of the test observed.

8.3 Nonconformances and Stop-work Orders: Nonconformances and incidents shall be documented and handled as indicated in procedure P-15.0-1 "Control of Nonconformance, Incident Reports, and Corrective Action." Deficiencies of a minor nature that would not affect a permanent or significant change in quality if not corrected and can be brought into conformance with immediate corrective action shall not be categorized as a nonconformance. If a nonconformance requires stopping work in order to prevent future discrepancies, danger to personnel, loss of data, or similar problems, the designated inspector shall immediately notify the QA Manager, obtain concurrence, and issue stop work instructions. The affected Project Manager, Laboratory Manager, or Task Leader(s) shall be immediately notified.

9.0 RECORDS

9.1 Surveillance Inspection Report (SIR) Forms: An SIR form shall be filled out for each surveillance and routed to the QA Manager for review prior to routing to the project QA records; at a minimum the report shall contain the following information:

- Name of the inspected activity or test, with associated job number,
- Personnel contacted using the surveillance,
- Date and start/stop times of the surveillance,
- References to governing plans or procedures,
- Observations of equipment condition and calibration status,
- General observations and comments,
- NCIR numbers for any nonconformances resulting from the surveillance,
- Discussions of any immediate action taken to correct minor deficiencies or to stop work, and
- Signature of designated inspector and date.

SURVEILLANCE INSPECTION REPORT

SIR

Page 1 of ___

No.: _____

Inspected Activity or Test: _____

Job Number: _____

Personnel Contacted: _____

Reference Requirements: _____

Insp. Date: _____ Start Time: _____ End Time: _____

Equipment condition/Calibration Status: _____

Observation and Comments (Use Extra Sheets as Required): _____

NCIR Reference (if any): _____

Inspector: _____ Date: _____

Reviewed By:

QA Manager: _____ Date: _____

Comments: _____

Golder Associates
CONSULTING GEOTECHNICAL AND MINING ENGINEERS

TITLE			EFFECTIVE DATE	REV. LEVEL
P-10.0-4 RECEIVING INSPECTION				
PREPARED BY	APPROVED	APPROVED		
10-15-87	10/20/87	10/28/87		1
1-12-90	1/12/90	1/12/90	1-12-90	2

RECORD OF REVISIONS
P-10.0-4

Revision Level 2

Page Number	Section	Revision
1	2.0	Revised to allow reference materials to be evaluated per TP-5.1-1 and P-10.0-1 as an option, rather than a requirement
2	6.0	Editorial changes, and clarified QA Manager's involvement
Throughout		Changed "Corporate QA Officer" to "QA Manager"

1.0 PURPOSE

This procedure defines the requirements for receiving inspection of project related materials, and equipment.

2.0 APPLICABILITY

This procedure is applicable to project-related items, materials, and equipment procured for Golder Associates projects which are governed by the requirements of 10 CFR 50, Appendix B as interpreted by ANSI/ASME NQA-1. This procedure is applicable only to procurements directly in support of such projects. As an option, reference materials may be reviewed and evaluated under the requirements of technical procedure TP-5.1.1, "Conducting and Documenting Technical Literature Searches" and QA procedure P-10.0-1, "Technical Review", in lieu of this procedure.

3.0 DEFINITIONS

3.1 Receiving Inspection: The documented examination or measurement by an independent party to verify that materials, equipment, or services received conform to procurement specifications.

4.0 REFERENCES

4.1 Golder Associates QA Procedure P-17.0-1 "Quality Assurance Records Management."

4.2 Golder Associates QA Procedure P-15.0-1, Control of Nonconformances, Incident Reports, and Corrective Action."

4.3 10 CFR 50, Appendix B, Sections VII, VIII as interpreted by ANSI/ASME NQA-1.

5.0 DISCUSSION

5.1 The purpose of the receiving inspection function is to assure that items, materials, and equipment from Golder Associates' suppliers conform to the requirements specified in procurement documentation. All items received are to be clearly identified to maintain traceability of supplier documentation to the item procured, and to ensure that only correct items are accepted for use. All nonconforming items, materials or equipment shall be identified and reported in a timely fashion to aid in assuring effective corrective action.

6.0 RESPONSIBILITIES

6.1 Receiving Inspector: The Receiving Inspector is responsible to clearly document the results of all receiving inspections and verify proper identification and marking of all received items, materials, or equipment. Identifies and documents all nonconforming items or supplier documents and is responsible for the physical segregation and identification of these items where possible. The Quality Assurance Manager is responsible for designating and training all receiving inspectors. 2

6.2 Records System Administrator: The Records System Administrator is responsible for the filing, duplication, and maintenance of all completed receiving inspection records and related documentation in accordance with QA procedure P-17.0-1.

6.3 Property Control Administrator: The Property Control Administrator is responsible for the release and retrieval, inventory, and tracking of items, materials, or equipment when property controls are a contractual requirement.

6.4 Project Secretary: The Project Secretary is responsible for the processing of completed receiving inspection records and related documents in accordance with QA procedure P-17.0-1 and distribution to the Property Control Administrator, Records System Administrator, Cost Accounting, and others as determined by project management.

7.0 MATERIALS

- Quality Assurance acceptance stamp
- QA accept tag
- Procurement document(s)
- Receiving document(s)
- Nonconformance/Incident Report (NCIR) forms

8.0 PROCEDURE

All project related materials and equipment shall be inspected upon receipt as follows:

8.1 Golder Associates Project Materials and Equipment: Project related equipment and materials shall be inspected at the time of receipt for conformance to procurement document requirements.

8.1.1 At a minimum, the following attributes shall be verified:

- Dimensions and configuration shall be in accordance with drawings, specifications, or other requirements as referenced in procurement documentation,
- Test reports, certificates of conformance, calibration and maintenance information or other required supplier documents shall be correct and complete,
- Identifying label plates, tags, serial numbers, or other markings shall be correct and legible,
- Preservation, packing, and storage instructions shall be provided if required by procurement documentation,
- There shall be no visual evidence of damage or deterioration, and
- Acceptance Testing of received items, when required as a condition of acceptance by procurement documentation, shall be conducted and results documented by the Receiving Inspector. In cases where Acceptance Testing may be performed by a separate testing group, the Receiving Inspector is responsible for coordination and scheduling as required.

8.1.2 Inspection and acceptance of all received items, materials, or equipment will be documented by placement of a QA acceptance stamp (See exhibit A) and date on the receiving invoice or packing slip. All items, materials, or equipment shall be physically identified by attachment of a Golder Associates QA accept tag (See exhibit B). The QA accept tag shall remain attached to the item at least until the item is installed or placed in service. Each item shall be assigned a unique positive identification traceable to the procurement order. These identifiers shall also be noted in the receiving inspection documentation.

8.1.3 A copy of the requesting ordering documents, the original receiving invoice and packing slip shall be forwarded to the Project Secretary for validation and file identification in accordance with QA procedure P-17.0-1. Copies will be distributed to Cost Accounting for initiation of payment activity and to the Record System Administrator for inclusion in the project records.

8.1.4 When property controls are a contractual requirement, the Project Secretary shall provide a copy of the procurement documents with a copy of the QA accepted receiving documents to the project Property Control Administrator. This shall serve as notification of items, materials, or equipment which have been accepted by QA and may be entered into the property control inventory.

8.2 Client/Government Furnished Equipment and Materials: Client Furnished Materials (CFM) and Government Furnished Materials (GFM) shall be inspected at the time of receipt. At a minimum, the following attributes shall be verified:

- Identifying label plates, tags, serial numbers, or other markings shall be correct and legible, and
- There shall be no visual evidence of damage or deterioration.

Inspection and acceptance of all CFM and GFM items shall be documented and reported in accordance with the requirements of sections 8.1.2 through 8.1.4.

8.3 Nonconformance Reporting: All items or materials found to be discrepant shall be documented on a Nonconformance/Incident Report (NCIR). The NCIR shall be logged and processed in accordance with QA Procedure P-15.0-1, "Control of Nonconformances, Incident Reports, and Corrective Action." All discrepant items shall be physically segregated from acceptable materials and equipment whenever possible, and clearly identified by attaching a copy of the open NCIR to the item. Discrepant items shall not be released for use or continued processing until all open NCIR items have been resolved.

8.4 Inspection Stamp Control: Inspection and acceptance of received items, materials, or equipment shall be verified by use of a Golder Associates QA acceptance stamp (See exhibit A). QA acceptance stamps shall be issued by the QA Manager; each receiving inspector is directly responsible for the control and use of his/her assigned stamp. QA acceptance stamps shall not be loaned, borrowed, or used by unauthorized personnel. In the event of loss, or suspected misuse, the QA Manager shall be notified immediately. 2

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Golder Associates
QA Acceptance Stamp

Exhibit A

843-1040-050/1

9 3 1 2 2 1 5 7 8

Job No. _____ Date _____
P. O. No. _____ Serial No. _____
P. O. Item _____ Quantity _____
Part No. _____
Description/Comments _____

Inspector _____

Golder Associates

QA ACCEPT

QA Accept Tag

Exhibit B

843-1040-050/2

9 6 1 2 2 1 5 7 9

CONTROLLED DOCUMEN

Golder Associates
CONSULTING GEOTECHNICAL AND MINING ENGINEERS

TITLE			EFFECTIVE DATE	REV. LEVEL
P-12.0-1 CALIBRATION AND MAINTENANCE OF MEASURING AND TEST EQUIPMENT				
PREPARED BY	APPROVED	APPROVED		
3/20/90	3/21/90	3/21/90	3/21/90	7
1-12-90	1/12/90	1/12/90	1-12-90	8

RECORD OF REVISIONS
P-12.0-1

Revision Level 8

Page Number	Section	Revision
Throughout		Editorial corrections, and changed "Corporate QA Officer" to "QA Manager"
3	6.1	Added condition-found report-related responsibilities
Throughout		Deleted Field Laboratory Manager
3	6.2	Changed "Test Operator or Investigator" to "Field or Laboratory Personnel"
4	8.2	Deleted "lack of use" criterion for extending calibration interval
4	8.3	Added condition-found report requirements
5	8.7	Added requirements regarding damaged equipment
6	8.9	Added requirements regarding calibration-related nonconformances and audit findings

1. PURPOSE

This procedure defines the system to be used for the calibration, control, and maintenance for the calibration, control, and maintenance of measuring and test equipment and calibration standards.

2. APPLICABILITY

This procedure is applicable to all Golder Associates owned or leased measuring and test equipment used in laboratory analyses and field investigations. This procedure is not applicable to standard commercial measurement devices such as rulers, compasses, tape measures, mercury thermometers, or levels, provided that the required level of accuracy does not exceed the limits of the standard equipment.

3. DEFINITIONS

3.1 Calibration

Calibration is defined as periodic comparison of an instrument or measurement device to a standard of known and greater accuracy in order to assure continuity and accuracy of measurements or data. If no standards meeting the requirements of paragraph 3.2 exist, then the basis or justification of calibration method must be documented.

3.2 Calibration Standard

A calibration standard is a device or reference used as a means of comparison for determining quantitatively the accuracy, precision, and repeatability of instruments or measurement devices. Calibration standards must have a traceable, known relationship to nationally recognized standards such as those maintained by the National Institute of Standards and Technology (NIST).

4. REFERENCES

4.1 Golder Associates Quality Assurance Procedure P-18.0-1, "Audits."

4.2 Golder Associates Quality Assurance Procedure P-10.0-3, "Surveillance Inspection."

4.3 Golder Associates Quality Assurance Procedure P-15.0-1, "Control of Nonconformances, Incident Reports, and Corrective Action."

5. DISCUSSION

Calibration and maintenance of instrumentation is required so that the accuracy and precision of data collected, and hence the calculations based on the data, are known. Calibration should not be construed as the instrument adjustments or accuracy checks commonly performed during or as part of test operations, but rather consists of those systematic, periodic evaluations of instrumentation or equipment that verify performance within specified levels of accuracy, precision, and repeatability. Calibration shall be performed in a clean environment, giving due consideration for dust, relative humidity, temperature, and vibration, as necessary for the equipment being calibrated.

Calibration records are normally retained in the laboratory; copies of records specific to certain tests shall be forwarded to project files when requested.

6. RESPONSIBILITIES

6.1 Laboratory Manager

The Laboratory Manager is responsible for the implementation of the calibration and maintenance program within the laboratory. Detailed responsibilities for implementation include:

- Establishment of an identification system by assigning a unique serial number for each piece of equipment in inventory for issuing, tracking, calibration, charge accumulation, use, and recall;
- Provision of calibration and maintenance support to field operations when project size does not permit an onsite calibration facility;
- Assurance of the acceptable calibration status for all equipment, by use of a locator/recall system and calibration status labels prior to releasing for project work;
- Performance or direction of calibration and maintenance activities for all Golder-owned or leased instruments and equipment controlled by a particular Golder office;
- Maintenance and development of the master equipment file, which contains equipment calibration and maintenance instructions, established calibration intervals, and definition of special shipping and handling requirements;

- Maintain suitable storage facilities and instructions for use and care of laboratory standards, separate from other tools and equipment in the calibrated inventory; and

- Review all condition-found reports for equipment found to be out of calibration, and preparation of technical memoranda evaluating the potential effect on measurements made with such instruments over the previous calibration interval.

Specified duties supporting these responsibilities may be delegated to qualified personnel.

6.2 Field or Laboratory Personnel

Equipment users are responsible for verifying acceptable calibration status of all equipment or instrumentation used during a test, and returning such equipment to the Laboratory Manager when recalibration or maintenance is required.

6.3 Project Manager or Task Leader

The Project Manager or Task Leader is responsible for assuring that the equipment or instrumentation procured for or selected for use on a project is of sufficient range, accuracy, tolerance, and construction to provide meaningful data or measurements. In addition, the Project Manager or Task Leader is responsible for assuring that all equipment or instrumentation procured or leased for a particular project is routed through the Laboratory Manager, or for assignment of equipment numbers, entry of information into the equipment file, establishment of calibration interval, and entry into the locator/recall system; and for notifying the Laboratory Manager when client calibration needs exceed existing standards and new requirements must be incorporated into the equipment file.

6.4 QA Manager

The QA Manager is responsible for assuring that procurement documentation for equipment and instrumentation requires manufacturer's documented calibration certification, calibration instructions, maintenance requirements, storage requirements, and special handling requirements; and for scheduling internal audits or surveillances to monitor the effectiveness of the calibration program.

7. EQUIPMENT

Equipment required to implement the provisions of this procedure consists of a file containing calibration procedures and records for all measuring and test equipment, a locator/recall system, and the necessary calibration standards and maintenance tools required by the measuring and test equipment file.

8. PROCEDURE

8.1 Equipment Designation and Tagging

The Laboratory Manager shall assign unique numerical designators to all measuring and test equipment within their respective inventories. Designator assignment should be logical based on the calibration requirements of the instrument or system. If a system component can be used in various applications, the component should be given a unique number. The number should be marked permanently on the equipment. Once calibrated, the equipment shall have a readily visible calibration tag (see Exhibit "A") affixed indicating calibration acceptance, date of last calibration, due date of next calibration, initials of the person performing the calibration, and the equipment number. Equipment calibrated by an outside laboratory shall display the calibration label of that laboratory. In addition, a Golder Associates label will be applied to indicate acceptance in the laboratory tracking and control system. Equipment requiring calibration with each use shall so indicate on the calibration label. This requirement does not apply to equipment normally subjected to adjustments or operational checks before use; such adjustment is not considered calibration as defined in 3.1. Equipment with expired calibration shall be tagged with a red tag indicating "Out of Service" (see Exhibit "A").

8.2 Calibration Interval

The required calibration interval shall be assigned by the Laboratory Manager. In no case shall the calibration interval exceed the maintenance interval. The calibration interval shall be based on manufacturer's recommendations, level of projected use, probable usage environment, and usage history. Laboratory standards shall not be used as measuring or test devices beyond the scope of the calibration function. 8

8.3 Condition-Found Report

Calibration records shall document the as-found calibration status of all equipment. All equipment found to be out of tolerance shall be referred to the laboratory manager for evaluation and preparation of a memo to the equipment file and QA Manager addressing the potential effect on measurements from the previous calibration date. Significant effects shall prompt the initiation of a nonconformance report, which shall be documented and resolved in compliance with P-15.0-1 "Control of Nonconformances, Incident Reports, and Corrective Action." See 8.9 below. 8

8.4 Equipment File

The Laboratory Manager or Field Laboratory Manager shall develop and maintain a comprehensive equipment file which contains, by equipment number, specific calibration instructions, original calibration certifications, calibration intervals, maintenance instructions,

storage requirements, special handling requirements, calibration history (including condition found reports for each calibration), and, if appropriate, reference to the project that it was originally procured against.

8.5 Calibration Sources

Calibration may be performed internally under the direction of the Laboratory Manager, or by qualified external sources. Calibration technique shall be as defined in the Equipment File. Regardless of whether the calibration is performed internally or by an external source, all reference standards shall be traceable to nationally recognized standards. If no standards exist, justification of the calibration method must be a permanent part of the equipment file. Procurement documents for calibration and maintenance services shall require the source to perform the calibration and maintenance to established procedures with traceability to nationally recognized standards. The procurement document shall also require the source to provide a condition-found report and certificates of calibration (and maintenance, if a regular maintenance cycle is required). This documentation shall be reviewed by the Laboratory Manager for compliance with procurement requirements, prior to accepting the equipment into inventory and subsequent release for project use.

8.6 Equipment Tracking and Recall System

The Laboratory Manager is responsible for the maintenance of a system for controlling the issue of equipment, maintaining visibility of equipment location and calibration due dates, and issue of recall notices for recalibration and maintenance. The system may be maintained manually, or may be computerized, but in either case shall initiate recall activity well in advance of the calibration expiration dates in order for test managers to plan for equipment downtime.

8.7 Storage and Special Handling

Storage requirements shall be as specified by the manufacturer or in accordance with accepted industry practice. Equipment and reference calibration standards shall be used only for their intended purposes. They shall be adequately protected from moisture, dust, atmospheric contamination, and physical damage. Calibrated instruments being shipped or transported to field operations shall be securely packaged to prevent damage or loss of calibration due to shock, vibration, extremes of temperature, or moisture. Damaged equipment shall be tagged with a red "Out of Service" tag (see Exhibit A). If the date of equipment damage cannot be determined, the equipment shall be considered out of calibration, and addressed as a nonconformance (see Section 8.9).

8.8 Surveillances or Audits

When required by individual project-specific QA program plans or office baseline QA program plans, surveillances or audits shall be conducted periodically to verify compliance with this procedure, per the requirements of procedures P-10.0-3, "Surveillance Inspection" and P-18.0-1, "Audits". Frequency shall be as defined by governing QA program plans.

8.9 Calibration-Related Nonconformances and Audit Findings

When use of equipment with expired calibration, no calibration, or damage is observed in a surveillance inspection, the situation shall be documented as a nonconformance and resolved in compliance with P-15.0-1, "Control of Nonconformances, Incident Reports, and Corrective Action." If like situations are observed in an audit, they shall be documented as audit findings and resolved as required by P-18.0-1, "Audits." In both cases, resolution processes shall include a technical evaluation by the Laboratory Manager of the validity of test results obtained through the use of the equipment since its last calibration date.

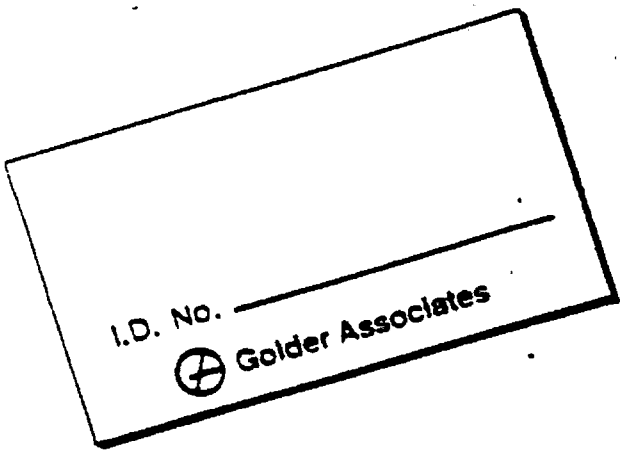

Exhibit A
P-12.0-1

993-1024//10023

Golder Associates Inc.

CONTROLLED DOCUMENT

Technical Procedure

Number: P-15.0-1

Title: CONTROL OF NONCONFORMANCES, INCIDENT REPORTS, AND CORRECTIVE ACTION

Prepared By:	Approved	Approved	Effective Date	Rev. Level
6/12/90	6/12/90	6/22/90		15

RECORD OF REVISIONS

P-15.0-1

Revision Level 15

Page Number	Section	Revision
all	all	minor editorial corrections throughout
4	6.4	changed President to Office Manager
4	7.0	added reference to NCIR forms
6	8.2.2	added discussion of design control measures applicable to dispositioned items. Changed President to Office Manager.
Exhibit B	Exhibit B	corrected C/A section of flow chart.

1. PURPOSE

This procedure establishes a system for the identification and reporting of nonconformances to specified requirements or approved procedures. It provides for identification of causes, disposition, and implementation of corrective action measures to preclude future occurrences. The same basic identification and reporting system is also utilized for the reporting of incidents.

2. APPLICABILITY

This procedure is applicable to nonconforming items, services, or activities that are identified during inspections or reviews, or to incidents that may occur in the field or office.

3. DEFINITIONS

3.1 Nonconformance

A nonconformance is a deficiency in characteristic, documentation, or procedure which renders the quality of material, equipment, services, or activities unacceptable or indeterminate. When the deficiency is of a minor nature, does not effect a permanent or significant change in quality if it is not corrected, and can be brought in conformance with immediate corrective action, it is not categorized as a nonconformance. Such situations might include: technical reviews signed but undated; use of pencil instead of ink; typographical errors in reports. However, if the nature of the condition is such that if it is not corrected it may result in a permanent and significant impact on the quality of the item, test, or report, it must be brought to the attention of the Project Manager and QA Manager (or their designees) for resolution and concurrence on the scope of required corrective action. Examples of nonconformances might include the following: incomplete or inadequate technical reviews; computer programs not verified or validated; testing not in accordance with procedures; sample traceability missing or deficient; sample collection not as prescribed by procedures; use of uncalibrated instrumentation for testing, measurement, or analysis.

3.2 Significant Nonconformance

A reportable nonconformance may be considered significant if it could invalidate the purpose of the activity, or be detrimental to the safety of personnel or public. Examples might be discovery of forged data; catastrophic loss of computerized data for which there is no backup; an improper use of a procedure which has endangered or could endanger others; lack of cooperation in the implementation of corrective action from nonconformances

previously considered reportable; or nonconformances resulting from misapplication, misuse, or non-use of approved test or safety procedures to the extent that the test activity is no longer valid, or personnel safety is endangered.

3.3 Incidents

An incident is defined as any unexpected event during an activity which may have significant impact on project costs, schedule, validity of data or analysis, safety, or environment. Incidents are major events that are clearly not in the category of uncertainties characteristic of geoscientific investigations. Examples might include: major accidents, major equipment failures, fires, earthquakes, cave-ins, or site support failures.

3.4 Disposition

Disposition is defined as the action taken to correct the immediate situation; examples might be. to re-run a portion of a test that was not being conducted in accordance with procedures; to calibrate test equipment found to be out of calibration and re-run any required tests; to re-perform independent technical review; to re-acquire samples; to return defective equipment to the manufacturer for repair or replacement. Item dispositions shall be specified as reject, accept-as-is, repair, or rework as appropriate.

3.5 Reject

"Reject" is an appropriate disposition when a nonconforming item is not acceptable, cannot be repaired such that it performs properly, or reworked such that it complies with the original requirements.

3.6 Accept As-Is

"Accept as-is" is an appropriate disposition when a nonconforming item is determined to perform its intended function properly, even though it does not comply with original requirements. Technical justification for the acceptability of an item dispositioned "accept as-is" shall be documented in the Nonconformance/Incident Report (NCIR).

3.7 Repair

Repair is an appropriate disposition when a nonconforming item can be restored to a condition such that it performs its intended function properly, even though it cannot be brought into compliance with the original requirements. Technical justification for the acceptability of an item dispositioned "repair" shall be documented in the NCIR.

3.8 Rework

Rework is an appropriate disposition when a nonconforming item can be brought into compliance with original requirements by correction or completion.

3.9 Corrective Action

Corrective action is defined as the specific action or actions taken to reduce or preclude the likelihood of future occurrences. Examples might include: revision of procedures for clarity or to resolve conflicting interpretations or instructions; conducting specific training exercises relative to the nonconformance; to redesign faulty equipment; to evaluate and select alternate sources of supply.

4. REFERENCES

Golder Associates QA Procedure P-10.0-3, "Surveillance Inspection"

5. DISCUSSION

All personnel are responsible for reporting possible nonconformances to the QA Department. If determined to be a minor deficiency, the condition may be immediately corrected to the satisfaction of cognizant QA personnel. However, if determined to be a nonconformance, the condition will require full documentation, investigation, disposition, and corrective action. Nonconformances are documented by QA on the Nonconformance/Incident Report (NCIR). The QA Manager and the Project Manager confer to determine the disposition and cause of the condition, and the corrective action necessary to preclude recurrence. If required by contract, the nonconformance is reported to the client. To close the nonconformance, the QA Manager confirms that all required actions have been appropriately completed. Incidents are reported and documented similarly, with the additional requirement of immediate and more detailed reporting to the client.

6. RESPONSIBILITIES

6.1 All Personnel

All personnel shall notify QA representatives when nonconforming conditions are observed; in case of incidents, all personnel are responsible for immediately reporting the situation to both the Project Manager and the QA Manager.

6.2 QA Personnel

QA Personnel performing inspections or reviews have the authorization and responsibility for obtaining immediate corrective action in cases of minor deficiencies, and for initiating nonconformance reports in cases of nonconformance. They are responsible for stopping work when necessary and appropriate and for the physical separation and identification of nonconforming items or documents whenever possible.

6.3 Project Manager and QA Manager

The Project Manager and QA Manager are jointly responsible for reviewing and approving all nonconformances, determining cause, providing disposition and defining the corrective action required to preclude or reduce the likelihood of future occurrences. The QA Manager is responsible for reporting all nonconformances to the client when required by contract. In the case of significant nonconformances and incidents, the Project Manager and QA Manager shall notify their respective client contacts. On a case by case basis, the QA Manager and the Project Manager may delegate responsibility for certain aspects of resolution of nonconformances to the Project or Field QA Coordinator and Project Administrator or cognizant Task Leader.

6.4 Office Manager

The Office Manager acts when necessary to resolve differences between Quality Assurance and Project Management regarding corrective action required as a result of nonconformances.

7. EQUIPMENT OR MATERIALS

NCIR forms (Exhibit A) as required.

8. PROCEDURE

8.1 Handling of Minor Deficiencies

Cognizant QA Personnel shall evaluate apparent deficiencies to determine whether or not a nonconformance exists, given the criteria of 3.1 above. If the situation is minor as defined therein, immediate action may be taken to correct the deficiency and shall be documented on a Surveillance Inspection Record (SIR) form in compliance with P-10.0-3 "Surveillance Inspection." In borderline situations or in any case where there is the least uncertainty, the QA Manager shall be apprised of the situation and shall provide direction as required.

8.2 Handling of Nonconformances

The process for documenting and resolving a nonconformance is described below. A logic chart (Exhibit B) is included which graphically represents this process is included.

8.2.1 Initiation of Nonconformance/Incident Documentation; Stop Work Orders, Identification and Segregation

In cases of nonconformances, cognizant QA personnel will initiate a Nonconformance/Incident Report (NCIR; see Exhibit A). All NCIR forms will be numbered consecutively. A log will be maintained by QA in which the date, NCIR control number, description of nonconformance, project reference and status will be recorded. The situation or discrepancy shall be described on the NCIR in concise, descriptive language, and shall include all appropriate references to documents or procedures. If the situation requires stopping work to prevent further discrepancies, danger to personnel, loss of data, or other problems, the originator of the NCIR shall, after immediately notifying the QA Manager and obtaining concurrence, stop work as required. If work stoppage will affect the scheduled performance of related activities, as in construction or testing, the cognizant Task Leader or Project Manager shall likewise be immediately notified. If the nonconformance is associated with materials, items, or reports, they shall be physically separated or segregated wherever possible and identified with a copy of the open NCIR pending completion of review and disposition.

8.2.2 Review

The NCIR shall be routed to the QA Manager for review; a copy of the initial report shall be retained for tracking purposes; completeness of information will be verified, probable cause will be determined, and recommendations for corrective action will be prepared. The QA Manager then shall meet with the Project Manager; together, they shall jointly agree as to probable cause, disposition, and the corrective action required to preclude recurrence. If nonconformances relate to design requirements, any use as-is or repair dispositions shall require the application of the same design control measures and approvals as was required for the original design. When appropriate, disposition authority may be delegated to personnel technically competent in the applicable area, or additional technical support may be obtained as required. If agreement cannot be reached, the Office Manager shall be consulted for resolution of their differences. The cause, disposition and corrective action shall be documented on the NCIR and a corrective action completion date agreed upon. The QA Manager shall notify the client's QA representative when so required by contract, and advise them that complete documentation will be forwarded upon completion of corrective action. On a case by case basis, or in field situations, the QA Manager and Project Manager may delegate all or portions of the review process.

8.2.3 Corrective Action

Corrective action measures shall be selected to prevent or reduce the likelihood of future occurrences and shall address root causes to the extent identifiable; selected measures shall be appropriate in relation to the seriousness of the nonconformance and shall be realistic in terms of the resources required to implement them. Corrective action instructions are summarized on the NCIR, but shall be communicated in appropriate detail to project staff by the QA Manager and Project Manager (or their designees) by the means most appropriate to the situation. This may be by special corrective action group meetings, training sessions, by individual Specific Work Instructions, by internal memo, or by such other means as may be required to implement the required action. Nonconformances indicative of serious trends or worsening conditions shall require specific detailed reports to management. All such actions shall be documented and will become part of the nonconformance files.

8.2.4 Verification of Effectiveness of Corrective Action

Verification of effectiveness of corrective action shall be as required by individual corrective action instructions. Acceptability of reworked items shall be based on original criteria. Acceptability of repaired items shall be based on criteria equivalent to the original requirements.

8.2.5 Closure

The QA Manager shall confirm that both the disposition and verification of corrective action have been accomplished to his satisfaction. Upon confirmation, the QA Manager shall sign the NCIR for each action. The NCIR shall then be considered closed and the date entered in the log. When required by contract, copies of the NCIR and all supporting information shall be submitted for information to the client's QA organization.

8.3 Significant Nonconformances

Significant nonconformances shall be handled in the same manner as reportable nonconformances except that, when required by contract, they shall require the notification of client QA and Project representatives by the QA Manager and Project Manager.

8.4 Incidents

All personnel with knowledge of an incident are responsible for immediate notification of the Project Manager and QA Manager. NCIR's for incidents shall be prepared in the same manner as those for nonconformances. Upon receiving a report of an incident, the QA Manager will verify that the Project Manager has received the information and, if required, immediately notify the client. Verbal notification must take place within 24 hours; a detailed report will be prepared by the Project Manager and QA Manager and submitted to the client within 14 days. The Project Manager and QA Manager are responsible for resolution of any client requests resulting from the reporting of incidents. If the incident involves Golder Associates' responsibility, formal corrective action reports may be submitted in addition to NCIR forms in order to permit a more detailed level of reporting.

9 3 1 2 9 3 2 1 5 9 8

Golder Associates

NONCONFORMANCE/INCIDENT REPOR

Project Client/Title: _____

Project/Task No. _____

Stop Work? ☐ YES ☐ NO

☐ NONCONFORMANCE

☐ SIGNIFICANT

☐ INCIDENT

NCIR NO: ____

DATE: ____

REPORTED BY: ____

CONDITION

Description of Condition (location, time/date of occurrence)	Disposition to Correct Condition

ACCEPT: QA Mgr./Date _____ Proj. Mgr./Date _____ Other ____

CORRECTIVE ACTION

Cause of Condition	Corrective Action Required
	Estimated Completion Date: _____

ACCEPT: QA Mgr./Date _____ Proj. Mgr./Date _____ Other ____

Client Notified by: _____ Date _____

Disposition Complete: QA Mgr./Date _____

Client Re[illegible]

EXAMPLE

9 5 1 2 9 5 5 1 5 9 9

Golder Associates

NCIR/CONTINUATION SHEET

Continuation of Section _____

NCIR NO.

Page

EXAMPLE

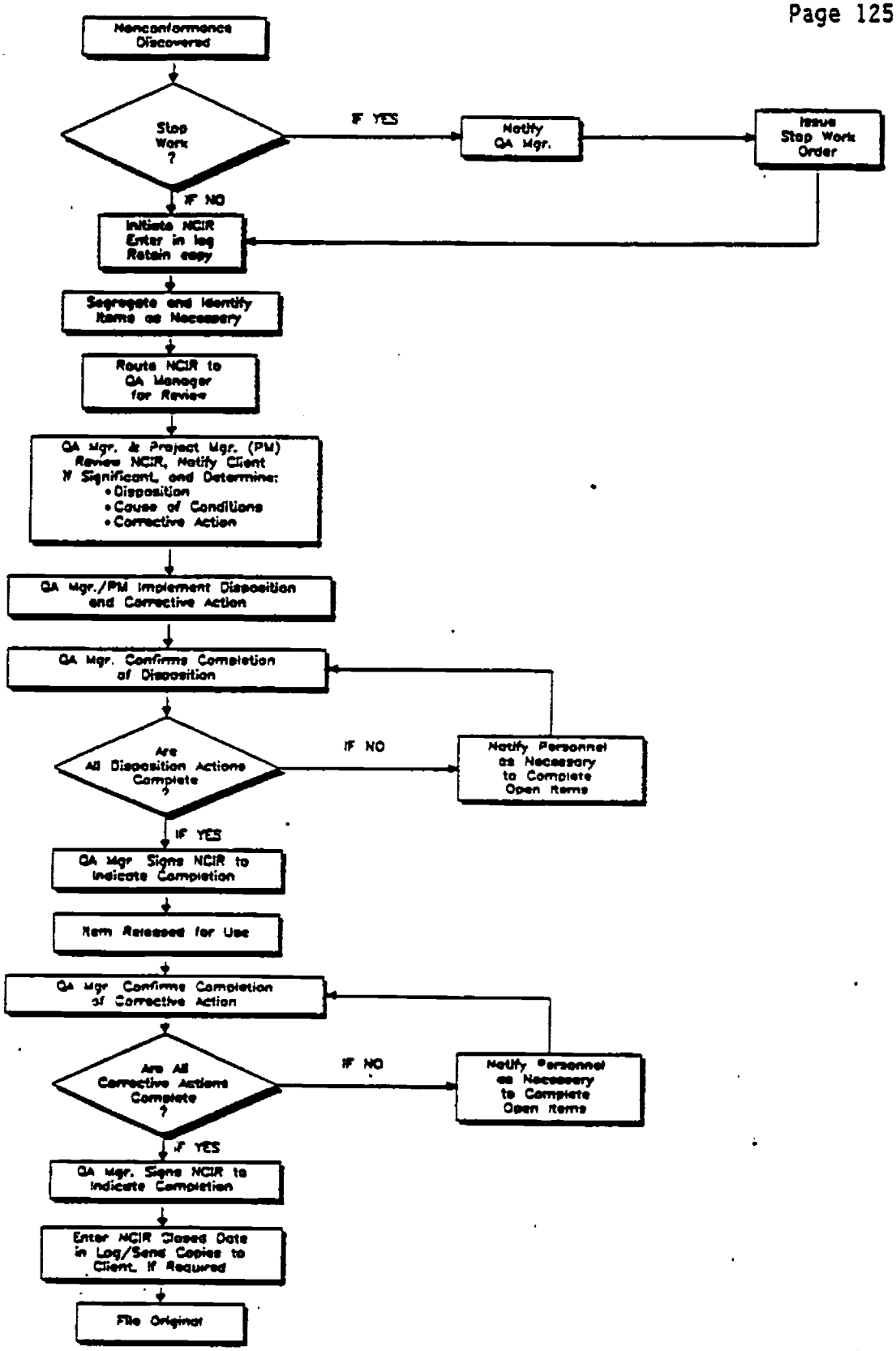

EXHIBIT B
NONCONFORMANCE RESOLUTION
QA PROCEDURE P-15.0-1

PROJECT NO 9931024 DWG NO 33730 DATE 6/11/90 DRAWN JSS APPROVED JO

Golder Associates

CONTROLLED DOCUMENT

Golder Associates Inc.

Quality Assurance Procedure

Number: P-17.0-1
Title: QUALITY ASSURANCE RECORDS MANAGEMENT

Prepared By:	Approved	Approved	Effective Date	Rev. Level
[signature] 4-2-90	[signature] 4/3/90	[signature]	4/3/90	11

RECORDS OF REVISIONS
P-17.01

Revision Level 11

Page Number	Section	Revision
2	4.0	deleted uncited references per P-5.0-1 Rev. 9

1. PURPOSE

This procedure provides the methodology for the collection, storage, maintenance, retrieval and turnover of Quality Assurance (QA) records.

2. APPLICABILITY

When invoked by project-specific plans or procedures, this procedure applies to the management of all completed documents generated within the context of a QA program that provide evidence of the quality of items or activities affecting quality.

3. DEFINITIONS

3.1 Quality Assurance Records

Quality Assurance Records are completed documents which furnish objective evidence of the quality of items or services, those activities affecting quality, or the completeness and quality of data.

3.1.1 Project QA Records

Project QA records are those Quality Assurance records (as defined above) maintained for a specific project. As examples, correspondence, notes of telephone conversations, project deliverables, reports of data obtained in the field, Specific Work Instructions, and technical reviews are considered project QA records.

3.1.2 Duplicate Records

Duplicate records are copies of the project QA records made at the point of file entry and stored separately from the originals as a measure of protection against loss or damage.

3.1.3 Corporate QA Records

Corporate QA records are those records which may generally be drawn upon to support all project QA programs. Such records may include QA and Technical Procedures, QA Program Plans, personnel training records, audit records, and other records for which QA is directly responsible. Corporate QA Records are stored in the corporate QA files. If a client requires certain types of records stored in the corporate QA files as part of the project QA records,

copies will be routed to the project QA files and will be subject to the duplication and storage requirements defined in this procedure.

3.2 Records Index

A records index is an actively updated list of the project or corporate QA records which defines the location of the records within the filing system.

3.3 QA File Center

The QA File Center is a locking, fire resistant room with controlled access in which project QA records are normally stored.

3.4 Archives Facility

The Archives Facility is a controlled access facility separate from the QA File Center in which duplicate project QA records are normally stored.

4. REFERENCES

None.

5. DISCUSSION

This procedure addresses Quality Assurance records, which fall into two categories: QA records maintained for a specific project, and corporate QA records which may be drawn upon to support all project QA programs. A client may require that certain types of corporate QA records be included in the project QA records. In such cases, copies of the corporate records will be routed to the project files, and handled as original project records. Project QA records are reviewed and validated by the Project Secretary prior to filing. Original project QA records are normally stored in the QA File Center. The duplicate files are normally stored in the Archives Facility. Both facilities are under the control of the Records System Administrator. Corporate QA files are stored in a fire resistant, locking cabinet under the control of the QA Manager. Access to records of either type is controlled by a formal checkout system.

6. RESPONSIBILITIES

6.1 Project Manager

The Project Manager is responsible for establishing the basic project structure by dividing project activity into individual tasks, and for providing guidance in the design of the project records index based on the division of tasks.

6.2 Project Secretary

The Project Secretary is responsible for designing the Project Records Index in cooperation with the Records System Administrator, and with guidance from the Project Manager. The Project Secretary is also responsible for providing index changes to the Records System Administrator, and for validating and submitting records for storage.

6.3 Project Personnel

Project personnel are responsible for submitting completed documents to the Project Secretary in a timely manner for validation and forwarding to the project QA files.

6.4 QA Manager (or designee)

The QA Manager is responsible for the maintenance of the corporate QA files and the Corporate Records Index.

6.5 Records System Administrator

The Records System Administrator is responsible for assisting in the design of the Project Records Index with the Project Secretary based on guidance from the Project Manager, and is responsible for the production and maintenance of the Project Records Index, and for storage and control of project QA records files and duplicate files.

7. EQUIPMENT OR MATERIALS

Access-controlled, locking, fire resistant cabinets, access-controlled locking facilities with metal cabinets, and appropriate filing accessories are required to meet the records storage requirements of this procedure.

8. PROCEDURE

8.1 Project QA Records

8.1.1 Project Records Index

At the beginning of each project, a Project Records Index shall be designed which provides the basic structure of the project filing system. The first Index produced identifies the types of records anticipated for the project and assigns a location in the filing system for each type. As the project progresses, the Index is updated to include more and more specific information. The Index shall be designed in a cooperative effort by the Project Secretary and the Records System Administrator. The Project Manager shall provide guidance in the design of the Index based on the project structure and his division of the project activities into job tasks.

As a minimum, the Project Records Index shall include:

- The Golder job number
- The client contract number
- The project title
- A numerical listing of the files
- The title of the file associated with each number. The title shall be specific enough to allow easy retrieval and filing of records.

The Records System Administrator shall produce the Index and update it on a regular basis. The Project Secretary shall provide the Records System Administrator with the information necessary to accurately update the Index. The Records System Administrator shall concur with changes or additions to the Index.

8.1.2 Collection and Validation

Project personnel who generate documents in support of a project shall submit the completed documents to the Project Secretary.

The Project Secretary shall review each document to ensure that it is complete as required by the appropriate QA Procedure, legible, identified with the project number, and contains sufficient information to permit identification between the document and the activity to which it applies. If problems are identified, the document may be returned to the preparer for resolution. The Project Secretary shall also assign a file number to the document based on the Project Records Index. The Project Secretary shall validate each document by

applying a dated records stamp, or by initialing and dating the document. Validated documents shall be forwarded to the Records System Administrator for duplication and filing. At the Project Manager's option, duplication may be performed by support staff. Completed documents awaiting validation and/or entry into the project QA records shall be temporarily stored during non-working hours in a fire-resistant, locking file cabinet, or locking, access-controlled fire-resistant file room.

8.1.3 Duplicate Files

The Records System Administrator shall ensure that a duplicate of each project QA record submitted for filing is produced and properly stored. Duplicate file organization shall be identical to the organization of the original records files. Duplicates shall be stored in binders or folders, in filing cabinets or in containers on shelving. Duplicates shall be stored at a facility which has limited access and is sufficiently removed from the original records to avoid damage or destruction of both sets of files from the same hazardous condition. Normally, duplicates are stored at the Archives Facility. However, when acceptable to the QA Manager and the affected Project Manager, another location may be used provided that the other requirements of this section are met.

8.1.4 Storage Requirements

Project QA records are normally stored in the QA File Center by the Records System Administrator. However, when acceptable to the QA Manager and the Project Manager, records may be stored in another location which has access controls commensurate with those described in paragraph 8.1.5 of this procedure. In either case, records shall be stored in a manner which effectively prevents deterioration or damage from natural disasters or environmental conditions. Records shall be stored in binders, folders, or envelopes in metal cabinets or on shelving in containers. Records files shall be organized separately by project and in accordance with the individual project records index. Special processed records, such as photographs, negatives, and magnetic media shall not be stored in stacks and shall be protected from excessive light, electromagnetic fields, and excessive temperatures and humidity as appropriate for the record type.

8.1.5 QA File Center Access

Access to the QA File Center is limited. The Records System Administrator, with the concurrence of the QA Manager, shall compile a list of personnel allowed direct access to the QA File Center. At least one representative from each project for which records are filed in the Center shall be included on the list. The Project Manager shall designate the project representative. The list shall be posted outside the File Center. All others may gain access only when escorted by an authorized individual, or by permission of the Records System Administrator. The QA File Center shall remain locked when unattended.

8.1.6 Records Retrieval

Individuals may request that files or individual records be retrieved for their use. Requests should be directed to the Records System Administrator. However, any authorized individual (see paragraph 8.1.5) may retrieve records. A formal checkout system shall be used which includes, as a minimum, an outcard to replace the item removed.

8.1.7 Corrections and Revisions

Revisions to records shall be done in accordance with the appropriate QA procedures when applicable. Other corrections shall be made by drawing a single line through the incorrect information and initialing and dating the new entry. Approval of the correction or revision must be equivalent to the level and/or type of approval required for the original information, or as directed by Specific Work Instruction. All corrections and revisions to records checked out of the records files must be brought to the attention of the Records System Administrator to permit appropriate revision of the duplicate files.

8.1.8 Retention Time

All project QA records are considered permanent until turned over to the client or until the close of the contract. After that time, the Project Manager shall determine the disposition of the remaining records unless special direction is provided by the client. Normally, they shall be entered into the Golder archives system.

8.1.9 Records Turnover

Records shall be turned over to the client at their request. Unless otherwise requested by the client, the originals shall be shipped and the duplicates shall remain the property of Golder Associates. Records which have been turned over are the property of the client and maintenance of those records will no longer be considered the responsibility of Golder Associates.

Records to be turned over to the client shall be packaged securely for shipping. Each package of records shall contain an index of the records in that package and shall be clearly labeled as to client, project number, and total number of packages in the shipment. A set of indexes shall be sent to the client under separate cover. Additional requirements may be specified by the client.

8.1.10 Contract Closeout

The date of contract closeout shall be identified by the Project Manager. After this date, records remaining in Golder's possession are no longer subject to the requirements of this procedure. If no records turnover has been requested, and both the duplicate and the original sets remain, the duplicate set may be discarded.

8.2 Corporate QA Records

8.2.1 Corporate Records Index

The Corporate Records Index shall list and provide the location of the records in the corporate QA records files. The QA Manager shall ensure that the index is updated as necessary to reflect changes.

8.2.2 Storage Requirements

Corporate QA records are stored in a locking, fire resistant file cabinet.

8.2.3 Corporate QA Records Access

Access to corporate QA records is by permission of the QA Manager or his designee. A list of personnel allowed access to the files shall be posted on the cabinet.

8.2.4 Retention Time

The following records, as a minimum, shall be retained in the corporate QA files:

- Correspondence from both the current and previous year
- Personnel records for current Golder employees and current subcontractors
- Current revision of each procedure and each QA Plan.

Other records may be transferred to the Golder Archives at the discretion of the QA Manager. Transferred records are no longer subject to the requirements of this procedure. The current contents of the corporate QA files shall be clearly identified on the Corporate Records Index.

CONTROLLED DOCUME

Golder Associates
CONSULTING GEOTECHNICAL AND MINING ENGINEERS

TITLE P-18.0-1 QUALITY ASSURANCE AUDITS			EFFECTIVE DATE	REV. LEVEL
PREPARED BY	APPROVED	APPROVED		
3/24/88	3/24/88	3-31-88	3/31/88	12

RECORD OF REVISION

Revision Level	Page Number	Section Number	Revision P-18.0-1
12	4	8.1	Clarified audit schedule review requirements
12	6	8.6	Added statement re: notification of situations requiring immediate CA
12	6	8.8	Clarified audit report content requirements
12	8	9.0	Clarified audit record requirements
12	Throughout		Changed "Corporate QA Officer" to "QA Manager"

1. PURPOSE

The purpose of this procedure is to establish methodology and general guidance for Quality Assurance (QA) audits performed by Golder Associates personnel.

2. APPLICABILITY

This procedure applies to all Golder Associates QA audits of internal and subcontracted project activities.

3. DEFINITIONS

3.1 Quality Assurance Audit

A planned and documented investigation performed in accordance with written procedures or checklists for the purposes of verification, by examination and evaluation of objective evidence, that applicable elements of a Quality Assurance program have been developed, documented, and effectively implemented in accordance with specified requirements.

3.2 Lead Auditor

A qualified, and certified individual authorized to organize and direct audits, report findings, and evaluate corrective action. Lead Auditors shall be trained, qualified and certified as required by procedure P-18.0-2, "Auditor Qualification."

3.3 Auditor

A qualified and trained individual authorized to perform audit functions under the direction of a Lead Auditor. Auditors shall be qualified and trained as required by procedure P-18.0-2, "Auditor Qualification."

3.4 Technical Observer

An audit team member assigned to observe audit activities under the direction of the Lead Auditor. At the Lead Auditor's discretion, technical observers may be requested to participate in areas of an audit for which they have particular technical expertise.

3.5 External Audit

An audit of the QA program of a subcontractor, supplier, consultant, or other external organization.

3.6 Internal Audit

An audit of those portions of a Quality Assurance program controlled by and within Golder Associates' own organizational structure.

3.7 Finding

A deficiency or lack of compliance with any element of the QA program which renders the quality of items, services, or activities unacceptable or indeterminate. All findings must be formally resolved to assure effective correction of the observed condition and the adoption of preventive measures to reduce or preclude the likelihood of recurrence.

3.8 Observation

A weakness in a program or practice that could lead to a more serious deficiency or finding if not corrected. Although not necessarily constituting a lack of compliance or affecting quality, all observations must be formally resolved to assure effective correction of the observed condition and the adoption of preventive measures to reduce or preclude the likelihood of recurrence.

3.9 Management Assessment

An independent, annual assessment of the overall effectiveness of the QA program by a representative of Golder Associates upper management familiar with the scope of contractual QA requirements and Golder Associates' QA program. The assessment is documented by means of a report that is presented to the President of Golder Associates, the Principal-in-Charge, and the QA Manager.

4. REFERENCES

4.1 Golder Associates Quality Assurance Manual, Section 18.0, "Quality Audits."

4.2 Golder Associates Quality Assurance Procedure P-18.0-2, "Auditor Qualification."

4.3 10 CFR 50, Appendix B, Section XVIII, as interpreted by ANSI/ASME NQA-1.

5. DISCUSSION

QA audits are performed periodically on internal or subcontracted project activities to verify project performance relative to established quality requirements and to provide management information on the effectiveness of project QA programs. Auditing is a positive activity, which has as its

ultimate goal the improvement or enhancement of project performance. QA audits are independent, formal processes with strict rules of conduct and protocol designed to assure the impartiality and usefulness of the results. Auditor and technical observer selection is based on experience, training, and functional independence from the organization or group being audited. The activities of auditors and observers are directed by a trained and qualified Lead Auditor who has primary responsibility for audit planning, conduct, reporting of results, and monitoring the effectiveness of corrective action. The effectiveness of the auditing program itself is evaluated by an annual independent management assessment.

6. RESPONSIBILITIES

6.1 QA Manager

Responsible for establishing audit schedules in project-specific QA Program Plans. Responsible for selection of Lead Auditors who are functionally independent from audited organizations. In conjunction with the Lead Auditor, reviews and approves audit plans and reports prior to release. Responsible for preparation of an annual report to management on the previous year's audit activity.

6.2 Lead Auditor

Responsible for the organization and direction of audits; selection and supervision of auditors and technical observers functionally independent from the organization or group being audited; and the evaluation of observations and findings. In conjunction with the QA Manager, reviews and approves audit plans and reports prior to release. Presents audit results to project management and evaluates corrective action responses.

6.3 Auditor

Under the direction of the Lead Auditor, responsible for assisting in audit preparation, conduct, and report preparations.

6.4 Technical Observer

At the direction of the Lead Auditor, responsible for assisting in audit preparation and conduct in selected audit areas.

6.5 Audited Organization

Responsible for the provision of time, workspace, and availability of personnel as necessary to support the performance of the audit. Responsible for the effective resolution of audit findings and observations.

7. REQUIRED MATERIALS OR DOCUMENTS

- Notification letter or memorandum
- Audit plan
- Pre- and post-audit attendance sheets
- Audit checklists (see Exhibit A)
- Reference plans or procedures
- Audit Quality Notices (see Exhibit B)

8. PROCEDURE

8.1 Audit Scheduling

QA audits shall be conducted in accordance with schedules contained within individual Project Specific QA Program Plans. Audit frequency shall be based on the scope, level of activity, and complexity of the project as well as the number of personnel assigned, specific client requirements, and other factors. Schedules presented in each QA Program Plan shall be considered minimum requirements, and shall be periodically reviewed and revised to accommodate changing project requirements. Audit frequency may be increased at the discretion of the QA Manager or when requested by management.

8.2 Audit Plan Preparation

The Lead Auditor shall be responsible for preparation of an audit plan. The audit plan shall be approved by both the Lead Auditor and QA Manager, and shall include the following:

- The source of the requirement for conducting the audit
- The audit number (consecutive on a calendar year basis)
- Identification of the audited organization
- The specific project, tasks or activities being audited
- A discussion of any special emphasis or focus
- Specific plan, procedures, or requirement references
- The prospective date(s) of the audit

- Identification of the audit team, with definition of audit responsibilities.

Audit team selection shall be based on team member independence from the organization being audited. Technical observers may be selected if, in the opinion of the Lead Auditor, a particular type of expertise would enhance audit effectiveness. Audit files and nonconformance records for the audited organization shall be reviewed for trends or repetitive problems. Existence of such conditions shall prompt the re-examination of problem areas.

8.3 Audit Notification

The Lead Auditor shall transmit a memo or letter of notification transmitting the audit plan to the prospective auditee at least two weeks prior to the projected audit date. The notification letter or memo shall set the date, time, and location of the opening meeting, request that appropriate personnel from the audited organization be in attendance, and, for external audits, request separate working space for the audit team to work in during the course of the audit.

8.4 Audit Checklist Preparation

Lead Auditors shall be responsible for directing the preparation of the audit checklist. Checklist format is provided as Exhibit A. Auditors or technical observers may be assigned the preparation of checklist sections, particularly in areas for which they will assume auditing responsibilities. The checklist shall be reviewed and approved by the Lead Auditor and the QA Manager. Approval shall be indicated by signature and date on sheet of the checklist.

Checklist content shall be consistent with the scope of the audit presented in the Audit Plan; checklist items shall be structured in question format and shall directly relate to the procedure and plan requirements applicable to the audited area. As much as possible, questions should focus the inquiry towards an evaluation of the effectiveness of implementation of plan and procedure requirements.

Copies of the checklist, the audit plan, and any required reference specifications, procedures, or plans shall be distributed to the audit team prior to the audit. The Lead Auditor shall brief the audit team on the general scope of the audit, the details of the audit plan, and discuss audit checklist assignments prior to the pre-audit meeting.

8.5 Pre-audit Meeting

The preaudit meeting shall be conducted by the Lead Auditor and shall be attended by the audit team and appropriate representatives of the audited organization. Attendance shall be documented. The scope of the audit and duties of the auditors or any technical observers shall be briefly presented.

Questions from the audited organization shall be answered, proper lines of communication established, and a time set for the closeout meeting.

8.6 Conducting the Audit Investigation

Each auditor should proceed with the investigations required on their assigned portion of the checklist. Auditing techniques should include records review, interviews with project staff, and direct observation of project activities. Personnel interviewed shall be noted in the response column on the checklist. When evaluating similar items of information, a sufficiently large sample shall be selected to support any conclusions. The audit team shall meet and report on audit progress at the direction of the Lead Auditor. Observed conditions that require immediate corrective action shall be promptly reported to the management of the audited organization; in any case, daily briefings shall be given to the audited organization at their option. The Lead Auditor may restructure the audit in terms of emphasis and auditor assignment as required to accommodate changes to the audit plan or checklist required as a result of information obtained during the audit. Demand on project resources and time should not be increased beyond the level presented in the opening meeting without first clearing such requests with the management of the audited organization.

8.7 Post-Audit Meeting

When all checklist items have been completed, the audit team shall meet and present their potential findings, or observations to the Lead Auditor. The Lead Auditor shall review the auditors' input, obtain additional clarification where required, and prepare a draft list of potential findings and observations for presentation to representatives of the audited organization in a post-audit meeting. Discussion should be limited to the presentation of findings and observations and the resolution of any errors or misunderstandings. Audited personnel shall be advised that a written report will be forthcoming with full details of any findings or observations. Attendance shall be documented.

8.8 Audit Report Preparation

After the post-audit meeting, the auditors shall prepare final copies of their completed checklist sections and submit them to the Lead Auditor. The Lead Auditor shall document each finding or observation on an Audit Quality Notice (AQN, see Exhibit B) and shall prepare a formal audit report in the form of a memo or letter to the management of the audited organization. The report shall include the following:

- A brief description of the audit scope
- Identification of the audit team and all personnel contacted from the audited organization

- A general statement of effectiveness
- Discussion of all findings, observations, and comments

The audit report shall formally transmit any AQNs, which shall contain sufficient detail to permit effective corrective action responses. All AQNs shall require response by the audited organization regarding its proposed corrective action within fifteen working days after receipt. The report shall be reviewed, approved, and countersigned by the QA Manager prior to transmittal.

8.9 Determination of Cause and Proposed Corrective Action

The audited organization shall respond to the AQNs in the time specified. The deficiency shall be investigated and the cause determined and documented on the AQN; the description of cause must address the basic source of the problem. Proposed corrective action must address the possibility of similar problems outside the audited sample, and, considering the source or cause of the problem, must be capable of implementation at an effective level.

8.10 Review of AQN Responses and Audit Closeout

The Lead Auditor shall evaluate responses from the audited organization to assure that the proposed corrective action for each finding or observation has been adequately addressed. In some cases, corrective action may require reassignment to other groups for the corrective action to be considered effective. (In cases in which corrective action responsibilities lead back to the Lead Auditor's organization, the proposed corrective action on the AQN must be reviewed by an independent management representative familiar with the auditing process to assure the appropriateness of the response. The same management representative must countersign the AQN upon closeout.) The Lead Auditor shall initiate a letter or memorandum to inform the audited organization and the QA Manager of the acceptance or rejection of audit responses. Memoranda indicating acceptance must identify any conditions that must be verified prior to audit closeout. Methods of verification of corrective action may include direct examination, reaudit, interview, or other appropriate means selected by the Lead Auditor. Memoranda indicating rejections must contain sufficient detail to redirect the auditee and establish a new response due date. The Lead Auditor or a designated audit team member shall actively track the resolution of observations or findings until closeout. The Lead Auditor and the QA Manager must concur on the closeout of all findings and observations.

8.11 Management Assessments

An independent management assessment of the overall implementation of QA program requirements on projects requiring QA Program Plans shall be conducted at least once annually to provide upper management independent evaluations of the effectiveness of all elements of the QA program including auditing. Such

assessments may be performed by outside consultants with appropriate expertise or by senior management officials; assessments shall be documented in letter or memo format and forwarded to the President, Principal-in-charge, and QA Manager. The QA Manager shall be responsible for any required corrective action resulting from management assessments.

9. RECORDS

Audit records shall be retained as follows:

- Corporate QA Records: Notification letter or memorandum, pre- and post-audit attendance sheets, audit plan, completed checklist, audit report letter or memorandum, completed and closed AQNs (with any additional related responses from the audited organization attached), and, in a separate file, independent management assessments.
- Project QA Records: Same as above, less completed checklists and management assessment documentation, with transmittal letters if required for informational submittals to the client by the QA Program Plan.

GOLDER ASSOCIATES
QA AUDIT CHECKLIST

Approved by _____ Lead Auditor

_____ Quality Assurance Officer

Approval Date _____

Audit Number _____

Date _____

Audited Organization _____

QUESTION	REFERENCE REQUIREMENT	RESI

EXAMPLE

P-18.0-1
Exhibit B

GOLDER ASSOCIATES, INC.
AUDIT QUALITY NOTICE (AQN)

1. TO:_____

2. ORGANIZATION:_____

3. COMPANY OR PROJECT:_____

4. FROM:_____

5. AQN NUMBER:_____

6. TYPE OF NOTICE:_____

___ FINDING ___ OBSERVATION

7. DESCRIPTION OF REQUIREMENT:_____

8. DISCUSSION OF CONDITION REQUIRING CORRECTIVE ACTION:_____

9. DISCUSSED WITH:_____ DATE:_____

10. AUDITED ORGANIZATION TO COMPLETE THE FOLLOWING ITEMS AND RETURN TO GAI QA BY:_____

11. PROPOSED CORRECTIVE ACTION; LIST FUNDAMENTAL BASIS FOR DEFICIENCY AND ACTION TO BE TAKEN TO PREVENT RECURRENCE:_____

12. COMPLETION SCHEDULED BY:_____
DATE

13. RESPONSIBLE FOR CORRECTIVE ACTION:_____
_____
DATE

CLOSEOUT

14. CLOSED BY:_____
LEAD AUDITOR

DATE CLOSED:_____

15. APPROVED BY:_____
GAI QA MANAGER

DATE APPROVED:_____

Golder Associates
CONSULTING GEOTECHNICAL AND MINING ENGINEERS

CONTROLLED DOCUMENT

TITLE			EFFECTIVE DATE	REV. LEVEL
P-18.0-2 AUDITOR QUALIFICATION				
PREPARED BY	APPROVED	APPROVED		
3/30/88	3/30/88	3-31-88	3/31/88	4

Revision Level	Page Number	Section Number	Revision P-18.0-2
4	Throughout		Changed "Corporate QA Officer" to "QA Manager"
4	3	8.1.2	Clarified qualification lapse definition
4	3	8.1.3	Clarified certification responsibilities if Lead Auditor is also QA Manager
4	4	8.2.2	Clarified preaudit discussion content
4	5	8.3.3	Defined responsibilities for maintenance of audit log
Exhibit A			Added second certification block

1. PURPOSE

This procedure defines the requirements for the qualification, training, and orientation of Golder Associates' Quality Assurance (QA) auditors, lead auditors, and technical observers.

2. APPLICABILITY

This procedure applies to all Golder Associates' QA auditors, lead auditors, and technical observers performing audit functions under the requirements of procedure P-18.0-1, "Quality Assurance Audits."

3. DEFINITIONS

3.1 Quality Assurance Audit

A planned and documented investigation performed in accordance with written procedures or checklists to verify, by examination and evaluation of objective evidence, that applicable elements of a QA program have been developed, documented, and effectively implemented in accordance with specified requirements.

3.2 Lead Auditor

A qualified individual, certified by Golder Associates' management, who is authorized to organize and direct audits, report findings, and evaluate corrective action.

3.3 Auditor

A qualified and trained individual authorized to perform audit functions under the direction of a lead auditor.

3.4 Technical Observer

An audit team member assigned to observe audit activities under the direction of the lead auditor. At the lead auditor's discretion, technical observers may be requested to participate as an auditor in areas of the audit for which they have particular technical expertise.

4. REFERENCES

4.1 ANSI/ASME NQA-1, Basic Requirement 18, Supplement 2S-3, and Appendix 2A-3.

4.2 Golder Associates QA Procedure P-18.0-1, "Audits."

5. DISCUSSION

All QA audit functions shall be performed by qualified lead auditors, auditors, or technical observers who are independent from direct responsibility for the activities being audited. Qualification of auditors and technical observers shall be based on appropriate work experience and on audit-specific training and guidance provided by the lead auditor. Lead auditors shall be experienced in the auditing process, and, by virtue of passing a comprehensive examination, shall have demonstrated knowledge of 10 CFR 50 Appendix B, ANSI/ASME NQA-1, general requirements of QA programs, evaluative auditing techniques, and audit planning and execution.

6. RESPONSIBILITIES

6.1 Lead Auditor

Responsible for selection of the audit team; trains newly assigned auditors or technical observers in the requirements of procedure P-18.0-1 and provides general background in the provisions of 10 CFR 50 Appendix B, ANSI/ASME NQA-1, and Golder Associates QA program. Responsible for providing direction to the audit team in the requirements of individually assigned checklist sections and any referenced plans or procedures.

6.2 QA Manager

Responsible for the certification of lead auditors in conjunction with the Office Manager.

6.3 Office Manager

Responsible for the certification of lead auditors in conjunction with the QA Manager.

7. MATERIALS

- Lead Auditor Qualification Record (Exhibit A)

8. PROCEDURE

8.1 Lead Auditor Qualification Requirements

8.1.1 Basic Requirements

Lead auditors shall possess the oral and verbal communication skills necessary to effectively conduct an audit. By written examination, they shall have demonstrated their knowledge of the applicable regulatory guidelines and standards, the general requirements of QA programs, appropriate auditing techniques, and the methods of audit planning. Lead auditors shall have participated in at least five (5) previous audits in the three years prior to certification, one of which, in the last year prior to certification, shall have been conducted on a program for which 10 CFR 50 Appendix B was a regulatory requirement. Lead auditors shall have additional technical and/or QA related experience totalling at least ten (10) points as required by the Lead Auditor Qualification Record (Exhibit A). Qualification points shall be assigned in accordance with the guidelines provided in paragraphs 2.1, 2.2, 2.3, and 2.4 of Appendix 2A-3, ANSI/ASME NQA-1.

8.1.2 Maintenance of Qualification and Requalification

Lead auditor performance shall be assessed on an annual basis to assure continued facility with the auditing process and P-18.0-1 requirements. Qualification may be maintained by continued active work assignment within the QA organization, participation in an audit training program, or by active participation in the audit process. In any case, in order to maintain qualification, at least once every two years a lead auditor must lead or participate in an audit conducted in accordance with procedure P-18.0-1. If qualification should lapse, the QA Manager and the Office Manager shall assess the circumstances requiring requalification. Retraining may be required if warranted, but in all cases the candidate shall be re-examined as described in 8.1.1 above, and shall participate in at least one nuclear level audit under the direction of a certified lead auditor.

8.1.3 Certification

The branch Office Manager and QA Manager will certify individuals as lead auditors when the basic qualification requirements are met as defined in 8.1.1 above, except that if the QA Manager is also the candidate for certification, the Office Manager alone shall certify. Lead auditors will be recertified on an annual basis provided that the maintenance requirements defined in 8.1.2 are met and documented. Lead auditors whose qualifications have lapsed will be recertified only when the requalification requirements described in 8.1.2 have been completed.

8.2 Auditor and Technical Observer Qualification Requirements

8.2.1 Experience Requirements

Auditors shall have at least 2 years geotechnical, nuclear industry, or QA background; auditors and technical observers shall have at least six months' experience working under Golder Associates' (or similar) QA program. Technical observers assigned audit duties shall have expertise in the assigned area as documented by corporate resume. In exceptional circumstances (for example, a situation in which a potential observer or auditor has a particularly useful technical expertise but is an independent consultant or has just recently joined the company), experience requirements for a particular individual may be waived by the lead auditor for a particular audit; written justification shall be retained on file, however, and the training and orientation required by 8.2.2 given additional emphasis.

8.2.2 Qualification of Auditors and Technical Observers

Auditors and technical observers shall participate in a preaudit orientation meeting led by the lead auditor. In addition to discussing the detailed scope of the audit to be performed, the lead auditor shall provide newly assigned auditors and observers instruction in the provisions of 10 CFR 50 Appendix B, ANSI/ASME NQA-1, proper auditing technique, and the provisions of Golder Associates' QA procedure P-18.0-1, "Audits." Regardless of previous experience, all auditors or observers shall be briefed in the requirements of their assigned checklist sections and in the provisions of any referenced plans or procedures.

8.3 Qualification Documentation Requirements

8.3.1 Lead Auditor Qualification Documentation

If performed internally, lead auditor examinations shall be retained in confidential personnel files. Successful examination completion, assessment of communications skills, experience, credentials, certification, and annual evaluation shall be documented on the Lead Auditor Qualification Record (Exhibit A) and retained in corporate QA personnel files. Qualification points shall be assigned for experience as discussed in paragraphs 2.1, 2.2, 2.3, and 2.4 of Appendix 2A-3, ANSI/ASME NQA-1. If examinations are performed by outside agencies, copies of course completion certifications and notification of successfully completed examinations shall also be retained in corporate QA personnel files.

8.3.2 Auditor and Technical Observer Training Records

Auditor and technical observer training and orientation as required by section 8.2.2 above shall be documented on a standard QA training record (see Exhibit A, P-2.0-1, "Personnel Training"); training records shall be reviewed and approved by the Corporate QA Officer.

8.3.3 Audit Participation Records

Records of audit participation by all lead auditors, auditors, and technical observers shall be documented by the audit log and summary maintained in corporate QA records. The log shall be updated at least quarterly by the Lead Auditor or designated QA personnel, and copies routed to the individual corporate QA personnel records for the auditors and observers so identified.

8.3.4 Records of Technical Experience

Corporate resumes documenting the general technical experience and background of all lead auditors, auditors, and technical observers shall be retained in corporate QA personnel records.

LEAD AUDITOR QUALIFICATION RECORD

Golder Associates

Auditor	Date	
QUALIFICATION POINT REQUIREMENTS		CREDITS
Education-University/Degree Date	4 Credits Max.	
1. Undergraduate Level 2. Graduate Level		
Experience-Company/Dates	9 Credits Max.	
Technical (0-5 credits), and Nuclear Industry (0-1 credit), or Quality Assurance (0-2 credits), or Auditing (0-4 credits)		
Other Credentials	2 Credits Max.	
1. 2.		
Rights of Management	2 Credits Max.	
Justification: Evaluated by: (Name and Title)	Date	
	Total Credits	

AUDIT COMMUNICATION SKILLS

Evaluated by: (Name and Title) Date

AUDIT TRAINING COURSES

Description:
1.
2.

AUDIT PARTICIPATION, INITIAL QUALIFICATION*

Location	Audit	Date
1.		
2.		
3.		
4.		
5.		

EXAMINATION BY: PASSED EXAMINATION ON (Date):

AUDITOR QUALIFICATION CERTIFIED BY: (Signature and Title)	Date Certified
AUDITOR QUALIFICATION CERTIFIED BY: (Signature and Title)	Date Certified

ANNUAL EVALUATION (Signature and Date)					

*Status reports updated and attached annually

873-1313-063/9100

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Date Clearance Required: 5-14-92

Title: Quality Assurance Program Plan, RMW Land Disposal Facility-Non-Drag-Off

Lead Author Name	Impact Level	Phone	MSIN	Other Author(s) Name(s)
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Editor Name	Phone	DOE/HQ Assistant Secretary For:
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Cognizant Line Management

Author: [signature] For EG ERPENBECK — Date 4/20/92

Peer Review: N/A — Date

Cognizant Manager: [signature] — Date 4/20/92

Auth. Derivative Classifier: [signature] — Date 4-20-92

	Yes	No
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Classified	☐	☒
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State of Washington
Department of Ecology
Mail Stop PV-11
Olympia, Washington 98504-8711

AUG 0 0 1991
CORRESPONDENCE CONTROL

Dear Messrs. Day and Nord:

LOW-LEVEL BURIAL GROUNDS PART B PERMIT APPLICATION (TSD: D-2-9)

This letter transmits a Notice of Deficiency (NOD) response table addressing the 171 NOD comments received from the State of Washington Department of Ecology (Ecology) pertaining to the Low-level Burial Grounds Part B Permit Application. This transmittal fulfills Ecology's request that a NOD response table be submitted on or before July 26, 1991.

If you have any questions regarding the enclosed NOD response table, please contact Mr. C. E. Clark of the DOE Field Office, Richland, on (509) 376-9333, or Ms. C. J. Geier of the Westinghouse Hanford Company on (509) 376-2237.

Sincerely,

for

E. A. Bracken, Director
Environmental Restoration Division
DOE Field Office, Richland

ERD:CEC

R. E. Lerch, Manager
Environmental Division
Westinghouse Hanford Company

Enclosure:
NOD Response Table

cc w/o encl.:
R. E. Lerch, WHC

AUG 1991
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LOW-LEVEL BURIAL GROUNDS
NOTICE-OF-DEFICIENCY RESPONSE TABLE

No.	Comment/Response	Ecology Concurrence
1.	Chapter 2.0 (2-1). In several sections of Chapter 2.0 (page 2-14, Table 2-1, and page 2-21) it is documented that mixed waste is currently being disposed of in unlined trenches at the (Low-Level Burial Grounds (LLBG). On page 2-21, it is stated that this disposal is allowed under the existing portion exemption. There is no reference, within the document, that the Applicant has applied for or received from Washington State Department of Ecology (Ecology) an existing portion exemption in accordance with Washington Administrative Code (WAC) 173-303-665(2)(b). Ecology Recommendation. The Applicant should submit with this permit application all information in support of it's request for an exemption for mixed wastes currently being disposed of in unlined trenches. **DOE-RL/WHC Response: It is our understanding from the reading of the Environmental Protection Agency (EPA) regulations [40 CFR 264.301(a)] and Ecology regulations [WAC 173-303-806(4)(h)(ii)(A)] that the existing portion is exempt from liner leachate requirements by regulation; therefore, no application for exemption in accordance with WAC 173-303-665(2)(b) is required. Mixed waste is disposed in the existing portion of the trenches based on criteria described in Section 4.6.2.1 and after notifying Ecology.**	4-26-91
2.	Page 2-14 (2-2). It is noted in the first paragraph that the permit application will not be revised to include all changes to the volume forecasts. Ecology Recommendation. In accordance with WAC 173-303-830(3)(a)(i), any modifications in the projected volume of waste should be noted in a revised permit application and submitted to Ecology. **DOE-RL/WHC Response: As stated in the text, the annual waste forecast was used for the preparation of Table 2-1. The forecast is for a period of 30 years and is necessarily only a rough estimate in the later years. Any waste receipts greater than the amounts forecasted in the Part A of the permit application would of course result in a revision to the permit. The paragraph will be rewritten to clarify why Table 2-1 will not be revised.**	4-26-91

No.	Comment/Response	Ecology Concurrence
3.	Page 2-14, Section 2.1.2.2.1 (2-3). In the third paragraph, mention is made of drag-off boxes being transported to a trench by a flatbed railroad and remotely skidded off into the trench. Ecology Recommendation. It is not clear if the boxes are arranged after they are remotely skidded into the trench. Detailed procedures should be provided. **DOE-RL/WHC Response: Text will be added discussing that the waste is covered with soil as soon as it is placed and a description of procedures will be provided.**	4-26-91
4.	Page 2-23, lines 10 and 11 (2-4). Section 2.5.1 states "The LLBG are located in a semiarid climate with an average annual rainfall of about 6.3 inches." There is no cite given for this conclusion. Ecology Recommendation. Include the reference cite for this conclusion. **DOE-RL/WHC Response: Reference to Pacific Northwest Laboratory (PNL) PNL-4622, Climatological Summary for the Hanford Area, Washington State, Stone et. al., June 1983 will be added to the text.**	4-26-91
5.	Page 2-57 (2-5). Section 2.7.2.3 states that due to the remote location of the LLBG that discharges occurring on property not owned by the U.S. Government are unlikely and, therefore, a description of the actions to restore the impacted area is not required. There is no cite given for this conclusion. Ecology Recommendation. Include the reference cite for this conclusion. **DOE-RL/WHC Response No. 1: Reference to the site map, which shows the LLBG location well within the site boundaries, will be added.** Ecology Response No. 1 Comment: Section 2.7, Spills and Discharges, Page 2-57 Edit Section 2.7.2.3 to read "actions taken to restore an off-site impacted area and to replenish off-site resources is not required".	

No.	Comment/Response	Ecology Concurrence
	DOE-RL/WHC Response No. 2: The last sentence of 2.7.3.3 will be revised to read "Therefore a description of the actions taken to restore an offsite impacted area and to replenish offsite resources is not required."	
6.	Page 3-1, lines 11 through 13 (3-1). This section states, inter alia, that, "The generators are responsible for identifying and providing waste designations in accordance with WAC 173-303 (Ecology 1989)." A complete cite is required when referencing any statutes or regulations. Ecology Recommendation. Include the complete cite (i.e., WAC 173-303-070). **DOE-RL/WHC Response: A complete cite to WAC 173-303-070(1)(b) will be included in the text.**	4-26-91
7.	Page 3-2, lines 10 through 12 (3-2). Section 3-1 discusses mixed wastes and states that "such waste also is categorized as toxic ... under WAC 173-303 (Ecology 1989)." A complete cite is required. Ecology Recommendation. Include the complete cite (i.e., WAC 173-303-070). **DOE-RL/WHC Response No. 1: A complete cite to WAC 173-303-070 will be included in the text.** Deficiency: Section 3.1, Chem, Bio and Physical Analysis, Page 3-2 Although the correct reference has been provided in the response, the Extraction Procedure Toxicity test is no longer accepted. Requirement: All references to future toxicity testing must reference the Toxicity Characteristic Leaching Procedure (TCLP). WAC 173-303-090(8) (October 16, 1990) **DOE-RL/WHC Response No. 2: The text will be revised to remove Extraction Procedure requirements and insert Toxicity Characteristic Leaching Procedure in its place.**	

No.	Comment/Response	Ecology Concurrence
8.	Page 3-3, line 20 (3-3). Section 3.1.1.3 states that "small quantities" of mercury are disposed at the Hanford Site. Ecology Recommendation. The term "small quantities" should be refined (e.g., less than 5 pounds per year). **DOE-RL/WHC Response: The term "small quantities" will be refined to read 'less than 10 pounds per year.'**	4-26-91
9.	Page 3-4, lines 35 through 37 (3-4). Section 3.1.3 states that operation of the LLBG does not involve storage of waste in tank systems and, therefore, the requirements of "this section" are not applicable to the LLBG. It is unclear what "section" is referenced. Ecology Recommendation. Explain which "section" and its requirements that are not applicable to the LLBG. **DOE-RL/WHC Response: The text will be changed to "... the requirements of WAC-173-303-640 are not applicable to...".**	4-26-91
10.	Page 3-4, lines 42 and 43 (3-5). Section 3.1.4 states that operation of the LLBG does not involve the placement of waste in piles and, therefore, the requirements of "this section" are not applicable to the LLBG. It is unclear what "section" is referenced. Ecology Recommendation. Explain which "section" and its requirements that are not applicable to the LLBG. **DOE-RL/WHC Response: The text will be changed to "... the requirements of WAC 173-303-660 are not applicable to...".**	4-26-91

No.	Comment/Response	Ecology Concurrence
11.	Page 3-5, lines 8 through 10 (3-6). Section 3.1.6 states that operation of the LLBG does not involve the incineration of waste and waste used in performance tests and, therefore, the requirements of "this section" are not applicable to the LLBG." Ecology Recommendation. Explain which "section" and its requirements that are not applicable to the LLBG. **DOE-RL/WHC Response: The text will be changed to "...the requirements of WAC 173-303-807 are not applicable to...".**	4-26-91
12.	Page 3-5, lines 15-16 (3-7). Section 3.1.7 states that operation of the LLBG does not involve the land treatment of waste and, therefore, the requirements of "this section" are not applicable to the LLBG. It is unclear what "section" is referenced. Ecology Recommendation. Explain which "section" and its requirements that are not applicable to the LLBG. **DOE-RL/WHC Response: The text will be changed to read "... the requirements of WAC 173-303-655 are not applicable to...".**	4-26-91
13.	Page 3-5, lines 39 through 41 (3-8). Section 3.2 states that "...the waste must be completely and accurately characterized in accordance with Ecology regulations before approval for storage or disposal is granted." No cite for the referenced regulations is given. Ecology Recommendation. Include the complete cite for the referenced regulations. **DOE-RL/WHC Response: "...Ecology regulations..." will be changed to "...WAC 173-303-070...".**	4-26-91

No.	Comment/Response	Ecology Concurrence
14.	Page 4-3, Section 4.1.2.1 (4-1). It is noted that testing for free liquids is not performed because testing would increase the potential for radiation exposure of personnel. Ecology Recommendation. The reason for not testing for liquids seems reasonable. However, there is no means of verifying whether or not free liquids actually exist in a particular waste. Alternative methods to test for free liquids should be explored and discussed here. **DOE-RL/WHC Response No. 1: Text will be revised.** Comment: Section 4.1.2.1, Test for Free Liquids, Page 4-3 The alternate methods of testing for free liquids should be presented in the next NOD Response Table. This discussion must also justify the equivalency of any alternate method to the Paint Filter Method. **DOE-RL/WHC Response No. 2: The proposed alternative method for determining the presence of free liquids is real time radiography. This is the approved method for determining the presence of free liquids in transuranic waste to be shipped to the WIPP site, and has been proven very effective in locating small quantities of free liquids where lead shielding isn't used. This will be done in accordance with a sampling plan to be developed in support of the Hanford Facility Dangerous Waste Permit Application.**	
15.	Page 4-4, Section 4.6.1 (4-2). Appendix 4B indicates the waste type, age, and status of the trenches in the 200 West and 200 East Areas burial grounds. Based on information presented in Appendix 4B tables, some trenches are presently accepting mixed waste. Ecology Recommendation. The Applicant should identify the specific areas of the existing unlined trenches in the LLBG that have received these mixed wastes, identify the mixed waste characteristics, and present a plan for dealing with these mixed wastes. **DOE-RL/WHC Response No. 1: Trenches receiving mixed waste are existing portion trenches which are exempt from liner and leachate collection requirements [WAC 173-303-806(4)(h)(ii)(A)]. A listing of the mixed waste placed since November 23, 1987, will be added to the text. The plan for dealing with these wastes is the same as for other remote-handled waste. The waste will be covered with 8 feet of soil and will receive a RCRA compliant cover upon closure as described in Chapter 11.0.**	4-26-91

No.	Comment/Response	Ecology Concurrence

Comment: Section 4.6.1, List of Wastes, Page 4-4

Concurrence with this response will be based upon the additional information to be submitted. This information should be provided as soon as possible to facilitate our evaluation. In addition, the trench locations where liquids have disposed must also be identified.

DOE-RL/WHC Response No. 2: Trenches receiving mixed waste and trenches containing liquid waste will be identified to Ecology, and in the list of waste. This information already is listed in Appendix 4A.

16. Page 4-5, Section 4.6.2.1 (4-3). A request for an exemption for mixed wastes (specifically categorized as remote-handled waste) placed in unlined trenches subsequent to November 23, 1987, is reported here. The Applicant states that this element of the radioactive mixed waste management strategy was summarized in Applicant's January 26, 1988, letter to Ecology.

Ecology Recommendation. The Applicant should identify the specific areas of the existing unlined trenches in the LLBG that have received these mixed wastes, identify the mixed waste characteristics, and present a plan for dealing with these mixed wastes.

DOE-RL/WHC Response No. 1: Trenches receiving mixed waste are existing portion trenches which are exempt from liner and leachate collection requirements [WAC 173-303-806(4)(h)(ii)(A)]. A listing of the mixed waste placed since November 23, 1987, will be added to the text. The plan for dealing with these wastes is the same as for other remote-handled waste. The waste will be covered with 8 feet of soil and will receive a RCRA compliant cover upon closure as described in Chapter 11.0.

Deficiency: Section 4.6.2.1, Exemption Based on Existing, Pg 4-5

Although trenches which were operational and received mixed waste prior to November 23, 1987 are exempt from the double-liner requirements of HSWA, the portion of these trenches which did not receive wastes must still meet the single liner with leachate collection system required prior to HSWA.

No.	Comment/Response	Ecology Concurrence
	Requirement: The additional information to be provided should also specify what portions of each trench did not contain wastes on November 23, 1987. In addition, the term "notification of" on line 21 must be replaced with "approval from." **DOE-RL/WHC Response No. 2: There is no question that the mixed waste is subject to the Hazardous and Solid Waste Amendments (HSWA); however, HSWA did not change the definition of the existing portion of a landfill. Mixed waste has been accepted, with prior notification of Ecology by DOE, in the open trenches beyond that which was there on November 23, 1987; therefore, the definition of the existing portion of the landfill has had implicit concurrence by Ecology.**	
17.	Page 4-5, lines 26 through 33 (4-4). The Applicant states that a liner system exemption request for trench 94 in burial ground 218-W-12B will be submitted in a separate submittal. Ecology Recommendation. It is recommended that the Applicant submit the application for exemption in accordance with WAC 173-303-665(2)(b) with sufficient information demonstrating equivalent protection for the hazardous wastes to be included in the reactor compartments. **DOE-RL/WHC Response: An application for exemption in accordance with WAC 173-303-665(2)(b) was prepared and submitted to Ecology on July 25, 1990.**	4-26-91
18.	Page 4-12, Section 4.6.3.3.1 (4-5). Placing the asphalt in nondrag-off landfills using heavy machinery will be difficult and if not done with proper care, could damage the underlying liner. Ecology Recommendation. It is recommended that the use of light vehicles be investigated for use over the liner to lay asphalt as a way to avoid heavy loading on the liner during construction. Detailed procedures for ensuring liner and leachate collection system integrity must be developed during final design but should be provided at the conceptual level in the permit application. **DOE-RL/WHC Response No. 1: The construction of an asphalt pad is not included in the definitive design that will be submitted to Ecology for review. The permit application will be revised to agree with the definitive design.**	

No.	Comment/Response	Ecology Concurrence
	Comment: Section 4.6.3.3.1, Liner System Description, Page 4-12 Until the definitive design is complete, Ecology will not issue a dangerous waste permit for the dragoff mixed waste trench. If this trench is not scheduled for design and construction in the near future (within the next 12 months), all references to this trench should be eliminated from the Part A and the Part B applications. A permit modification can be used if and when the dragoff trench becomes a reality. **DOE-RL/WHC Response No. 2: Design and Construction of the dragoff mixed waste trench will not be completed in the next 12 months. The project was replaced with the non-dragoff mixed waste trench. The reference to the dragoff trench will be removed from the Part A and Part B permit application.**	
19.	Page 4-13, lines 5 and 6 (4-6). There is high potential for significant shear when boxes loaded with wastes are pulled into place in the drag-off trenches. The Applicant has proposed to evaluate the effects on the liner by use of a test pad. Ecology Recommendation. As noted by the Applicant, there is a high degree of uncertainty associated with quantifying the shear stresses associated with movement of the drag-off trenches on the liner. Applicant should provide a detailed review of the alternative procedures proposed for testing of the liner damage. **DOE-RL/WHC Response No. 1: The mixed waste trench to be constructed in burial ground 218-W-5 is designed for nondrag-off packages. This section will be revised to address only burial ground 218-W-5.** Deficiency: Section 4.6.3.3.2, Stresses from Equipment, Page 4-13 The response is unclear. If burial ground 218-W-5 is a nondrag-off burial ground, why would it be the only burial ground addressed in a permit section discussing the effects of dragging boxes? Furthermore, the text appears to indicate that the sole purpose of the test pad is to evaluate operational stresses on the liner. The test pad must also be constructed to determine the acceptability of the soil liner construction and design specifications. Section 4.6.5.5.1 discusses some field tests for the liner, but does not indicate whether these tests are for both the dragoff and non-dragoff trenches, nor if these will be performed on a test pad or the installed liner.	

No.	Comment/Response	Ecology Concurrence

Requirement: Please clarify the response and provide more detail for the dragoff test pad if the dragoff trench is to be included in the application (see comment 18).

DOE-RL/WHC Response No. 2: Burial Ground 218-W-5 is a non-dragoff mixed waste trench. The portion of section 4.6.3.3.2 that pertains to the dragoff trench will be removed from the permit. The field test mentioned in section 4.6.5.5.1 applies to the non-dragoff landfill. A test fill (also known as a test pad) will be performed for the admix liner material to document the adequacy of the materials, design, equipment, and construction procedures proposed for the admix liner [see the recently submitted Construction Quality Assurance Plan (WHC-SD-W025-PLN-001), Sections 4.3.2 and 4.4.1]. Furthermore, samples of the liner material will be collected and tested upon delivery and preparation to document that the material properties are within the range stated in the specifications (WHC-S-045, Section 02275). As noted in WHC-SD-W025-FDR-001, section 5.3.3., Page 19 of 197, a two-foot operations layer will be placed over the entire landfill, including the slopes, during construction to protect the liners from equipment damage during operations and to act as an insulating layer.

20. Page 4-14, lines 26 through 29 (4-7). The anchor trenches are intended to hold the liners in place while the liner is extended up the side slopes to the ground surface.

Ecology Recommendation. Details of the anchor trench construction and overlying weight specifications should be provided in the detailed design. The Applicant should provide conceptual information in the permit application sufficient to demonstrate that the anchor trenches will be of adequate design to hold the liners in place during construction and operation periods.

DOE-RL/WHC Response No. 1: The information requested will be provided in the definitive design that will be submitted to Ecology for review. The permit application will be revised to agree with the definitive design.

Comment: Section 4.6.3.4, Liner System Coverage, Page 4-14

This comment will be addressed in a subsequent NOD to be issued for the definitive design document.

No.	Comment/Response	Ecology Concurrence
	DOE-RL/WHC Response No. 2: The anchor trench design is shown on Drawing H-2-131579. Pullout resistance for this system is analyzed in Appendix C.11 of the Design Report and demonstrated to be substantially greater than required.	
21.	Page 4-14, lines 31 through 33 (4-8). The Applicant states that the portion of the liner system on the upper side slopes will be exposed to the weather for several years. Ecology Recommendation. The Applicant has not demonstrated with test data that the integrity of the liner will remain after an extended period of exposure to the elements. Although some liner materials are less effected by exposure than others, Ecology knows of no liner materials which would be unaffected by prolonged exposure over several years. Alternative approaches to limit the period of exposure of a particular liner section, such as covering the liner and phased cell construction, should be evaluated. **DOE-RL/WHC Response No. 1: The liner will be covered with soils to protect it from the environment as described in the definitive design that will be submitted to Ecology for review. The permit application will be revised to agree with the definitive design.** Deficiency: Section 4.6.3.5, Liner Exposure Prevention, Page 4-14 Comment 20 also applies here. **DOE-RL/WHC Response No. 2: The stresses caused by thermal contraction can be seen in the Definitive Design Report WHC-SD-W025-FDR-001, Appendix C.10, Pages 275-279 of 397 and on Page 19 of 397, Sections 5.3.3, 5.4.1. A two foot operations layer will be placed over the entire landfill, including the slopes, during construction to act as an insulating layer and to prevent exposure of the geosynthetics to ultraviolet (UV) radiation, the most serious cause of deterioration. Carbon black will be added to the FML and will prevent deterioration during reasonably expected storage times even if the geomembrane is exposed to UV light. Any deterioration would be identified by conformance testing as described in Section 4.4.1.2 of the CQA Plan.**	

No.	Comment/Response	Ecology Concurrence
22.	Page 4-26, lines 3 through 5 (4-9). Indicates an absence of hydraulic conductivity test data. Ecology Recommendation. Hydraulic conductivity test data would be useful as part of the permit review process. The Applicant should provide the test results. **DOE-RL/WHC Response No. 1: Hydraulic conductivity test data are not required for the definitive design. There are no plans to conduct additional testing as part of this project.** Deficiency: Section 4.6.4.3.4, Hydraulic Conductivity, Page 4-26 Line 4 and 5 indicate that some hydraulic conductivity test results from the unsaturated zone were not available at the time of preparing the permit application. These results should be available now. Requirement: A summary of these test results should be provided in the application. **DOE-RL/WHC Response No. 2: The requested hydraulic conductivity test results have been incorporated into the revised Chapter 4.0.**	
23.	Page 4-31, Section 4.6.4.4.5 (4-10). As part of the preliminary design, there are no provisions for monitoring the potential landfill gas. Ecology Recommendation. Although significant amounts of landfill gas are not expected to be generated in the LLBG, it is possible that radioactive gases, such as tritium, could be produced in the LLBG cells. The Applicant should provide an assessment of the potential for gas production and an evaluation of alternative gas monitoring alternatives. **DOE-RL/WHC Response: Section 4.6.4.4.5 is discussing the potential for gas pressure in the subgrade beneath the liner of the landfill and not generation of gas by the waste placed in the lined trench and above the liner. The discussion as written is correct for the subject of this section as defined by the Ecology permit application outline. Generation of gas by the waste is discussed in Section 11.1.4.3.**	4-26-91

No.	Comment/Response	Ecology Concurrence
24.	Pages 4-34 and 4-35, Section 4.6.5.2 (4-11). According to the testing protocol, separate samples will be subjected to primary leachate, secondary leachate, and radiation levels to provide the total expected design-life dose in a period of about 30 days. Ecology Recommendation. The test protocol as proposed may not be adequate. In order to simulate the cumulative effect of all three forms of contaminants, some of the liner samples should be exposed concurrently to combinations of the strongest leachate form and radiation. Extended period testing should also be considered in parallel with permitting and design activities to increase information available on the basis for liner selection. **DOE-RL/WHC Response: A "Liner/Leachate Compatibility Test Plan" has been submitted to Ecology for review. The proposed leachate and radiation testing protocols are described in more detail in the test plan. The permit application will be revised to agree with the test plan.**	4-26-91
25.	Page 4-36, lines 14 and 15 (4-12). The Applicant refers to "substantial modification" of the conceptual design. Ecology Recommendation. Some additional clarification with regard to the term "substantial modification" is needed. A change in the conceptual design requires a modification of the permit application, per WAC 173-303-610(3)(b). **DOE-RL/WHC Response: The definitive design will be submitted for review and will be the basis for modifying the permit application.**	4-26-91
26.	Page 4-37, Section 4.6.5.3.4 (4-13). The thermal expansion of the liner due to temperature variations will be accommodated by installing the flexible membrane liner with a small amount of slack in the side slopes of the trenches. Ecology Recommendation. Given the extreme temperature variations at the Hanford Site, providing slack might not be sufficient to prevent damage due to thermal stresses and other effects of prolonged exposure. The exposed portion of the liner on the side slope portions of the trenches should be covered with ultra-violet protection material until the side slopes are covered with waste. See comment number 22.	

No.	Comment/Response	Ecology Concurrence
	DOE-RL/WHC Response No. 1: Thermal expansion is described in more detail in the definitive design that will be submitted to Ecology for review. The permit application will be revised to agree with the definitive design.	
	Deficiency: Section 4.6.5.3.4, Thermal Stresses, Page 4-37	
	Comment 20 also applies here.	
	DOE-RL/WHC Response No. 2: The stresses caused by thermal contraction are described in the Definitive Design Report WHC-SD-W025-FDR-001, Page 19 of 397, Section 5.4.1. and in Appendix C.10, Pages 275-279 of 397. This analysis shows that thermal stresses and strains in the FML were well within acceptable limits even when extreme temperature conditions and no slack were assumed. Also, once the operations layer is in place, thermal fluctuations will be relatively minor compared to the extreme conditions assumed for the analysis.	
27.	Page 4-41, Section 4.6.5.5.2 (4-14). Soil liner compatibility test procedures.	4-26-91
	Ecology Recommendation. Similar to the synthetic liner testing protocol, some means of testing the cumulative effects of the contaminant types should be included.	
	DOE-RL/WHC Response: This information will be provided in the Liner/Leachate Compatibility Test Plan. The permit application will be revised to agree with the test plan.	
28.	Page 4-44, Section 4.6.6.1.1 (4-15). The locations of the sumps in the primary system are not specified.	
	Ecology Recommendation. Specify the location of sumps in the primary system.	
	DOE-RL/WHC Response No. 1: The locations of the sumps will be provided in the definitive design documents that will be submitted to Ecology for review. The permit application will be revised to agree with the definitive design.	
	Comment: Section 4.6.6.1.1, Primary System Page 4-44	
	Comment 20 also applies here.	

No.	Comment/Response	Ecology Concurrence
	DOE-RL/WHC Response No. 2: See the Definitive Design Report WHC-SD-W025-FDR-001, Page 29 of 397, Section 6.4.1.1, "Primary System." The sump locations are shown on the design drawings and on Figure 4-7 of the revised Chapter 4.	
29.	Page 4-46, Section 4.6.6.1.2 (4-16). The locations of the sumps in the secondary system are not shown. Ecology Recommendation. Specify the locations of the sumps in the secondary system. DOE-RL/WHC Response No. 1: The locations of the sumps will be provided in the definitive design documents that will be submitted to Ecology for review. The permit application will be revised to agree with the definitive design. Comment: Section 4.6.6.1.2, secondary System, Page 4-46 Comment 20 also applies here. DOE-RL/WHC Responses No. 2: See the Definitive Design Report WHC-SD-W025-FDR-001, Page 30 of 397, Section 6.4.1.2, "Secondary System Pumps." The sump locations are shown on the design drawings and on Figure 4-7 of the revised Chapter 4.	
30.	Page 4-47, Section 4.6.6.5 (4-17). The Applicant cites references to other sources for information on components within the waste stream. Ecology Recommendation. Test results for compatibility of components within the waste stream handling system (pumps, holding tanks, and drain pipes) with radioactive and dangerous wastes should be provided here or appended by reference. DOE-RL/WHC Response No. 1: Items that are replaceable, such as pumps and tanks, will not be subjected to Method 9090 testing. The high-density polyethylene pipe used for drainage and transfer of leachate from the sump area into the aboveground holding tank will be tested. The design attempts to minimize the components that would not be accessible for maintenance.	

No.	Comment/Response	Ecology Concurrence

Comment: Section 4.6.6.5, System Compatibility, Page 4-47

Comment 20 also applies here.

DOE-RL/WHC Responses No. 2: When the 9090 test report is completed, it will be submitted to Ecology and will provide the information applicable to this comment.

31. Pages 4-36 through 4-48, Sections 4.6.5.3.2 and 4.6.6.6.1 (4-18). Both sections discuss the stresses on the liner and geonet from the overlying load.

Ecology Recommendation. The weight of the overlying material on the geonet after the landfill is closed has a tendency to impinge the geonet and impair the function of the geonet resulting in clogging of the drainage layer. Laboratory tests should be performed on a geonet layer sandwiched between flexible membrane liners and geotextile and supplying the weight of the waste and final cover to demonstrate that the geonet will perform in the field. Such tests should include bearing weights of asphalt or other base courses provided as storage flooring overlying the liner system. These test results should be provided for Ecology review. Factors of safety for compression and clogging (particles, mineral deposits, and biological growth) also should be provided for Ecology review.

DOE-RL/WHC Response No. 1: This concern is addressed in the definitive design specifications which will be submitted to Ecology for review. In the specifications, the transmissivity value is specified under normal load of about one-half the ultimate waste cover. Manufacture's test data and results of planned conformance tests will be submitted to Ecology if requested.

Comment: Sections 4.6.5.3.2 and 4.6.6.6.1, Weight of Overlying Material and Stability of Drainage Layers, Pages 4-36 and 4-47

Transmissivity tests should indicate adequate performance (i.e., transmissivity greater than 5×10^{-4} m^2/sec) at 1.5 times the maximum expected load which the geonet will experience. Furthermore, the manufacturer's test data and results must be submitted to Ecology. Comment 20 also applies here.

No.	Comment/Response	Ecology Concurrence
	DOE-RL/WHC Response No. 2: Manufacturer's transmissivity data for the proposed geonet is shown on the attached Figure PN-3000. With respect to performance, we believe that the section tested by Fluid Systems, Inc. is similar to the critical section in the Project W-025 Landfill (operations layer over geocomposite). It can be seen that at loads up to 10,000 psf, the transmissivity of this system exceeds 5×10^{-4} m^2/sec in all cases. Conservatively assuming a unit weight of 110 pcf for materials above the liner, a load of 10,000 psf corresponds to 90 feet of waste and soil cover. This is 2 to 3 times the expected thickness, so the geocomposite has an acceptable margin of capacity. With respect to test data, formal manufacturer's submittals and conformance testing results are required, not only for the geocomposite but for most other materials, as established in the CQA Plan and the Specifications. This information will be made available to Ecology as requested.	

LOW-LEVEL BURIAL GROUNDS
NOTICE-OF-DEFICIENCY RESPONSE TABLE

No.	Comment/Response	Ecology Concurrence

No.	Comment/Response	Ecology Concurrence
32.	Page 5-1, lines 18-21 (5-1). This section states that because a waiver from the groundwater monitoring requirements under WAC 173-303-645 is not requested by this plan, "therefore, the requirements of this section of the Washington Administrative Code are not applicable to the LLBG." This is not correct. This section of the Code (173-303-645) states, inter alia, "(a) Except as provided in (b) of this subsection, the regulations in this section apply to owners and operators of facilities that treat, store, or dispose of dangerous waste in surface impoundments, waste piles, land treatment units, or landfills. The owner or operator must satisfy the requirements of this section for all wastes (or constituents thereof) contained in any such waste management unit at the facility that is a "regulated unit" [as defined in WAC 173-303-040(75)]." Thus, subsection -645 applies although application of specific provisions of this subsection (i.e., those relating to exemption from groundwater monitoring) are not requested. Ecology Recommendation. Rewrite this section to state that WAC 173-303-645 applies and that exemption from this subsection of the code is not requested. **DOE-RL/WHC Response: The sentence "Therefore, the requirements of this section ... are not applicable to the LLBG." will be deleted.**	4-26-91
33.	Page 5-2, lines 25 through 35 (5-2). Section 5.2.1 discusses what the Interim Status Groundwater Monitoring Approach was supposed to do to meet the 1986 compliance order. To what degree these requirements were carried out is not detailed. Ecology Recommendation. Outline to what degree requirements, goals, and objectives were met. **DOE-RL/WHC Response: The text will be expanded to indicate that the initial network of 35 monitoring wells was installed as planned, and that the goals of the network in providing hydrogeologic property information and background water quality data were met.**	4-26-91
34.	Page 5-3, lines 4 and 5 (5-3). The basis for establishing the compliance boundaries is not explained. Is the compliance boundary the same as the low-level waste management area (LLWMA) boundary shown in Figures 5-1 and 5-2? Ecology Recommendation. Describe the basis for establishing compliance boundaries and delineate the compliance boundary in figures.	4-26-91

No.	Comment/Response	Ecology Concurrence
	DOE-RL/WHC Response: The compliance boundary is defined by a line that connects the monitoring wells spaced around the perimeter of the waste management area. If no well is located at a corner of a waste management area the compliance line is continued along both sides of the waste management area until they meet. The lines on Figures 5-1 and 5-2 that delineate the 'low-level waste management area' are the compliance boundaries. Both text and figures will be altered to specifically define these boundaries.	
35.	Page 5-6, line 51 (5-4). Bierschenk initials turned around in reference section.	4-26-91
	DOE-RL/WHC Response: The order of Bierschenk's initials will be corrected in the references.	
36.	Page 5-7, line 8 (5-5). Deju (1975) citation omitted in reference section.	2-26-91
	DOE-RL/WHC Response: The Deju (1975) citation is not correct. The citation in the text will be corrected to Ledgerwood and Deju (1975).	
37.	Page 5-7, lines 30-42 (5-6). Section 5.2.2.2 discusses the interim status monitoring well network and states that four of the 35 wells, completed in 1987, are screened over the lowermost 20 feet of the uppermost aquifer. The remaining 31 wells are completed in the upper 20 feet of the uppermost aquifer. No explanation is given why four wells were completed in the deep section of the aquifer. Ecology Recommendation. Provide an explanation on the number of wells chosen for monitoring the deeper section of the aquifer. This discussion should focus on explaining why a small number of wells were completed in the deeper section of the aquifer relative to the larger number of wells for the upper part of the aquifer. DOE-RL/WHC Response: There is considered to be virtually no likelihood of dense non-aqueous phase liquids reaching the groundwater from the wastes in the LLBG. However, four wells were selected as deep wells for verification. This concept is supported by the types and quantities of waste described in Chapter 3.0, the methods of disposal, and the mechanisms available for mobilization and transport to the groundwater. Furthermore, the results of the first year of monitoring have been found to be consistent with this concept. The text will be revised to explain the number of wells chosen to monitor the deeper section of the aquifer.	4-26-91

No.	Comment/Response	Ecology Concurrence
38.	Page 5-9, lines 25 and 26 (5-7). A detailed explanation on casing and screen inspection was not provided. Was decontamination performed prior to placement? If so, what solutions/solvents were used? Ecology Recommendation. Provide a detailed explanation on casing and screen inspection. **DOE-RL/WHC Response: The casing and screen were factory-cleaned and delivered to the well site in clean plastic bags where they were visually inspected prior to installation. No additional cleaning was found to be required at the well site. A detailed description of the cleaning, inspection, and handling process will be added to the text.**	4-26-91
39.	Page 5-9, line 30 (5-8). What size and type of silica sand? **DOE-RL/WHC Response: The size and type of silica sand will be specified in the text.**	4-26-91
40.	Page 5-9, line 38 (5-9). What proportion of grout is Volclay vs. concrete? **DOE-RL/WHC Response: Volclay does not contain concrete. A detailed description of Volclay will be added to the text.**	4-26-91
41.	Pages 5-10 and 5-13 (5-10). Well 299-W7-2 has been left out of well listing. Ecology Response. Include Well 299-W7-2 to the well listing. **DOE-RL/WHC Response: Well 299-W7-2 will be added to the well listing.**	4-26-91
42.	Page 5-13, lines 12-17 (5-11). Text says that the data do not "clearly indicate" whether upgradient contamination is a problem. Is there 'some' indication that upgradient contamination is a problem? Ecology Recommendation. Elaborate on the potential for upgradient contamination and how it should be addressed in the monitoring program. **DOE-RL/WHC Response: Upgradient contamination is a potential problem at the site. A description of this upgradient contamination is provided in Section 5.4. An approach for treating the statistical complications resulting from the presence of upgradient**	4-26-91

No.	Comment/Response	Ecology Concurrence
	contamination is outlined in Section 5.5.4.7. References to these sections will be added to Section 5.2.2.4.	
43.	Page 5-13, lines 26 through 35 (5-12). Section 5.2.2.5 lists analysis performed on sediments. Were the grab samples used for analysis? If so, were they hard drive slurry or drive barrel samples? Ecology Recommendation. Elaborate and clarify the sampling methods employed and the type of samples tests were performed on. Subsequent sections' discussion on heterogeneity of material types, hydraulic conductivity, etc., could raise question on quality of lithologic evaluation. DOE-RL/WHC Response: A more detailed description of the sediment sampling techniques and the testing performed on each type of soil sample will be added to the text. Sediment was collected as split barrel continuous core, hard tool slurry, and drive barrel samples.	4-26-91
44.	Page 5-13, line 47 (5-13). How was contaminated purge water disposed of? DOE-RL/WHC Response: A more detailed discussion of purge water disposal will be presented in the new Section 5.2.3.1.8, and a reference to that section will be added to the text.	4-26-91
45.	Page 5-14, lines 37 through 44 (5-14). What decontamination techniques were used to decontaminate water-level measuring equipment between wells? DOE-RL/WHC Response: The water-level measuring equipment is decontaminated between wells by rinsing with distilled water. A description of the decontamination techniques will be added to the text.	4-26-91
46.	Page 5-15, lines 2 through 4 (5-15). For low-yielding wells, at least two volumes should be evacuated to purge annular space water in contact with casing volume water. DOE-RL/WHC Response: The LLBG monitoring networks contain no low-yielding wells at present, and at least three well volumes have been removed from all interim status wells before each sampling event. The discussion of reduced purging of low-yielding wells will be removed from the text.	4-26-91

No.	Comment/Response	Ecology Concurrence
47.	Page 5-15, lines 7 and 8, Section 5.2.3.1.3 (5-16). Specify pump flow rate during VOA collection. **DOE-RL/WHC Response: The flow rate during collection of VOA samples is generally 1 gallon per minute. A discussion of this flow rate will be added to the text.**	4-26-91
48.	Page 5-15, line 34 (5-17). Semivolatiles were not specified in above sampling order (Section 5.2.3.1.3, lines 16 and 17). When was this fraction sampled? Ecology Recommendation. Specify semivolatiles in the sampling order. Identify when this fraction was sampled. **DOE-RL/WHC Response: The sampling order, including semivolatiles, will be more clearly described in the text.**	4-26-91
49.	Page 5-15, lines 43 through 45 (5-18). Semivolatiles require a volume of only 75 percent container. **DOE-RL/WHC Response: All sample bottles, other than those for VOA's, are filled to the top, although a small amount of air space (less than 5 percent) may remain in the bottle. The VOA vials are filled slightly more than full so that no air space remains in the bottle. The text will be modified to clarify the extent of filling and specify sample bottle types.**	4-26-91
50.	Page 5-15, lines 40 through 43 (5-19). Specify sample bottle types - size, clear glass, amber glass, polyethylene, etc. **DOE-RL/WHC Response: The text will be revised to specify sample bottle types.**	4-26-91
51.	Page 5-15, line 48 (5-20). What methods were used to monitor the 4°C temperature? Ecology Recommendation. Specify methods used to monitor the 4°C temperature. **DOE-RL/WHC Response: A description of the methods will be included in the permit application.**	4-26-91

No.	Comment/Response	Ecology Concurrence
52.	Page 5-16, lines 29 through 37 (5-21). What preparation procedures were used for field and trip blanks? What kind of water is used - distilled, deionized, or carbon-free? Where are trip blanks prepared? **DOE-RL/WHC Response: A more complete description of the preparation procedures for blank samples will be added to the text.**	4-26-91
53.	Page 5-16 (5-22). Section 5.2.3.1.7 does not indicate whether samples were collected as a check on matrix homogeneity (duplicates, replicates). Ecology Recommendation. Applicant should elaborate on this and specify frequency. In addition, state whether or not any unsates on ancillary equipment (water-level measurement tapes, probes) were taken to evaluate the effectiveness of the decontamination process. **DOE-RL/WHC Response: Duplicate sampling frequency and a discussion of equipment blanks will be added to the text.**	4-26-91
54.	Page 5-25, lines 10 and 11 (5-23). What was done with the water from Well 299-E28-26? **DOE-RL/WHC Response: Well 299-E28-26 was not pump tested. Purge water from this well was treated the same as other purge water, as described in Section 5.2.3.1.8. The text will be modified to clarify water handling from this well.**	4-26-91
55.	Pages 5-25 through 5-27, Section 5.2.3.2.3 (5-24). What was done with unacceptable purge water during quarterly monitoring? **DOE-RL/WHC Response: A description of disposal procedures for all purge water will be outlined in the new Section 5.2.3.1.8. A reference to this section will be added to the text.**	4-26-91
56.	Page 5-39, line 34 (5-25). Refer to Section 5.3.3 which does not discuss transmissivity. Ecology recommendation. Delete reference or clarify. **DOE-RL/WHC Response: The reference to Section 5.3.3 will be changed to Section 5.3.5.1.5.**	4-26-91

No.	Comment/Response	Ecology Concurrence
57.	Page 5-41, Table 5-3 (5-26). This table identifies the major ion chemistry of the unconfined aquifer on the Hanford Site. No source for this data is noted. Ecology Recommendation. Include the citation for this data at the bottom of Table 5-3. **DOE-RL/WHC Response: The source of the data will be added to Table 5-3.**	4-26-91
58.	Pages 5-42 through 5-59, Section 5.3.5 (5-27). There is a considerable amount of ambiguity with respect to hydraulic conductivities. It is understood that a considerable degree of heterogeneity in site materials results in great variations in hydraulic conductivity. However, evaluation and analysis should focus more attention on this critical parameter because it does play such a critical role in the efficiency modeling, potential plume dispersion, and ultimately the location of monitoring wells. **DOE-RL/WHC Response: Although discussion of hydraulic conductivities will be clarified in the text, this parameter does not affect dispersion, the efficiency modeling, or the location of monitoring wells. Efficiency modeling depends upon the plume shape when plumes reach the boundary of the buffer zone. As described in Section 5.5.2.1.4, dispersion in porous media is the sum of molecular diffusion and mechanical dispersion. Mechanical dispersion, which equals velocity times a dispersivity coefficient, dominates molecular diffusion except at very low flow rates. Assuming a diffusion coefficient of 1×10^{-6} square feet per day, and a low transverse dispersivity of 1 foot, molecular diffusion may be neglected at flow rates greater than 1×10^{-4} feet per day, which is several orders of magnitude smaller than the estimated flow rates beneath the LLBG. For nonreactive transport dominated by mechanical dispersion, the shape of a plume of a given size is independent of groundwater velocity and, therefore, also independent of hydraulic conductivity. This velocity independence is evident upon careful inspection of the equation in Section 5.5.2.1.4. This will be described in greater detail in the text.**	4-26-91

No.	Comment/Response	Ecology Concurrence
59.	Page 5-48, lines 33 through 38 (5-28). Section 5.3.5.1.5 suggests a comparison of hydraulic conductivity in feet per day for basalt to transmissivity in square feet per day of Hanford and Ringold Formations. Ecology Recommendation. Convert transmissivity to average hydraulic conductivity so units will allow direct comparison. **DOE-RL/WHC Response: Transmissivity values will be converted to hydraulic conductivity values.**	4-26-91
60.	Page 5-59, lines 12 through 16 (5-29). Section 5.3.5.2.5 discusses groundwater flow velocities beneath the low-level waste management areas and indicates that Darcian flow is assumed to be valid. No explanation is given why this assumption should not be considered valid. Ecology Recommendation. Provide an explanation why Darcian flow should be considered valid for groundwater flow beneath these management areas. **DOE-RL/WHC Response: Darcy's law is considered valid for all flow through granular media except in fine-grained materials of very low permeability (Freeze and Cherry, 1979, pp. 72-73). Sediments in the Hanford and Ringold Formations are relatively coarse grained with moderate to high permeability. The text will be modified to eliminate the suggestion that Darcy's law may not be valid.**	4-26-91
61.	Page 5-60, line 44, Section 5.3.6 (5-30). What is (I)? **DOE-RL/WHC Response: 'I' refers to the upper member of the Elephant Mountain Basalt. The text will be changed to be consistent with the usage of 'upper' throughout.**	4-26-91

No.	Comment/Response	Ecology Concurrence
62.	Page 5-62, lines 3 through 5 (5-31). Section 5.4 states that, "Ecology regulations require a description and delineation of any groundwater contaminant plume that, based on interim status monitoring data, is suspected of originating from one of the LLBG-regulated units." The specific Ecology regulations must be cited. Ecology Recommendation. Cite the specific Ecology regulations referenced. **DOE-RL/WHC Response: The specific Ecology regulation will be added to the text.**	4-26-91
63.	Page 5-62, line 5 (5-32). The, "on" should be "of". **DOE-RL/WHC Response: This sentence will be replaced as part of revising Chapter 5.**	4-26-91
64.	Pages 5-77, lines 22 and 23 (5-33). Text implies drinking water standard for nitrate is 45 parts per million as NO_3, but should specifically state. **DOE-RL/WHC Response: The text will be changed to specifically state that the water standard for nitrate is expressed in terms of nitrate.**	4-26-91
65.	Pages 5-77 through 5-148, Section 5.5 (5-34). General monitoring program design should consider contingency for monitoring aquifer below uppermost aquifer if uppermost aquifer becomes contaminated. **DOE-RL/WHC Response: The text will be changed to indicate that monitoring the aquifer below the uppermost aquifer may be necessary should the bottom of the uppermost aquifer become contaminated from waste in the LLBG.**	4-26-91

No.	Comment/Response	Ecology Concurrence
66.	Page 5-85, Section 5.5.2.1.3 (5-35). The monitoring efficiency model appears to be an ideal approach to the design of monitoring systems. However, even if the model is valid, it should be in addition to conventional hydrogeologic analysis, particularly, the preparation of detailed planer and cross-sectional flow nets for each of the sites. There may not be sufficient data for the preparation of detailed flow nets, specifically for LLWMA-2, -4, and -5. If this is the case, and representative flow net construction is not possible, this may indicate that data are insufficient for a valid interpretation of the hydrogeology and the proper design of a monitoring system, including application of the efficiency model. Ecology Recommendation. Provide detailed planer and cross-sectional flow nets for each site or provide a detailed explanation why construction of these nets is not possible. **DOE-RL/WHC Response: Equipotential maps of the groundwater surface have been prepared for three consecutive years for all low-level waste management areas to supplement the efficiency model results and will be added to the text. These maps have contour intervals of 1 foot or less and are based upon data from the immediate vicinity of the low-level waste management areas and from the surrounding area. The consistency of the equipotentials with time and the level of detail provided by the small contour intervals are considered to provide sufficient information on the hydrogeology to support monitoring network design. Planer flow nets have been prepared at 1 foot contour intervals or less for all low-level waste management areas for the most recent data set. Companion cross-sectional flow nets have also been prepared at 1-foot contour intervals or less for the low-level waste management areas in the 200 West Area, where the thickness of the uppermost aquifer is about 200 feet and deep monitoring wells have been installed. All flow nets will be added to the text and will be used with the MEMO Model results in monitoring network design.**	4-26-91

No.	Comment/Response	Ecology Concurrence
67.	Page 5-90, lines 1 through 52 (5-36). The original Domenico and Robbins (1985) article on the two-dimensional analytical transport model could not be obtained for review within the time available. Until the original article and other documentation can be reviewed, specific comments on the applicability of this particular model must be deferred. **DOE-RL/WHC Response: Additional comments on the applicability of the Domenico and Robbins plume generation model have not been received from Ecology, and it is assumed that this model was found to be acceptable.**	4-26-91
68.	Page 5-91, lines 1 through 9 (5-37). The report states the model is valid for lower density contaminants which would not exhibit vertical mixing. A potential problem could exist with heavier contaminants that would show vertical mixing and that would then invalidate the two-dimensional assumption of the Domenico and Robbins model. Deeper monitoring wells and some type of three-dimensional model may be warranted. **DOE-RL/WHC Response: The text will be modified to include a discussion of potential sources of dense non-aqueous phase liquids and metal salts at the low-level waste management areas that, if present, could invalidate the application of the two-dimensional formulation of the Domenico and Robbins model. In brief, based on the quantities and disposal methods of metal salts and dense non-aqueous phase liquids, no significant potential for density driven transport is considered to exist at the low-level waste management areas.**	4-26-91
69.	Page 5-92, lines 29 through 32 (5-38). The assumption of a 20-foot long source length through a 200-foot deep vadose zone is not adequately substantiated. This factor could greatly effect the model results as it would effect the generation of the plume family curves used. Ecology Recommendation. Backup data for the assumption of 20-foot long source length through a 200-foot deep vadose zone would be helpful. Golder Associates (i.e., Charles Wilson) stated that the figure came from the literature. A source reference was not cited, but should be. **DOE-RL/WHC Response: The text will be modified to include an expanded discussion (Section 5.5.2.1.5.3) of line source width. The magnitude of this width was determined based upon site specific conditions and was not taken from the literature. A review of Hanford Site data on tank and crib leaks and the associated spreading of the plume through the vadose**	4-26-91

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	zone will be presented. Modeling results of the T-106 point source leak and of an aerially distributed leak scenario will be summarized. In addition, a detailed analysis of model sensitivity to source width will be included. Because monitoring efficiencies decrease at a decreasing rate as source width declines, and changes little below about 40 feet, the selection of source width is not critical to model results.	
70.	Page 5-93, lines 1 through 36 (5-39). Discussion states: a) Smaller dispersitivities are more conservative. b) Longitudinal dispersivity (Dx) for Ringold like material is 49 feet over distance of 260 feet (scale of interest). c) Scale of interest at 200 Areas is 300 to 1,000 feet. d) Selected 'conservative' longitudinal dispersivity is 70 feet. Dx=70 feet may be conservative for a scale of interest of 1,000 feet. However, it is not very conservative for a scale of interest of 300 feet which is closer to what the Ringold like material was evaluated at. For monitoring well placement, proper selection of a representative transverse dispersivity is even more critical. Hydraulic conductivity influences the dispersivity ratio and the data indicate low and high extremes in hydraulic conductivity for the low-level waste management areas. A single transverse dispersivity for all cases does not seem appropriate, particularly in the case of the Hanford formation where hydraulic conductivities are on the order of 10 feet per minute. In such a case, a transverse dispersivity of 3 to 5 feet might be more appropriate. Ecology Recommendation. Re-evaluate dispersivities. If necessary use more than one dispersivity value for modeling runs to reflect variations in site conditions. Due to the extreme sensitivity the model results would have on the selection of both lateral and transverse dispersivity, some type of tracer test should be run to further validate the model assumptions for typical sites around the project.	4-26-91

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	DOE-RL/WHC Response: Dispersivity values presented in the literature and estimated from existing plumes at the Hanford Site were re-evaluated, and detailed sensitivity studies were performed on both longitudinal and transverse dispersivities using the MEMO Model. The results of these studies will be added to the text. The monitoring efficiency was found to be sensitive to transverse dispersivity but relatively insensitive to longitudinal dispersivity. The data were evaluated at a scale of about 1,000 feet, which is considered appropriate because of the need to model plumes extending across the 500 feet wide buffer zone and well back into the low-level waste management area. The dispersivity data show wide ranges, from which conservative values were selected for use in the model. Emphasis was given to transverse dispersivities because of the demonstrated sensitivity to that parameter. While the process of dispersion is velocity dependent, the dispersivity coefficients are material properties that depend only upon the heterogeneity of the material, and not upon the absolute magnitude of the hydraulic conductivity; see, for example, "Three-Dimensional Stochastic Analysis of Macrodispersion in Aquifers" by L. W. Gelhar and C. L. Axness (Water Resources Research, Vol. 19 No. 1, 1983), and "A Natural Gradient Experiment on Solute Transport in a Sand Aquifer, Spatial Variability of Hydraulic Conductivity and Its Role in *the Dispersion Process*" by E. A. Sudicky (Water Resources Research, Vol. 22 No. 13, 1986). While the geology of the 200 East and West Areas are somewhat different, there is no reason to believe that the heterogeneity of the areas differs significantly. As a result, because the scale of interest is the same for all of the low-level waste management areas, the same values for dispersivity coefficients were used for all sites. Several existing plumes on the Hanford Site have been analyzed to estimate dispersivities, and the results will be summarized in the text. Performing a field tracer test to further validate the model assumptions is suggested in the comments but is not believed to be warranted for the purpose of supporting network design. A single test could not be demonstrated to be representative of all sites; several tests would need to be run to overcome this difficulty. Further, tracer testing is not a routine practice in the same sense as permeability testing, but is of a somewhat experimental nature. It is proposed instead to base the monitoring network design upon conservatively selected dispersivities from the literature and from analysis of existing plumes at the Hanford Site.	

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71.	Page 5-94, lines 1 through 8 (5-40). The need for a buffer zone in the model is well explained but selection of a 500 foot width appears somewhat arbitrary. Discussions with Golder Associates (Charles Wilson) indicate that there were no guidelines for buffer zone width designation. Guidelines they did see pertained mostly to urbanized areas. The remote location of the sites appears to have strongly influenced the selection of 500 feet as the zone width. Are there any objective criteria which can be used? What would a small buffer zone be? What would a large buffer zone be? Ecology Recommendation. Elaborate on selection of a specific buffer zone width. Some backup references concerning this are in order, even if they pertain mostly to urban areas. This would at least give some feel for the numbers used at other sites. If objective criteria cannot be established, describe the benefit of using 500 foot width over larger or smaller widths (i.e., sensitivity analysis presented on page 5-98, lines 16 through 24, cost differences, etc.). **DOE-RL/WHC Response: The discussion of buffer zone width will be expanded in the text. Regulatory guidelines relating to the buffer zone concept have been discussed, and references to those guidelines have been included. In addition, several objective criteria are suggested for determining buffer zone widths, although not all may apply to any one site. A sensitivity analysis of monitoring efficiency to buffer zone width was conducted, and the results will be described in the text. The results indicate that the efficiency is not highly sensitive to buffer zone width.**	4-26-91
72.	Page 5-97, lines 21 through 25 (5-41). Northern wells are spaced farther apart because of angle of incidence. Because hydraulic conductivity is also highest in the north, transverse dispersivity will consequently be less, yielding a narrower plume. Ecology Recommendation. Reconsider wider spacing of monitoring wells on the northern margin of LLWMA-1. **DOE-RL/WHC Response: Transverse dispersivity is a material property that is independent of the magnitude of hydraulic conductivity and groundwater flow velocity (see response to comment number 69). However, the process of dispersion, which governs lateral spreading in the Domenico and Robbins model (ignoring molecular diffusion) is dependent upon the magnitude of hydraulic conductivity and groundwater flow velocity. This process is adequately**	4-26-91

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	represented in the MEMO Model. The width of the plume and the spacing of the northern wells of LLWMA-1 are, therefore, entirely appropriate.	
73.	Page 5-98, lines 26 through 36 (5-42). Larger transverse dispersivity is less conservative given fixed well locations as in design presented. Sensitivity to changes in transverse dispersivity is reported low for high-efficiency levels and high for low-efficiency levels. How low is low? Ecology Recommendation. Perform sensitivity analysis using a transverse dispersivity of 3 to 5 feet which would be representative of high hydraulic conductivities and result in lower efficiencies, indicating a given well spacing is less conservative. DOE-RL/WHC Response: A sensitivity analysis of monitoring efficiency to transverse dispersivity will be conducted over the range of 1.75 to 17.5 feet, and a discussion of the results will be added to the text.	4-26-91
74.	Page 5-100, lines 18 through 20 (5-43). The text states that the lower hydraulic gradient in the west-central part of the area suggests that the groundwater is crossing a band of lower conductivity material. Typically (everything else being equal), a lower hydraulic gradient is indicative of a higher hydraulic conductivity. Therefore, the text is confusing or erroneous. Which data supports the use of the efficiency model, the hydraulic gradient or the hydraulic conductivities? Ecology Recommendation. Clarify or correct and relate to model application. DOE-RL/WHC Response: This section of the text will be clarified. The original text erroneously referred to a lower, rather than a higher, hydraulic gradient in the central part of the low-level waste management area. The MEMO Model depends only on the direction, and not the magnitude, of the hydraulic gradient, and does not depend upon the magnitude of hydraulic conductivity (see response to comment number 69).	4-26-91

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75.	Page 5-104, lines 20 through 24 (5-44). A hydraulic conductivity of 0.6 feet per day (4 x 10-4 feet per minute) is not consistent with the sandy gravel depicted in Figure 5-19. This order of magnitude for hydraulic conductivity is characteristic of a very fine sand or silt. Ecology Recommendation. Re-evaluate hydraulic conductivity for LLWMA-3, basic data or interpretation of aquifer tests may be in error or original lithologic descriptions may be in error. **DOE-RL/WHC Response: The values of hydraulic conductivity reported in the text were obtained from Last et al. (1989), in which hydraulic conductivity was estimated by dividing the transmissivity by the total saturated thickness of the aquifer. This was incorrect, since in most cases the wells were not screened over the total saturated thickness of the aquifer. Hydraulic conductivities have been recalculated by dividing the transmissivity obtained from the well tests by the total screen length of 10 feet. These new values will be reported in Sections 5.3.5.1.5 and 5.3.5.2.5. In some cases, the new values of hydraulic conductivity are more than two orders of magnitude larger than originally reported.**	4-26-91
76.	Pages 5-107 and 5-108, Figure 5-39 (5-45). Figure labeled incorrectly. Should be Area-3. **DOE-RL/WHC Response: The figure heading will be corrected.**	4-26-91
77.	Page 5-112, Section 5.5.2.1.9 (5-46). With the data and discussion presented, it is not possible to evaluate the adequacy of the base of aquifer monitoring program (deep wells). Ecology Recommendation. Provide cross-sectional flow nets parallel to groundwater flow for each site and relationship of deep wells. **DOE-RL/WHC Response: Cross-sectional flow nets have been prepared at 1 foot contour intervals or less for the low-level waste management areas in the 200 West Area, where the thickness of the uppermost aquifer is about 200 feet and deep monitoring wells have been installed. These flow nets will be added to the text and are used with the MEMO Model results in monitoring network design. The thickness of the uppermost aquifer in the 200 East Area is sufficiently small that many monitoring wells penetrate the entire aquifer, and vertical flow nets for that area have not been prepared.**	4-26-91

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78.	Page 5-112, lines 40-43 (5-47). Section 5.5.2.1.9 discusses the need to monitor the deeper portion of the uppermost aquifer due to possible migration of dense contaminants to the bottom of the aquifer. It is stated that, "in view of these considerations, deep wells will be installed at each low-level waste management area to provide samples for upgradient and downgradient water quality analysis, but will not be configured to establish networks equivalent to those described for the shallow wells." This explanation regarding the network density for wells monitoring the deeper portion of the aquifer relative to wells monitoring the shallow portion of the aquifer is inadequate. Ecology Recommendation. Provide a detailed explanation regarding the rationale for the network of wells monitoring the shallow portion of the aquifer and wells monitoring the deeper portion of the aquifer. **DOE-RL/WHC Response: Based on the quantities and disposal methods of metal salts and dense non-aqueous phase liquids, no significant potential for density driven transport exists at the low-level waste management areas. As a result, the number of deep wells is smaller than the number of shallow wells (see response to comment number 68). The text will be revised to explain the number of wells chosen to monitor the shallow and deeper sections of the aquifer.**	4-26-91
79.	Page 5-115, line 47 (5-48). Well Construction Standard citation not included in references. **DOE-RL/WHC Response: The WAC 173-160 Well Construction Standard will be added to the reference list.**	4-26-91
80.	Page 5-129, line 26 (5-49). Implements should be steamed cleaned after 6 and before 7. **DOE-RL/WHC Response: The type of groundwater sampling equipment addressed in this paragraph is usually not steam cleaned. The text will be changed to clarify that this discussion applies only to laboratory decontamination of groundwater sampling equipment.**	4-26-91
81.	Page 5-130, lines 44 through 51 (5-50). Section 5.5.3.2.1 states that, "For low-level waste management areas in which regulated units presently contain buried waste, background water quality conditions will be determined from monitoring wells located immediately hydraulically upgradient and within 100 feet of the boundary of the respective low-level waste management area." No explanation is given why 100 feet was chosen as the maximum distance an upgradient well will be situated at the monitored burial ground.	4-26-91

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	Ecology Recommendation. Provide a detailed explanation regarding the spacing of upgradient monitoring wells from the burial grounds. DOE-RL/WHC Response: The text will be modified to clarify the rationale for locating upgradient wells. Generally, it will be necessary to locate upgradient wells relatively near the low-level waste management areas because of the close proximity of other potential sources of contamination. Such locations are also desirable in areas where groundwater flow directions are projected to change because of mound decay, and some upgradient wells may become downgradient wells. However, the text was not intended to imply that 100 feet is a limit that will be applied to all future upgradient wells. The text will be revised accordingly.	
82.	Page 5-134, line 35 (5-51). Section 5.5.3.2.3 should include a discussion of quality control sample types and frequency. DOE-RL/WHC Response: A discussion of quality control sample types and frequency will be added to the text.	4-26-91
83.	Page 5-135 (5-52). Section 5.5.4.1.1 should discuss procedures used for decontamination of measurement devices between wells. DOE-RL/WHC Response: A discussion of decontamination of water-level measurement devices between wells will be added to the text.	4-26-91
84.	Page 5-136, lines 14 through 45 (5-53). Pump type selection is critical and should be detailed. Ecology Recommendation. Describe pump type, manufacturer, and reason for selection. DOE-RL/WHC Response: A discussion of the reasons for selecting the Hydrostar pump will be added to the text. The pump type and manufacturer have also been added to the text.	4-26-91

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85.	Page 5-136, lines 21 through 24 (5-54). What is sampling procedure if stabilization of parameters does not occur after evacuation of two well volumes? DOE-RL/WHC Response: A description of the procedure to follow, should parameters not stabilize after evacuation of two well volumes, will be added to the text.	4-26-91
86.	Page 5-136, lines 33 through 34 (5-55). At least two volumes should be removed to evacuate annular space water in contact with casing volume. DOE-RL/WHC Response: A description of the methods will be included in the Hanford Dangerous Waste Permit. The LLBG will cross reference the site-wide permit.	4-26-91
87.	Page 5-138, lines 1 through 18 (5-56). Pump type selection is critical and should be detailed. Ecology Recommendation. Describe pump type, manufacturer, and reason for selection. DOE-RL/WHC Response: The criteria for selection of the pump type will be explained in Section 5.5.4.1.3. The pump type and manufacturer will also be added to the text. A reference to that section will be added to the text.	4-26-91
88.	Page 5-138, line 46 (5-57). What methods will be used to monitor the 4°C temperature? DOE-RL/WHC Response: A description of the methods will be included in the permit application.	4-26-91
89.	Page 5-140, lines 32 and 33 (5-58). How will trip blanks be prepared? What media will be used for field and trip blanks - distilled, deionized, or carbon-free? DOE-RL/WHC Response: A description of procedures for field-related quality control blank and duplicate samples will be provided in Section 5.5.3.2.3. This description will be modified to indicate the type of media to be used. A reference to that section will be added to the text.	4-26-91

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90.	Page 5-140, line 31 (5-59). Analysis of another sample from the original sample volume is a replicate, not a duplicate. **DOE-RL/WHC Response: A description of the methods will be included in the Hanford Dangerous Waste Permit. The LLBG will cross reference the site-wide permit.**	4-26-91
91.	Page 5-148, lines 8 through 15 (5-60). This section outlines the DOE-RL actions in the event of determining a statistically significant increase in one or more parameters. However, the discussion omits immediate resampling as required under WAC 173-303-645(9)(h)(ii). Ecology Recommendation. Include immediate resampling as the DOE-RL action or explain why resampling will not be performed. **DOE-RL/WHC Response: Immediate resampling will be added to the text as a required action if a statistically significant increase is detected.**	4-26-91
92.	Page 5-148, line 36 (5-61). Typo, "started" should be "stated". **DOE-RL/WHC Response: Typo will be corrected.**	4-26-91
93.	Page 5-151, lines 38 and 39 (5-62). Section 5.7 states that, "Characterization will provide concentrations of each constituent listed in WAC 173-303-9905 (Ecology 1989)..." Characterization should be conducted in compliance with 40 CFR 264, Appendix IX (EPA 1988). Ecology Recommendation. Replace WAC 173-303-9905 with 40 CFR 264, Appendix IX (EPA 1988) in the above quoted sentence. **DOE-RL/WHC Response: The citation will be changed in the text as suggested.**	4-26-91
94.	Page APP 7A-1 through 7A-4 (7-1). Appendix 7A is a sample procedure for "clean up/recover radioactive material spills emergency procedures--low-level burial grounds. Submission of a sample procedure is inappropriate for this application. Ecology Recommendation. The Applicant is required to submit an actual sampling procedure for clean up/recover radioactive spills emergency procedure for the low-level burial grounds permit application.	

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	DOE-RL/WHC Response No. 1: A description of operations will be provided as required by WAC 173-303-806(4)(a)(viii). All 'sample' procedures and references to such will be removed from the permit application. This approach is consistent with that being used to finalize the 616 NRDWSF permit application.	
	Comment: Appendix 7A, Sample Procedure, Page 7A-1	
	In addition to the description of operations which will be provided, a statement must be made indicating the locations of the actual procedures.	
	DOE-RL/WHC Response No. 2: Controlled copies of the procedures are kept in Building 272WA and in vehicles so that they are available at the work location. A statement will be included noting that these procedures will be available for on-site inspection by the regulators.	
95.	Page 8-9, Table 8-1, line 15 (8-1). This table indicates that Basic Crane and Rigging Training is not a required course for crane operators. Is this correct? If so, please provide an explanation why crane operators are not required to complete the course.	4-26-91
	DOE-RL/WHC Response: The Basic Crane and Rigging Training is required for crane operators. Table 8-1 will be corrected to show that the training is required.	
96.	Page 9-12, lines 39 through 41 (9-1). Section 9.2.2.2 states, inter alia, that because of low precipitation, flat topography, and the lack of nearby surface water bodies, the risk of human exposure to LLBG waste through the surface water pathway is very low. Emphasis added. Characterizing any risk to human health as low without further quantification is not appropriate for a document of this type.	4-26-91
	Ecology Recommendation. Quantify the risk to human health of exposure to LLBG waste through the surface water pathway.	
	DOE-RL/WHC Response: The EPA guidelines for preparing the Exposure Information Report state that the "EPA does not expect applicants to develop major, extensive new pieces of information..." Quantification of the risk to human health of exposure to LLBG waste would require developing new information that is beyond the scope of the EPA guidelines; therefore, the text will remain unmodified.	

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97.	Page 9-14, lines 37 and 38 (9-2). The same comment applies to the characterization of the risk to human health via the air pathway as for the surface water pathway. Ecology Recommendation. Quantify the risk to human health of exposure to LLBG waste through the air pathway. DOE-RL/WHC Response: The EPA guidelines for preparing the Exposure Information Report state that the "EPA does not expect applicants to develop major, extensive new pieces of information..." Quantification of the risk to human health of exposure to LLBG waste would require developing new information that is beyond the scope of the EPA guidelines; therefore, the text will remain unmodified.	4-26-91
98.	Page 9-14, lines 1 and 2 (9-3). The same comment applies to the characterization of the risk to human health via soils as for the air and surface water pathways. Ecology Recommendation. Quantify the risk to human health of exposure to LLBG waste through soils. DOE-RL/WHC Response: The EPA guidelines for preparing the Exposure Information Report state that the "EPA does not expect applicants to develop major, extensive new pieces of information..." Quantification of the risk to human health of exposure to LLBG waste would require developing new information that is beyond the scope of the EPA guidelines; therefore, the text will remain unmodified.	4-26-91
99.	Page 9-17, lines 26 through 28 (9-4). The same comment applies to the characterization of the risk to human health via transportation-related releases as for air, surface water, and soil pathways. Ecology Recommendation. Quantify the risk to human health of exposure to LLBG waste via transportation-related releases. DOE-RL/WHC Response: The EPA guidelines for preparing the Exposure Information Report state that the "EPA does not expect applicants to develop major, extensive new pieces of information..." Quantification of the risk to human health of exposure to LLBG waste would require developing new information that is beyond the scope of the EPA guidelines; therefore, the text will remain unmodified.	4-26-91

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100.	Page 11-2, Section 11.1 (11-1). The fourth paragraph indicates burial ground 218-E-12B is to be a RCRA compliant facility. Ecology Recommendation. Until an exemption is approved with regard to lining of particular trenches within the LLBG, the LLBG is not considered a RCRA compliant facility. **DOE-RL/WHC Response: The purpose of the application is to receive a Part B permit for the Low-Level Burial Grounds as a RCRA disposal facility. When this permit and any necessary exemptions are granted, the Low-Level Burial Grounds will indeed be a RCRA compliant facility. The statement is made in this context.** **In light of this, the text in lines 27 and 28 of page 11-2 will be modified with the following or similar text:** **"Landfills for future disposal of low-level mixed waste are required to comply with RCRA standards and are proposed in burial grounds 218-W-5 (lined landfill) and 218-E-12B (trench 94 extension)".**	4-26-91
101.	Pages 11-15 and 11-16, Figure 11-7 (11-2). The identification of trench numbers 20, 24, and 29 is not shown on the legend. Ecology Recommendation. The figure should be revised as appropriate. **DOE-RL/WHC Response: These trenches are identified in the legend, but the identification appears to be misleading because only the outline of the trench bottom is black instead of the entire bottom. This will be changed to make the identification of this type trench in the figure clearer.**	4-26-91
102.	Page 11-22, Section 11.1.2 (11-3). This paragraph states that following retrieval of the transuranic and radioactive organic liquid waste, native soils lying beneath the existing unlined trenches that may have been contaminated by waste or waste residues will be left in place. It is proposed that the trenches will be closed in compliance with the closure requirements of WAC 173-303. After retrieval of the transuranic and radioactive organic liquid waste and closure under WAC 173-303, it is possible that the trenches will be reused for the burial of stabilized low-level waste.	

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	Ecology Recommendation. Following retrieval of wastes that are regulated by Ecology, the trenches may have to be certified closed before reuse for the disposal of low-level waste or any other waste. The closure performance standards required that all contaminated soils be cleaned to background levels [WAC 173-303-610(2)(b)(i)]. The conditions under which the trenches may be reused should be more clearly defined. DOE-RL/WHC Response No. 1: It seems that Ecology's interpretation of the closure of a trench and the closure of a landfill is two separate issues. Individual trenches remain part of the LLBG regardless of whether the waste in those trenches has been moved, retrieved, or replaced. Closure requirements for the LLBG are defined in WAC 173-303-665(6)(b), "a landfill must comply with all postclosure requirements contained in WAC 173-303-610(7), (8), (9), and (10)". There are no requirements in these sections which discuss cleanup levels for soils. Therefore, there are no closure performance standards for a landfill which require that contaminated soils be cleaned to background levels or to designated limits. The WAC 173-303-610(2)(b)(i) and (ii), do not apply to the closure of a landfill. To assist in clarifying the WAC requirements which must be met for closure of the LLBG, the text will be modified to cite closure under WAC 173-303-665.	
	Deficiency: Section 11.1.1.2, Removal or Decontamination, Page 11-22 After the waste is retrieved from a trench, any further use of that trench would be considered replacement and would therefore be subject to double liner requirements. Furthermore, it would not be prudent to leave uncontainerized, contaminated soil in place when it can easily be identified and removed. The identification of soil contamination, if any, would also provide valuable insight into the potential extent of contamination beneath other trenches as well as other disposal sites at the Hanford Reservation. Requirement: After waste retrieval, soil sampling must be conducted. The results of this sampling will determine any further actions to be taken and future use of the trench. The permit application must contain a generalized sampling plan for this situation. A detailed sampling plan need not be developed until the soil beneath the retrievable waste is visually inspected. DOE-RL/WHC Response No. 2: The text will be modified to present a general soil sampling plan for extremely hazardous waste (EHW) in trenches where such waste has been retrieved. Details	

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	of the sampling program, such as depth, locations, and methods, will depend on a number of factors, including trench geometry, age of the waste, and type of waste. Detailed sampling plans for a particular trench or portion thereof will be prepared after the waste has been retrieved and the constituents verified. On the basis of sampling and testing results, further requirements (if any) for reusing the trench will be identified.	
103.	Page 11-25, Section 11.1.4.1 (11-4). It is noted that in the third and fourth storage configurations (containing retrievable transuranic waste) have not been covered since 1987 and will continue to be that way for the next 10 years. It appears that the containers are left exposed to ambient atmospheric conditions for long periods making them more susceptible to degradation and eventual leakage. Ecology Recommendation. The Applicant should provide some discussion of measures that have been taken to protect the containers from the weather. If measures have not been taken to date, the possibility of a temporary cover that will serve to protect the waste containers for the next 10 years should be explored and discussed. DOE-RL/WHC Response No. 1: In a desert climate, such as is present on the Hanford Site, the relative humidity is low and metal surfaces do not corrode rapidly in the open atmosphere. The text will be revised to include a discussion of this 'as is' option as well as soil covering or temporary cover options. The text will provide supporting rationale for the preferred option. Deficiency: Section 11.1.4.1, Retrievably Stored TRU Waste, Page 11-25 The response is erroneous. The Central Waste Complex has experienced the corrosion of drums stored on exposed pads for periods far less than 10 years. Furthermore, it is not acceptable to only state that the text will be revised. Requirement: Either retract the first sentence of the response or expand the response to discuss the reality of storing containerized dangerous waste in a semiarid climate. In addition, provide the revised test as part of this response. DOE-RL/WHC Response No. 2: The reviewer's understanding of the 183H Basin waste problem is incorrect. The drums corroded from the inside out due to improper packaging methods. Many of the presently uncovered waste containers will be retrieved, repackaged, and transferred to	

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	a permitted storage facility in the Central Waste Complex within a year's time period. The concept of providing weather protection for the remaining uncovered mixed-waste containers in the trenches is being discussed. Alternatives under consideration include some type of roof cover and a plastic tarp covered with soil as was used previously. Because this waste is to be retrieved in the future, the method of protection should not unduly hinder the retrieval operation. Current plans call for transferring the uncovered containers of transuranic waste from the trenches to a permitted storage building when space becomes available. It is anticipated that this transfer will be initiated within two years. In addition, an engineering evaluation will be performed during FY 1992 to determine if a cover should be placed over the uncovered waste in the interim. The last sentence of the fourth paragraph will be deleted and replaced with the following statements: "Uncovered waste will be transferred to a permitted storage building at the Central Waste Complex or the 224T Transuranic Waste Storage and Assay Facility when space becomes available. The feasibility of providing a cover over this waste in the interim will be determined in 1992."	
104.	Page 11-27, lines 39 through 43 (11-4). Section 11.1.4.5 states that decontaminated equipment and structures will be disposed of in accordance with requirements of the U.S. Department of Energy and WAC 173-303 (Ecology 1989). The cite to the Washington Administrative Code is incomplete. Ecology Recommendation. Include the complete cite to WAC 173-303 for disposal of decontaminated structures and equipment. DOE-RL/WHC Response: The text will be modified to cite WAC 173-303-665.	4-26-91
105.	Page 11-28, Section 11.1.4.5 (11-5). The last paragraph indicates that contaminated native soils, if any, lying beneath the retrievable trenches will not be removed as part of closure operations. Ecology Recommendation. The Applicant should provide some discussion of measures that have been taken to protect the containers from the weather. If measures have not been taken to date, the possibility of a temporary cover that will serve to protect the waste containers for the next 10 years should be explored and discussed. DOE-RL/WHC Response No. 1: It seems that Ecology's interpretation of the closure of a trench and the closure of a landfill is two separate issues. Individual trenches remain part of the	

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	LLBG regardless of whether the waste in those trenches has been moved, retrieved, or replaced. Closure requirements for the LLBG are defined in WAC 173-303-665(6)(b), "a landfill must comply with all postclosure requirements contained in WAC 173-303-610(7), (8), (9), and (10)". There are no requirements in these sections which discuss cleanup levels for soils. Therefore, there are no closure performance standards for a landfill which require that contaminated soils be cleaned to background levels or to designated limits. The WAC 173-303-610(2)(b)(i) and (ii), do not apply to the closure of a landfill. To assist in clarifying the WAC requirements which must be met for closure of the LLBG, the text will be modified to cite closure under WAC 173-303-665. Comment: Section 11.1.4.5, Decon and Disposal Procedures, Page 11-28 Ecology's concern in this comment is not so much whether soil sampling should occur as discussed in comment 102, but a reiteration of the concern raised in comment 103. In other words, what steps have and will be taken to prevent the soil contamination in the first place? The response to this comment need only note that this section will reflect any text changes resulting from the resolution of comments 102 and 103. DOE-RL/WHC Response No-2: As noted in the response to comment 103, the uncovered transuranic waste is to be transferred to a permitted storage building when space becomes available. In addition, an engineering evaluation will be performed in 1992 to determine the feasibility of putting a temporary cover over the waste during the interim.	
106.	Page 11-29, Section 11.1.5.2.1 (11-6). The cover will be sloped at a grade of 1.5 percent. This proposed slope is below the 3 percent slope recommended in the EPA technical guidance document entitled, "Final Covers on Hazardous Waste Landfills" (EPA/530-SW-89-047). Ecology Recommendation. The Applicant should demonstrate that the proposed slope is sufficient to drain the surface water flows and accommodate projected subsidence.	

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	DOE-RL/WHC Response No. 1: The necessary calculations have already been performed to evaluate the covers ability to adequately handle precipitation and other surface water flows. Ecology is directed to Appendices 11-A, B, C, and D. Further demonstration of design adequacy is presented in the response to comment 109. **Subsidence is not considered to be an issue of concern at the LLBG. Ecology is directed to Section 11.2.1.3 for a discussion on subsidence.** Deficiency: Section 11.1.5.2.1, General Description, Page 11-29 Although the calculations support the use of a 1.5% slope, a 3.0% slope would provide for unanticipated settlement/subsidence as well as meet the recommended guidance. Requirement: All final cover slopes must be no shallower than 3.0%. This grade must not vary more than 1/10 of a foot in 16 feet. **DOE-RL/WHC Response No. 2: Final covers will be sloped at a minimum grade of 3%.**	
107.	Page 11-48, Section 11.1.5.2.2 (11-7). The third paragraph of this section indicates that the grade layer will be placed in 18- to 24-inch-thick lifts in most areas of the LLBG to a compaction of 95 percent or as high as is reasonably achievable. Ecology Recommendation. The proposed lift of 18- to 24-inch-thick lifts appear to be too thick to achieve the compaction limits of 95 percent density. Loose lifts of up to 12 inches should be used in order to achieve a more uniform compaction throughout the depth of the grade layer. **DOE-RL/WHC Response No. 1: Observations indicate that some of the potential grade layer material is quite coarse, containing a large fraction of cobbles. Experience indicates that this type of material can be placed in relatively thick lifts and compacted satisfactorily. However, it may be premature to specify a lift thickness at this time, even if only as an example. The text will be modified to delete reference to specific lift thickness and will note that the optimum lift thickness will be determined by constructing a test pad.**	

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	Deficiency: Section 11.1.5.2.2.1, Native Soil Grade Layer, Page 11-48 It is typical construction practice to place soil in 6 - 8 inch lifts when compaction or permeability are critical factors. Evaluating lift depths of up to 2 feet would only encumber the test pad evaluation. Requirement: All soil and soil mixtures must be placed per the accepted practice of 6 - 8 inch lifts. **DOE-RL/WHC Response No. 2: The soil available for the grade layer may have coarse material up to 12 inches in dimension. Placing such material in thin lifts would be counterproductive, as the roller would ride on the larger material and not effectively compact the finer grained matrix. Were this a normal fine-grained fill, lift thicknesses of 6 to 8 inches would be appropriate. While permeability is not a design consideration for the grade layer, we agree that compaction is important. Evaluation of compaction as part of the test pad construction may be slightly cumbersome, but is required and will be performed.**	
108.	Page 11-48, Section 11.1.5.2.2 (11-8). It is proposed that the compaction of the grade layer will be accomplished with a 20-ton dead weight or drum vibratory roller. Ecology Recommendation. The bearing capacities of the underlying cover material and waste containers should be determined to ensure that they can withstand the loads imposed by the 20-ton or greater weight drums vibratory roller and prevent any damage to the waste containers or the liner and leachate collection systems. The use of lifts of lesser thickness may allow adequate completion to be accomplished with lower weight roller sand limit the potential for such damage. **DOE-RL/WHC Response: This is a valid concern for structures with geosynthetics and should be addressed prior to closure when the waste characteristics and geometry are known. Text on page 11-48 will be modified to address this concern.**	4-26-91
109.	Page 11-52, Section 11.1.5.2.2.6 (11-9). No mention is made of the slope of the drainage layer. Ecology Recommendation. The EPA RCRA cover technical guidance document recommends a drainage layer with a minimum slope of 3 percent after settlement and subsidence.	

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	DOE-RL/WHC Response No. 1: The drainage layer will be sloped at 1.5 percent, the same as the other layers. However, the issue primarily relates to the performance of the drainage layer with the use of a 1.5 percent slope. The EPA technical guidance at the time of the LLBG cover design (EPA, 1982) recommended final slopes of 3 to 5 percent. However, slopes outside of this range have been approved for other hazardous waste facilities if adequate performance could be demonstrated. It appears that the EPA implicitly recognizes this in their latest guidance document for closure covers (EPA, 1989), which states: "In arid regions...it may be possible to construct a top layer that will absorb most, if not all, of the precipitation that infiltrates into that layer, eliminating the need for a drainage layer." Consequently, if the drainage layer is not required, then its slope is no longer a significant issue. To investigate this design approach, a series of supplemental HELP (Hydrological Evaluation of Landfill Performance) analyses were performed. The same parameters as in Appendix 11A of the application were used, except that the slope angle and drainage path length were varied. HELP version 2.04 was used instead of version 2.02, which was used for the original analysis. Daily precipitation data from 1979 through 1988 from the Hanford Meteorological Station were used in all cases. The results are summarized in the attached Table 1. Case 1 is the analysis presently contained in Appendix 11A, which was performed using version 2.02. Case 2 uses the same parameters with version 2.04. It may be seen that version 2.04 predicts slightly less evapotranspiration and slightly more flow through the drainage layer than does version 2.02. The difference is not considered significant. Cases 3 through 5 show the effect of increasing the cover slope from 0 to 5 percent. Case 6 shows the effect of a reduced drainage path length. It may be seen that the amount of lateral drainage increases with steeper cover slopes and reduced path length, as might be intuitively expected. However, the amount of percolation through the cover into the waste remains the same in all cases. This supports the EPA approach in that the contribution of the drainage layer to cover performance appears to be negligible at an arid site. This analysis indicates that a flat cover and a 5 percent sloped cover would perform equally well at the Hanford Site.	

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The advantages of a flatter cover relate primarily to (1) less water erosion, which is a major consideration on such large covers, and (2) less material required for the grade layer, which will reduce the cost.

This type of study should of course be repeated during final cover design, and should incorporate both the current EPA guidance and specific parameters for the cover soils and other components.

Table 1. Supplemental HELP Model Results.

Parameter	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6
HELP Version	2.02	2.04	2.04	2.04	2.04	2.04
Drainage layer slope %	1.5	1.5	0	3	5	1.5
Length of layer, ft	725	725	725	725	725	200
Average Annual: (inches)						
Precipitation	7.08	7.08	7.08	7.08	7.08	7.08
Run-off	0.002	0.002	0.002	0.002	0.002	0.002
Evapotranspiration	6.782	6.684	6.684	6.684	6.684	6.684
Lateral drainage	0.3785	0.4174	0.1041	0.4291	0.4309	0.4311
Percolation	0.0011	0.0011	0.0011	0.0011	0.0011	0.0011
Change in storage	-0.079	-0.020	0.293	-0.032	-0.034	-0.034

The text will be changed to identify the slope of the drainage layer.

References:

EPA, 1982, *RCRA (Resource Conservation and Recovery Act) Guidance Document: Landfill Design, Liner Systems and Final Cover*, PB87-157657, National Technical Information Service, Springfield, Virginia.

EPA, 1989, *Technical Guidance Document: Final Covers on Hazardous Waste Landfills and Surface Impoundments*, EPA/530-SW-89-047, Office of Solid Waste and Emergency Response, Washington, D.C., July

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	Comment: Section 11.1.5.2.2.6, Drainage Layer, Page 11-52 Comment 106 also applies here. **DOE-RL/WHC Response No. 2: The drainage layer will be sloped at 3%, the same as the other layers. See response to Comment 106.**	
110.	Page 11-64, Section 11.1.5.5.5 (11-10). The results of wind erosion analysis indicates a net loss of 3.5 tons of cover soil per year. This amount of soil is greater than the EPA recommended value of 2 tons per year. Ecology Recommendation. Discussion of alternative measures to reduce the total erosion due to wind and surface water should be provided here and specifically addressed in the detailed design. **DOE-RL/WHC Response: The need to revise the cover wind erosion section (Appendix 11F), due to subsequent work done in this area on cover designs for the Hanford Site, is recognized. The revised text will address such information as specific McGee Ranch soil physical property analysis that was not available at the time of submitting the permit application and information on the crusting properties of soil. If this additional information does not indicate a reduction of the erosion levels to EPA guidance levels, then a more in depth discussion will be added to the text that will explain why the erosion levels are not a point of concern and/or discussion of alternative measures proposed to achieve this level.**	4-26-91
111.	Page 11-64, Section 11.1.5.5.5 (11-11). The total erosion (sum of net cover water and wind erosion) is 4.3 tons of cover soil per acre per year. This exceeds the EPA recommended limit of 2 tons per acre per year. Ecology Recommendation. Discussion of alternative measures to reduce the total erosion due to wind and surface water should be provided here and specifically addressed in the detailed design. **DOE-RL/WHC Response: The main contribution to total erosion is wind erosion. As stated in response 110, this section will be revised. The concern that Ecology raises here will be dealt with in the revised text described in the response to Comment 110.**	4-26-91

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112.	Page 11-66, Section 11.1.5.6 (11-12). Two of the techniques proposed for correction of existing subsidence problems in inactive trenches prior to placement of final cover are mass impact (pounding of the ground using a weight of up to 30 tons dropped from a height of 65 feet) and dynamic consolidation (hammering or vibrating a beam or pile into the ground). Ecology Recommendation. Both methods have the potential for producing or increasing damage to previously disposed of wastes or waste containers and thereby increasing the potential for leakage or leaching. The bearing capacities of underlying waste containers, cover, and other materials should be determined to ensure that they can withstand the stresses due to mass impact and dynamic consolidation and prevent any supplemental damage that might increase the potential for emissions. Alternative approaches for providing the necessary ground improvement to support the final cover loads and minimize cover settlement should be considered, or more adequate assessment of the potential for increased leakage or leaching provided. **DOE-RL/WHC Response: This NOD suggests that dynamic consolidation will damage waste or waste containers, and thereby increase the potential for leakage or leaching. Furthermore, the NOD suggests that the purpose of dynamic consolidation is for support of static loads imparted by the surface (at grade) cover and for minimization of cover settlement.** **The initial premise of unintentional damaging of waste and waste containers, relative to solid waste burial grounds may not be correct. Solid waste typically consists of contaminated miscellaneous metallic, cellulose based, or mineralogic materials transported and discharged to burial trenches in bulk transport packaging, Little, if any, intent was given to disposal of waste materials in high integrity containers or equivalent packages. Additionally, most waste transport packages used have a nominal expected integrity when buried. Hence, one may assume that most packages and containers, will have presently degraded, or will degrade within a few decades.** **Structural collapse of waste materials and containers has occurred at most burial grounds as manifested by moderate to large subsidence features. This provides evidence as to the present failure of waste and waste containers under ambient conditions. It is indeed the intent of dynamic consolidation to cause "damage" to waste and waste containers. Dynamic consolidation causes compaction of waste under controlled conditions. Past field demonstration activities have shown that greater than 90 percent of potential waste volume reduction can be imparted by dynamic consolidating in situ with negligible health and safety**	4-26-91

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	concerns. Without dynamic consolidation, or equivalent in situ treatment, structural failure of surface engineered barriers overlying buried solid waste trenches is probable and could prove to be compromising to the life of the cover system. The text will be modified to clarify the purpose of the waste consolidation efforts.	
113.	Page 12-14, lines 44 through 46 (12-1). Section 12.4.1.8.2 states, "(c) The future use of the above described land is restricted under terms of 40 CFR 264.117(c) and WAC 173-303-61-(7)(d). The reference to the Washington Administrative Code is a misprint. The correct cite is WAC 173-303-610(7)(d). DOE-RL/WHC Response: The citation will be corrected.	4-26-91
114.	Pages APP 4A-17 through 4A-44 (Volume 5). Under the "Toxic Name" column on each of these pages are listed the various constituents placed in the trenches. In the T50 trench lead, oil, beryllium, zirconium, and "carcinogens" are listed. In the T10 trench, as noted on page APP 4A-44, lead, lead shielding, lead pipes, oil, "carcinogens", mercury, and charcoal are listed. The use of the term "carcinogens" is too vague. Ecology Recommendation. Replace "carcinogens" with the specific form of carcinogen (e.g., asbestos insulation). DOE-RL/WHC Response No. 1: A better description of "carcinogens" is not available because it was not recorded on the old records. The best information available has been provided in the permit application and in the "LLBG Database" (WHC-MR-0008). Comment: Appendix 4A, List of Mixed Waste The fact that "carcinogens" cannot be more specifically defined should be stated in the Chapter 4 text where this appendix is referenced. DOE-RL/WHC Response No. 2: The following statement will be added to 4.6.1: "Some older type waste was not well characterized at the time it was emplaced (e.g., waste listed as 'carcinogens'). This waste is identified to the extent possible with the available information."	

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115.	Deficiency: Part A Permit Application, Page Part A-iii It is inappropriate to dismiss a dangerous waste designation simply because certain tests have not been conducted. Unless toxicity testing proves otherwise, all elemental lead (whether used as shielding or not) must be designated as D008 as well as WT01. Designation of elemental lead as D008 is recognized in the liner exemption request (page 2-3). Requirement: Any lead disposed of at the LLBG or elsewhere on the reservation must be designated as WT01 and D008. This correction needs to be made throughout the text. Furthermore, TCLP testing should be cited instead of EP Toxicity testing. **DOE-RL/WHC Response: Revision 5 of the LLBG Part A permit application, which was included with the Part B permit application (Revision 0), did not include the D008 designation for all waste lead. Revision 6 of the LLBG Part A permit application now designates all waste lead as D008. The text in the Part A will be revised to designate waste containing radioactive elemental lead waste solids as 'WT01 and D008'. The text will also be revised to indicate that the Toxicity Characteristic Leaching Procedure (TCLP) has replaced the Extraction Procedure (EP) toxicity test for determining the characteristics of toxicity.**	
116.	Deficiency: Part A Permit Application The drawings provided in the Part A application, duplicated from Figures 2-7 through 2-14 of the Part B application, are illegible and therefore unacceptable. Furthermore, these drawings do not identify which trenches contain mixed waste. Requirement: Legible drawings must be provided and must identify which trenches contain mixed waste. **DOE-RL/WHC Response: Legible drawings that identify the mixed waste trenches will be provided.**	
117.	Deficiency: Section 2.1.1, Hanford Site, Page 2-3 It is not clear what is meant by "Heads of field documents" as used on lines 47 and 48.	

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	Requirement: Please clarify the text. **DOE-RL/WHC Response: The text will be replaced with "Heads of Field Elements" to agree with DOE Order 5820.2A.**	
118.	Deficiency: Section 2.1.1, Hanford Site, Page 2-4 The definition of mixed wastes on lines 6-8 is inadequate because it does not include radioactive waste containing dangerous constituents not regulated by RCRA. Requirement: Although DOE Order 5820.2A may not take into account state laws and regulations, the text must be edited to indicate that mixed waste at the Hanford Reservation includes waste containing both radioactive and hazardous components as defined by the Atomic Energy Act and the Hazardous Waste Management Act. RCW 70.105.109 **DOE-RL/WHC Response: The text will be changed to define mixed waste as: "Waste containing both radioactive components as defined by the *Atomic Energy Act*, and hazardous components as defined by RCRA, including state implementation of RCRA."**	
119.	Comment: Section 2.1.1, Hanford Site, Page 2-4 The regulation of radionuclides will be addressed in the facility wide permit. Delete the sentence beginning on line 12. **DOE-RL/WHC Response: Radionuclides are not regulated under RCW 70.105.109 because the Federal Government has not delegated this authority to the State; therefore this statement is correct.**	
120.	Deficiency: Section 2.1.2.1, Past Practices, Page 2-6 It is not clear in the last paragraph of this page and the first paragraph of page 2-11 if liquid waste (whether mixed waste or not) with a dose rate greater than 200 millirem per hour is still being placed in the trenches. Liquid dangerous/mixed waste can no longer be land disposed per WAC 173-303-140.	

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Requirement: The discussion must indicate what type of liquid wastes, if any, have been or continue to be disposed of or stored in the trenches since November 23, 1987.

DOE-RL/WHC Response: The following sentence will be added on page 2-6, line 51: "Liquid mixed waste is no longer accepted for storage."

121. Deficiency: Section 2.1.2.1, Past Practices, Page 2-11

The fire retardant that was used on the plywood may contain dangerous constituents which could eventually leach out of the burial ground. The text does not indicate if this possibility has been considered.

Requirement: The text should specify what type of fire retardant was and currently is used on the plywood within the burial grounds. A discussion should also be presented on the leaching potential of this material.

DOE-RL/WHC Response: The fire retardant type is being investigated and will be fully explained in the text.

122. Deficiency: Section 2.1.2.1, Past Practices, Page 2-11

Although trenches which received mixed waste and discontinued operation prior to November 23, 1987 are not subject to permitting under WAC 173-303, they are subject to the Hazardous and Solid Waste Amendments (HSWA) to RCRA.

Requirement: The application must incorporate the above text. In addition, the term "were backfilled" on line 31 should be replaced with "discontinued operation."

DOE-RL/WHC Response: There is no question the mixed waste is subject to the Hazardous and Solid Waste Amendments (HSWA); however, HSWA did not change the definition of the existing portion of a landfill. Mixed waste has been accepted, with Ecology's notification, in the open trenches beyond that which was there on November 23, 1987; therefore, the definition of the existing portion of the landfill has had implicit concurrence by Ecology. The text in section 2.1.2.1 on page 2-11, beginning on line 31, will be changed as follows: "Trenches that received mixed waste and were backfilled before the effective date of regulation of mixed waste are not subject to regulation as permitted treatment, storage, and/or disposal

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	units under WAC 173-303 (Ecology 1991), although the requirements of the (HSWA) to RCRA will apply."	
123.	Deficiency: Section 2.1.2.1, Past Practices, Page 2-11 Trenches which were constructed prior to November 23, 1987 but did not receive mixed waste until after November 23, 1987 are not considered existing units and therefore are not exempt from the liner requirements. Therefore, some "unfilled" trenches may be subject to the liner requirements. Requirement: Edit the last sentence of this section to read "The existing units include trenches which received mixed waste and were constructed prior to November 23, 1987." **DOE-RL/WHC Response: The last sentence in section 2.1.2.1 will be changed as follows: "The existing units include trenches which received mixed waste and were constructed before November 23, 1987."**	
124.	Deficiency: Section 2.1.2.3, Closure, Page 2-22 The distinctions drawn between the types of trenches are important to determine the applicable regulations. Although Appendix 4B aids in the identification of how each trench is classified, there is no visual aid to illustrate the locational relationship of each type of trench. Requirement: New figures should be provided or Figures 2-7 through 2-14 should be elaborated to distinguish the types of trenches within each burial ground (see comment 116). **DOE-RL/WHC Response: New figures will be provided that indicate which trenches contain mixed waste.**	
125.	Comment: Figure 2-7, Burial Ground, Page 2-25/2-26 Typo. The proper identification number for this burial ground is "218-W-3A", not "218-2-3A". Please correct. **DOE-RL/WHC Response: The number will be corrected.**	

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126.	Deficiency: Section 2.5.1, Measures to Prevent Degradation, Page 2-53 It is not clear if the discussion in this section on liquids in the trenches refers only to mixed waste placed prior to November 23, 1987. See comment 120. Requirement: The text should be clarified to indicate what, if any, liquid waste has been disposed in the trenches after November 23, 1987. **DOE-RL/WHC Response: The following statement will be added to second paragraph: "No liquid waste has been placed in the trenches since November 23, 1987."**	
127.	Comment: Section 3.1, Chem, Biol and Phys Analysis, Page 3-2 Waste analysis procedures for the Hanford Site are under development through the facility wide permit negotiations. The specific requirements for waste verification prior to disposal at the LLBG will be addressed upon resolution of this issue. **DOE-RL/WHC Response: The following paragraph will be added to section 3.0, beginning on line 20: "Unit particular waste analysis plans are being developed through the Hanford Facility Permit negotiations. As part of this effort, specific sampling and analysis strategies will be prepared for any waste received for disposal or storage."**	
128.	Deficiency: Section 3.1.2, Containerized Waste, Page 3-4 The text states that the mixed waste disposed at the LLBG is packaged "to ensure isolation from the environment for 20 years". It is unacceptable to only design for 20 year isolation. Requirement: It is Ecology's understanding that USDOE policy requires mixed waste disposal practices to isolate mixed waste for much greater periods of time, in some cases up to 10,000 years. Provide additional discussion in the application defending the 20 year time period in relation to both USDOE policy and dangerous waste closure performance standards. **DOE-RL/WHC Response: Most waste drums have a design life of 10 years; the drums used on site have a higher design standard of 20 years. This requirement is consistent with the intent to retrieve waste from the LLBG within this time period (Section 3.1, page 3-2, line 19). The DOE requirements for long term isolation will not depend upon waste container**	

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	design life. Other barriers are to be employed to prevent intrusion and exposure, such as the construction of thick, impervious covers over the trenches. The precise specifications for these barriers have not yet been finalized; however, the requirements of DOE Order 5820.2A, and the soon to be completed performance assessment, will be used to establish these criteria. The date for completion of the Performance assessment is not yet determined. To clarify these issues the text in section 3.1.2 will be revised as follows: "Under current operating conditions, mixed wastes stored at the LLBG is packaged to maintain containment and retrieval capability of the waste for up to 20 years. The mixed waste stored in open trenches will be moved into permitted storage buildings at the Central Waste Complex when space becomes available. Buried mixed waste in retrievable storage will be retrieved for subsequent processing at the proposed Waste Receiving and Processing Facility. Chapter 4.0, Section 4.1.1 provides details of the waste container system.	
129.	Deficiency: Section 3.1.5, Landfilled Wastes, Page 3-5 The definition of free liquid given on lines 1 and 2 is not consistent with the dangerous waste regulations. Requirement: The definition of free liquids should reference the Paint Filter Liquids Test as described in SW-846. WAC 173-303-140(4)(b) DOE-RL/WHC Response: Consistent with 40 CFR 260.10 and WAC 173-303-140, the definition of free liquid will be revised as follows: "liquids which readily separate from the solid portion of a waste under ambient temperature and pressure. For containerized or bulk waste, the absence or presence of free liquids is demonstrated by the Paint Filter Liquids Test."	
130.	Comment: Section 3.2, Waste Analysis Plan, Page 3-6 Comment 127 also applies here. DOE-RL/WHC Response: The issues will be addressed by adding to Section 3.0 the new paragraph shown in the response to comment 127.	

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131.	Comment: Section 3.2.3, Waste Shipment, Inspection, Page 3-7 Comment 127 also applies here. **DOE-RL/WHC Response: The issues will be addressed by adding to Section 3.0 the new paragraph shown in the response to comment 127.**	
132.	Comment: Section 3.2.4, Generator Oversight, Page 3-8 How long has the generator assessment program been used? How many noncompliant waste packages have been identified through this program? The application should describe who the "waste certification review committee" is, how often they meet, what criteria they use, etc. **DOE-RL/WHC Response: The assessment program has been replaced by a full audit and surveillance program, which has been in effect for three years. The exact number of noncompliant waste packages identified through the program is not known, but it is estimated to be less than 800.** **As a result of these changes to the audit program, the waste certification review committee has been replaced by the audit team. The audit team will consist of at least two engineers from Solid Waste and one engineer from Quality Assurance. A description of the revised program will be incorporated into Chapter 3.**	
133.	Comment: Section 3.2.4, Generator Oversight, Page 3-8 The overall planning efforts of the assessment team should not be directed toward "minimizing impacts to generator operations", but to ensuring environmentally safe packaging and adequate waste analysis. **DOE-RL/WHC Response: The sentence in question refers to the assessment procedure itself; the intent of the planning effort is to assure minimal impact to operations during the actual assessment. The objective of the assessment is to provide assurance that waste generators are in compliance with the Hanford Site solid waste acceptance criteria. This statement is made in the first sentence of Section 3.2.4. Section 3.2.4 will be replaced by attachment 1.**	

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134.	Deficiency: Figure 3-1, Sample Assessment Checklist, Page 3-9 It is unclear what is meant in item 4 of this checklist which asks "Are radioactive waste analyzed for dangerous constituents and their constituents?" Requirement: Correct or clarify item 4 on this checklist. **DOE-RL/WHC Response: The checklist will be replaced with an updated version (see attachment 1).**	
135.	Comment: Table 3-1, Mandatory Waste Characterization, Page 3-14 Item 7 must be corrected to indicate the TCLP test. **DOE-RL/WHC Response: Item 7 on page 3-14, lines 45 and 46 will be changed to "Toxicity Characteristic" which is consistent with the terminology used in WAC 173-303-090.**	
136.	Deficiency: Section 3.2.7, Sampling Methods, Page 3-16 Composite sampling should only be conducted when it is reasonable to assume the constituent concentrations are evenly distributed. Otherwise, samples should always be taken from the location where the highest chemical concentrations are expected. Furthermore, if a phase separation exists, each portion must be sampled and analyzed. Requirement: The text in the last paragraph of this section must be modified per the above discussion. **DOE-RL/WHC Response: The text in the last paragraph in section 3.2.7 on page 3-16 will be changed as follows: "Composite sampling is conducted when it is reasonably assumed the constituent concentrations are evenly distributed and is performed by obtaining random samples in random locations. Otherwise, samples will be taken from the location where the highest chemical concentrations are expected. Furthermore, if multiple phases or media exist, each different phase or media will be individually sampled and analyzed.**	

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137.	Comment: Table 3-2, Analytical Methodology, Page 3-17 The reference to EP Toxicity testing should be changed to TCLP testing. In addition, the procedure for determining the Ph of a solid outlined in Ecology's Chemical Testing Methods, WDOE 83-13, should be referenced for corrosivity testing. WAC 173-303-090(8) (October 16, 1990) **DOE-RL/WHC Response: The text on line 11, page 3-17 will be changed from "extraction procedure toxicity, reference 1310," to "toxicity characteristic leaching procedure, reference 1311." The following reference will be put after 9041, line 10, page 3-17: "9045," which is the ASTM testing method used for determining the Ph of soils and semi-solid materials.**	
138.	Comment: Section 3.2.9, Additional Requirements, Page 3-20 Are offsite generators subject to the generator assessment program discussed in Section 3.2.4? If not, how is offsite waste verified? Offsite waste should be more vigorously assessed than onsite waste. Common practice dictates 10% of offsite generated waste should be verified prior to acceptance. **DOE-RL/WHC Response: Except for special cases, most off-site generators are subject to the same auditing and surveillance program as the on-site generators. The schedule for conducting audits is a minimum of one per year. Surveillances are conducted on a more frequent basis.**	
139.	Deficiency: Section 4.1.1, Containers with Free Liquids, Page 4-1 The text on line 28 indicates that the containers with free liquids are lab packs. Lab packs are specifically defined in WAC 173-303-161. Section 4.1.1.1 describes containers containing liquids which may not meet the regulatory definition of lab packs. Requirement: Wac 173-303-161 and the federal regulations referenced therein should be reviewed to determine if all containers with liquids are indeed lab packs. If some containers are not lab packs, the text should be edited to identify the other type of free liquid containers which are located in the trenches.	

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	DOE-RL/WHC Response: The containers with free liquid consist of an inner container of no more than 15 gallons of liquid surrounded with an amount of absorbent which can absorb at least twice the amount of liquid present; this is packaged in 55-gallon steel drums. As discussed in section 4.1.1, these containers do meet the WAC-303-161 definition of a lab pack. To avoid further confusion, the above description of the containers will be added to the text in section 4.1.1 and will follow the first sentence which starts on line 28. Also the term lab pack will be deleted from the text. The revised text will be as follows: "Containers with free liquid are discussed in the following sections. The containers with free liquid consist of an inner container of no more than 15 gallons of liquid surrounded with an amount of absorbent which can absorb at least twice the amount of liquid present; this is packaged in 55-gallon steel drums. These sections describe past practices in the LLBG that were discontinued before November 23, 1987. Currently, mixed waste is received and stored at the new Central Waste Complex, which will be covered under a separate Part B permit application."	
140.	Deficiency: Section 4.1.1.2, Container Management Practices, Page 4-2 It is not appropriate to treat buried containers of waste as storage units because none of the container storage regulations can be applied. Requirement: The retrievable storage units must be considered landfills. DOE-RL/WHC Response: It is agreed the reference to storage units is inaccurate. However, it is necessary to differentiate the management of waste considered to be retrievable from that considered to be disposed. Therefore, retrievable waste in trenches will be referenced as such in the text. The phrase "retrievable storage units" will be replaced with "retrievable waste in the LLBG trenches." The buried containers were placed in storage prior to coming under Ecology regulation and the storage unit being classified as a landfill. The waste is to be retrieved when the Central Waste Complex is capable of receiving it.	

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141.	Deficiency: Section 4.1.2.4, Container Storage Area Drainage, Page 4-3 Precipitation that comes into contact with exposed waste containers could leach chemical and/or radiological contamination. There is no description of how the drainage liquid (run-off) is chemically or radiologically assessed and managed. Requirement: The application should discuss the potential for precipitation to leach contaminants from exposed waste containers and how the run-off is assessed to verify the absence of such contamination. **DOE-RL/WHC Response: The following text will be added to Section 4.1.2.4: "The Waste is packaged in polyethylene (either double bagged, or bagged and placed in 90 mil polyethylene liners inside 55 gallon DOT 17C or 17H drums containing absorbent material that would absorb any potential leachable waste). The packaging combined with the dry desert climate preclude the leaching of hazardous constituents from the waste. Weekly inspections are performed on waste stored in open trenches to check for evidence of any leakage from drums. Routine radiation surveys are conducted in the burial grounds to check for soil contamination. These checks are more sensitive than hazardous waste tests for verifying that waste drums are not leaking."**	
142.	Comment: Section 4.6.2.2, Exemption Based on Design, Page 4-5 Comment 115 also applies here. **DOE-RL/WHC Response: The sentence on Page 4-5 line 31 will be revised to say, "Each compartment weighs approximately 1,000 tons and contains waste lead designated as WT01 and D008." The paragraph beginning on Page 4-6 line 7 will be replaced with the following: "Of the hazardous constituents listed previously, only waste lead is present in quantities requiring regulation under WAC 173-303. This lead is designated as WT01 and D008."**	
143.	Deficiency: Section 4.6.2.2, Exemption Based on Design, Page 4-5 Based upon discussions with U.S. Navy personnel, it is our understanding that the reactor compartments will be encased in steel hulls with a minimum thickness of 3/4 inch, not 3/8 inch. Furthermore, it is now expected that as much as 230 gallons of liquid may remain in the compartments. Therefore, all free liquids have not been drained.	

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	Requirement: Please verify the text. Also, provide a reference for stating "the compartments should probably last longer than 500 years".	
	DOE-RL/WHC Response: Ecology comments 143, 256, 261, and 262 require further technical evaluation.	
144.	Deficiency: Section 4.6.3, Liner System, General Items, Page 4-6	
	The duration of postclosure has not been defined. Therefore, the term "30-year postclosure period" may not be accurate.	
	Requirement: Delete the term "30-year".	
	DOE-RL/WHC Response: The "30-year postclosure period" is defined in WAC 173-303-610(7)(a). No text change is required.	
145.	Deficiency: Figure 4-1, RCRA Compliant Liner System, Page 4-7/8	
	This figure and several other references indicate a layer of "asphalt". Taken literally, this means that a layer of viscous petroleum residues will be applied over the sand layer. It is unclear if this or asphaltic concrete will be used.	
	Requirement: Please verify the composition of this layer. Edit the text to specify the composition and purpose of this layer.	
	DOE-RL/WHC Responses: The only asphalt that will be used on the non-dragoff trench will be asphaltic concrete similar to that used elsewhere in the 200 Areas. The asphaltic concrete will provide pavement for the truck unloading area. Please see the Construction Quality Assurance Plan (CQAP), WHC-SD-W025-PLN-001, Page 23, Section 4.3.6, and the design drawings in WHC-SD-W025-FDR-001 on Page 105 of 397.	

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146. Deficiency: Section 4.6.3.1.2, Primary Liner System, Page 4-11

All landfill slopes must be no steeper than 4 horizontal: 1 vertical. This applies to both the lined trench slope and the final cover slope.

Requirement: Edit line 47 to read "4H:1V".

DOE-RL/WHC Response: The basis for Ecology's requirement of 4H:1V slopes is not clear. Slope stability is discussed in Section 5.1 of FDR-001. Details of these analyses are presented in Appendices C.8, C.9, and C.12 of the Design Report, and indicate acceptably high factors of safety under all design conditions. With respect to constructability, 3H:1V side slopes are routinely constructed without difficulties at several major hazardous waste disposal facilities (one facility even has side slopes as steep as 2H:1V). Operations layer material is also typically spread on these 3H:1V slopes.
The Design Report includes a filling plan (Section 6.6) which suggests that the landfill be filled in horizontal lifts. This approach will avoid any unbalanced forces acting downward along the slopes and will thus serve to maximize stability (also see response to comment 150).

The final cover has not yet been designed, so slope of the cover has not been determined.

147. Comment: Section 4.6.4.4.4, Stability of Slopes, Page 4-30

It is not just conjectural that sand will not stay on this slope, it is a certainty. There have been a number of reported slope failures at grades of 3H:1V. As far as mitigating this problem, option 1 is undesirable since it maximizes exposure of the geosynthetics, the solution in option 2 is obscure and needs expansion, and option 3 may not work due to crushing under the load of the backfill. Comments 20 and 146 also apply here.

DOE-RL/WHC Responses: See the Definitive Design Report WHC-SD-W025-FDR-001, Page 14 of 397, Section 5.1.1. and Appendix C.9, Page 264 of 397. The response to Number 146 also applies here.

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148.	Comment: Section 4.6.5.1.1, Geotextiles, Page 4-32 Typo. Line 52 should reference Section 4.6.5.2., not Section 4.6.5.1.1. This correction also needs to be made on line 45 of page 4-33 and line 10 of page 4-34. DOE-RL/WHC Responses: The references will be revised as suggested.	
149.	Deficiency: Section 4.6.5.1.2, Geonet, Page 4-33 The "important consideration" when selecting a geonet is transmissivity, not permeability. Requirement: The term "permeability" on line 32 should be replaced with "transmissivity". In addition, the appropriate ASTM test to determine transmissivity should be specified in the text. DOE-RL/WHC Responses: The transmissivity is the most important consideration when selecting a geonet. See the Definitive Design Report WHC-SD-W025-FDR-001, Page 21 of 397, Section 5.5.2. and Appendix C.3, Page 209 of 397. It specifically states that the "primary selection criteria for the geonet was the transmissivity." Also note that the specifications require conformance testing for transmissivity (see WHC-S-045, Section 02275 and the CQAP Appendix A).	
150.	Deficiency: Section 4.6.5.3.3, Operational stresses, Page 4-37 It is not clear how the waste will be backfilled. Requirement: Provide a discussion on backfilling waste, i.e., immediately after placement, after the trench is filled, in lifts, etc. DOE-RL/WHC Responses: The landfill filling plan is in the Definitive Design Report WHC-SD-W025-FDR-001, Page 35 of 397, and Section 6.6., Waste Stability 5.1.4, Page 15 of 397. Also see Page 112 of 397, Drawing H-2-131588. Golder Associates is currently evaluating alternative materials to be used as backfill and will prepare a report with these findings. Therefore, the approach described in FDR-001 may be modified.	

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151.	Comment: Section 4.6.5.5, Soil Liners, Page 4-39 Installation of soil/bentonite liners is underway at the LERF site. A number of refinements are being made to the process. Activities involving the development and installation of the admixed liner should be coordinated with the LERF project to ensure consistency in technical and regulatory matters (See Ecology letter to Wisness from Nord dated January 30, 1991 titled: Standardized Soil-Bentonite Project). DOE-RL/WHC Response: The LERF team has provided lessons learned on problems encountered during their project. Soil/Bentonite plans can be seen in the Definitive Design Report WHC-SD-W025-FDR-001, Section 4.2.1, 4.3.1, and 5.3. The Design Report, Specifications, and CQA Plan provide a great deal of latitude for the Contractor (or Construction Manager) to determine the most suitable types of equipment and procedures for preparing and placing the admix liner. The Specifications require a submittal to the Westinghouse Hanford Company Project Engineer and the CQA Engineer describing these activities. With this approach, the pertinent experience from the LERF Project will be incorporated as appropriate when the Project W-025 Landfill is constructed (see response to comment 19 in regards to an individual test fill).	
152.	Comment: Section 4.6.5.5.1, Material Testing Data, Page 4-40 Fines content testing (ASTM D 1140) should also be specified. DOE-RL/WHC Response: The CQA Plan requires sieve and hydrometer testing on Eolian sand and admix at the rate of 1 test per 1,000 cubic yards of material. The specified method is ASTM D422, which is much more comprehensive than ASTM D1140 (see WHC-S-045, Section 02224, Paragraph 2-3).	
153.	Deficiency: Section 4.6.5.5.1, Material Testing Data, Page 4-41 It is not sufficient to only use a nuclear densimeter when measuring density. A minimum number of sand cone tests, ASTM D1556-82, should be performed to provide calibration and backup for the nuclear densimeter.	

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	Requirement: The frequency of performing sand cone tests must be specified.	
	DOE-RL/WHC Response: The CQA Plan (Section 4.3.2) requires that nuclear gage density measurements be verified with either sand cone (ASTM D1556) or rubber balloon (D2167) tests. At least 1 of these tests is required for each 2 lifts of admix placed, or 1 per day, whichever is greater.	
154.	Deficiency: Section 4.6.5.5.2, Soil Liner Compatibility, Page 4-41	
	A permeability of 1 X 10^{-7} centimeters per second is a maximum value, not a minimum value as indicated on line 42.	
	Requirement: Edit the word "minimum" to read "maximum".	
	DOE-RL/WHC Response: The Design Report WHC-SD-W025-FDR-001, Page 18 of 397, Section 5.3.2 has the correct terminology. The word has been changed to a "maximum value" in the revised Chapter 4.0 permit application.	
155.	Comment: Section 4.6.5.5.5, Engineering Report, Page 4-43.	
	If this report is complete, it must be more specifically referenced and provided to Ecology. If it is not, provide an estimate for when it will be completed and modify the text to note that a copy will be provided to Ecology for review and approval.	
	DOE-RL/WHC Response: The Engineering Report has been provided to Ecology for review (see the Design Report WHC-SD-W025-FDR-001, DOE-RL-88-20, Supplement 2, Volume 1 of 2., Chapter 4).	
156.	Deficiency: Section 4.6.6.1.1, Primary System, Page 4-44	
	The text here states that the primary drainage layer will be composed of gravel. This contradicts Figure 4-1 which specifies sand.	
	Requirement: Clarify this contradiction and edit the application as necessary.	
	DOE-RL/WHC Response: The Primary Drainage Layers will be gravel (see the Design Report WHC-SD-W025-FDR-001, DOE-RL-88-20, Supplement 2, Volume 1 of 2, Chapter 4, Page 20 of 397,	

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	Section 5.5.1 and the design drawings). Figure 4.2 in the revised Chapter 4 has this revision.	
157.	Deficiency: Section 4.6.6.1.1, Primary System, Page 4-44 EPA guidance has changed since the publishing of the document referenced on line 8. The EPA currently recommends a granular drainage layer hydraulic conductivity of 1 cm/sec and a synthetic drainage layer transmissivity of 5 X 10^{-4} m^2/sec. Requirement: The above specifications must be used for the LLBG's. DOE-RL/WHC Response: EPA guidance allows use of either granular or synthetic drainage layer materials. The Project W-025 Landfill design includes both. As noted in the response to comment 31, the transmissivity of the geocomposite exceeds the EPA proposed requirement, and thus would be adequate by itself. However, the drainage gravel has been added for redundancy. Hence, the design provides high flow capacity and substantially exceeds the proposed EPA requirements.	
158.	Deficiency: Section 4.6.6.1.1, Primary System, Page 4-45 The text describes the possibility of an asphaltic operations layer. However, no evaluation is provided describing the potential impacts of this layer on the bottom liners and associated components. Requirement: An evaluation should be provided which addresses the possibility of both waste leachate and precipitation leaching materials from the asphaltic layer into the LDCRS. Effects such as accelerated degradation and clogging should be considered. DOE-RL/WHC Response: The words "asphalt operation layer" will be replaced with the following words "two foot operations layer of general fill." See the Design Report WHC-SD-W025-FDR-001, Page 8 of 397, Section 2.2 and design drawings.	

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159.	Deficiency: Section 4.6.6.1.1, Primary System, Page 4-45 It is insufficient to say the primary sumps will be monitored "regularly". Requirement: The monitoring frequency should be specified as weekly. **DOE-RL/WHC Responses: See the Design Report WHC-SD-W025-FDR-001, Page 37 of 397, Section 7.2. Periodic (daily) readings of the leachate levels in the primary and secondary sumps will be obtained and recorded.**	
160.	Deficiency: Section 4.6.6.1.2, Secondary System, Page 4-46 There is no reference to a Response Action Plan (RAP) which is required by EPA's minimum technology requirements for landfills. The RAP addresses the handling of liquids which enter the leachate detection, collection and removal system (LCDRS) and the actions to be taken in response to liquids in the LDCRS. Requirement: A RAP must be written and included in this application. Refer to the Grout Processing Facility RAP for guidance. **DOE-RL/WHC Response: A Response Action Plan will be included in the permit application prior to operation of the landfill.**	
161.	Deficiency: Section 4.6.6.5, System Compatibility, Page 4-47 There is no mention here or throughout the text on fingerprinting FML's. Requirement: Fingerprinting must be conducted for all synthetic liners. A discussion of the fingerprinting program must be presented in the text. Furthermore, the reference to "Farnsworth et al. 1988" should be corrected to read "Farnsworth et al. 1989". **DOE-RL/WHC Response: Fingerprinting will be conducted (see the Design Report WHC-SD-W025-FDR-001, Page 27 of 397, Section 6.3.1. and the 9090 Test Report to be submitted to Ecology). The reference to Farnsworth et al. is no longer cited in the revised Chapter 4.0.**	

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162.	Deficiency: Section 4.6.7.3, Construction Quality Control, Page 4-49 Although Appendix 4F provides some construction quality control information for the liner system, the EPA requires a comprehensive construction quality assurance (CQA) plan for the entire facility in the Hazardous and Solid Waste Amendments to RCRA. Requirement: A CQA plan must be provided as part of the application for the LLBG which addresses the EPA's, as well as Ecology's, concerns. **DOE-RL/WHC Response: The CQA Plan has been submitted to Ecology.**	
163.	Comment: Section 4.6.8.1.1, Design and Performance, Page 4-50 What factor of safety does a 0.3 foot freeboard provide? **DOE-RL/WHC Response: See the Design Report WHC-SD-W025-FDR-001, Page 122 of 397, for surface water hydrology calculations. Drainage ditch design is presented in Appendix C.1 of the Design Report. Because the total cross sectional area of the ditch is 3 times the area of flow for the peak 25-year storm, the factor of safety is 3.**	
164.	Deficiency: Section 4.6.8.5, Maintenance, Page 4-52 Given the sandy and windy conditions of the Hanford site, as well as the problems associated with tumbleweeds, it would seem maintenance may be a greater problem than projected. Requirement: Discuss the effect of wind, sand and tumbleweeds on drainage ditch maintenance. **DOE-RL/WHC Response: See the Design Report WHC-SD-W025-FDR-001, Page 37 of 397, Section 7.2. Surface drainage ditches surrounding the landfill should be cleaned out and graded in the fall of each year prior to start of the rainy season (see Section 4.6.8.5. of the revised Chapter 4.0).**	

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165.	Comment: Chapter 5, Groundwater Although Ecology concurs with the previous NOD responses made on this chapter, a number of new comments on this chapter are presented and may address similar concerns. It is our understanding that this chapter has been extensively revised since this application's submittal. Therefore, although the specific Chapter 5 comments which follow may no longer be applicable, the following general requirements should be addressed in the revised text. Chapter 5 should address the following: 1) all stages of monitoring well installation and well sampling should be coordinated with Ecology; 2) all lab result reports must be provided to Ecology; 3) all well completion reports must be provided to Ecology; 4) the revised chapter should utilize post 1987 data as well as prior data; and 5) provide supporting descriptions for the well location model. DOE-RL/WHC Response: 1) DOE/RL will continue to inform Ecology in advance of monitoring well installation and sampling plans. Advance information on each year's drilling program for installing new monitoring wells is provided in quarterly groundwater monitoring reports or in letter reports to Ecology. Advance information on well sampling is provided in the Part B permit application for both Interim Status and the proposed Final Status programs. This procedure provides Ecology with the opportunity to comment upon and discuss well installation and sampling plans at any time. 2) Ecology will continue to be provided with validated laboratory data from the LLBG monitoring wells in quarterly groundwater monitoring reports. Because of their volume, raw and unvalidated data are not automatically distributed; however, laboratory result reports will be provided to Ecology along with the validated laboratory data upon request. 3) Well Completion Reports for the LLBG monitoring wells will be provided to Ecology. 4) Post-1987 data will be incorporated into the revised Chapter 5. 5) The description of the Monitoring Efficiency Model used to locate monitoring wells will be expanded and clarified in response to Ecology comments. Further, references will be provided to technical reports describing the model that have been prepared since the first draft of Chapter 5 was submitted to Ecology.	

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166.	Deficiency: Section 5.2.1, Interim Status Groundwater, Page 5-2 According to the text, the monitoring system should accomplish the following: 1) define the specific waste management areas for the LLBG, 2) establish an initial ground water monitoring well network, and 3) characterize the hydrogeologic properties of the upper most aquifer beneath the LLBG. Item 3 was not fully accomplished nor completely presented in the application. Requirement: Based upon the most current data, item 3 must be completed according to the premise in the application. DOE-RL/WHC Response: The third objective of the interim status program was clarified in response to Ecology Comment 33, to indicate that the first 35 wells were intended to provide preliminary hydrogeologic properties of the uppermost aquifer system beneath the LLBG using data collected from the monitoring well network and from previously collected or published data. These data are being supplemented by additional data collected while installing new monitoring wells, and by monitoring data collected from the entire existing network. Chapter 5 will be revised to discuss these new data and will either present them or describe how they may be obtained. Characterization of the hydrogeologic properties of the uppermost aquifer is sufficient to support this Part B permit application.	
167.	Deficiency: Section 5.2.3.2.1, Groundwater Elevations, Page 5-18 Although the text states "Hydrographs for the interim status wells are given in Last et al. (1989)", no comments related to the hydrographs or any interpretations of the conclusion are given. Requirement: The information from the cited reference should be provided along with the conclusions drawn from this information. DOE-RL/WHC Response: The water level changes shown in the hydrographs are summarized in the paragraph containing the Last et al. citation, and the preceding paragraph of the text. The hydrographs are too short (covering a period of only about 8 months) to draw meaningful conclusions regarding long-term trends. The revised Chapter 5 will address the longer period of record now available, and present interpretations of that record.	

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168.	Deficiency: Figure 5-6, Water Table Beneath LLWMA 1 and 2, Page 5-19 A single contour line does not illustrate the flow direction of ground water. Requirement: The report cited on page 5-18, Last el al. (1989), indicates that the details of ground water movement in the vicinity of Waste Management Area 1 and 2 are difficult to discern. An explanation of why only one contour line is shown should be provided on the figure or in the text. If other data is available to better characterize the flow, it should be provided and the figure updated. In addition, the interpretation of reasons for ground water movement in the waste management area should be given. DOE-RL/WHC Response: In a homogeneous, isotropic system the direction of groundwater movement is perpendicular to the equipotential contour lines, and in heterogeneous, anisotropic systems the equipotential contour lines still provide an indication of the direction of flow (see Freeze and Cherry, 1979, Chapter 5). Thus a single contour line does provide information on the flow direction of groundwater. There are two equipotential contour lines shown on Figure 5-6, which provide an indication of hydraulic gradient as well as the direction of groundwater flow. The difficulties referred to by Last et al. resulted from low hydraulic gradients and a lack of data points to support additional contours. Additional data have since been obtained and Chapter 5 will be revised to present three sets of water table contours beneath LLWMA 1 and 2 covering a period of three consecutive years. Groundwater movement at this location is believed to be strongly influenced by the B-Pond groundwater mound, as stated in the text on page 5-18.	
169.	Deficiency: Section 5.2.3.2.3, Results of Water Quality, Page 5-26 The text states "The concentration of dissolved chromium exceeded drinking water standards...." However, the origin of the contamination and possible remedial actions are not discussed. Requirement: The text must discuss the origin of this contamination as well as remedial actions which could be immediately undertaken to address this contamination. This comment also applies to any other constituents which were above drinking water standards. DOE-RL/WHC Response: The origin of the high concentrations of chromium found in several of the wells is thought to be the well construction practices. This is so stated in the	

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	paragraphs immediately preceding the cited paragraph, and the text will be revised to clarify that this same potential source applies to all of the newly installed wells. Such contamination is thought to be highly localized around the well, is expected to dissipate with time, and does not result from a chemical release from a burial ground. A discussion of remedial actions for chromium contamination will be added to the text. The text will also be revised to address the origins of any other constituents found to exceed the drinking water standards listed in WAC 173-303-645(5) Table 1. Should any such constituents be indicated to have originated from the low-level burial grounds, the text will be revised to discuss remedial actions.	
170.	Comment: Section 5.3.3.2.1, Seismicity, Page 5-37 The Department of Natural Resources may have some pertinent information to these discussions from their state geological mapping efforts. Ecology recommends that the DNR be contacted for more information. DOE-RL/WHC Response: The Department of Natural Resources will be contacted regarding seismicity, and the text will be revised to incorporate any pertinent new information.	
171.	Deficiency: Section 5.3.4, Regional Hydrogeology, Page 5-38 The text notes that "The base of the aquifer is the basalt surface, but semiconfining silts and clays are present above the basalt in some areas." However, the locations of these semiconfining layers is not presented. Requirement: The locations of the semiconfining layers should be specified as well as a description of how these layers influence ground water flow and the entrapment of pollutants. DOE-RL/WHC Response: The text will be clarified to indicate that the semi-confining silts and clays are found in the lower fine-grained basal Ringold. This unit is shown in section in Figures 5-19 and 5-20. It is present beneath the 200-West Area where its lateral extent and thickness is shown in Figure 5-21. It is not present beneath the 200-East Area. The influence of this unit on groundwater flow and contaminant migration is discussed in Sections 5.3.5.2 and 5.5.2.1.9.	