Sta. 4 (3)

SEP 1 2 1995

ENGINEERING DATA TRANSMITTAL

Page 1 of 1

1. EDT № 612538

2. To: (Receiving Organization)	3. From: (Originating Organization)	4. Related EDT No.:
Characterization Field Engineering	Characterization Equipment Design	N/A
5. Proj./Prog./Dept./Div.:	6. Cog. Engr.:	7. Purchase Order No.:
75230/N4054	R. J. Blanchard	N/A
8. Originator Remarks: INITIAL RELEASE Reference ETN 95-0050		9. Equip./Component No.: N/A
		10. System/Bldg./Facility: 200 General
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) Approval Desig-nator	(G) Reason for Trans-mittal	(H) Origi-nator Dispo-sition	(I) Receiv-er Dispo-sition
1	WHC-SD-WM-ETP-159	N/A	0	Improving Sampling Recovery Task Plan	SQ	1	1	

16. KEY

Approval Designator (F)	Reason for Transmittal (G)	Disposition (H) & (I)
E, S, Q, D or N/A (see WHC-CM-3-5, Sec.12.7)	1. Approval 4. Review 2. Release 5. Post-Review 3. Information 6. Dist. (Receipt Acknow. Required)	1. Approved 4. Reviewed no/comment 2. Approved w/comment 5. Reviewed w/comment 3. Disapproved w/comment 6. Receipt acknowledged

17. SIGNATURE/DISTRIBUTION (See Approval Designator 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.
1	1	Cog.Eng. R. J. Blanchard			S7-12	R. N. Dale			S7-12	3	—
1	1	Cog. Mgr. D. W. Hamilton		9/11/95	S7-12	G. L. Ralston		9/11/95	S7-12	3	—
1	1	QA M. L. McElroy		9-11-95	S7-07	R. E. Raymond			S7-12	3	—
1	1	Safety J. A. Harvey			S7-07	J. S. Schofield		9/11/95	S7-12	3	—
3	—	J. L. Smalley			S7-12						
3	—	G. J. Bogen			S7-12						
3	—	G. P. Janicek			S7-12						

18.	19.	20.	21. DOE APPROVAL (if required) Ctrl. No.
R. J. Blanchard 9/11/95 Signature of EDT Originator — Date	J. S. Schofield 9/11/95 Authorized Representative for Receiving Organization — Date	D. W. Hamilton 9/11/95 Cognizant Manager — Date	[ ] Approved [ ] Approved w/comments [ ] Disapproved w/comments

BD-7400-172-2 (04/94) GEF097

RELEASE AUTHORIZATION

Document Number:	WHC-SD-WM-ETP-159, REV 0
Document Title:	Improving Sample Recovery
Release Date:	9/12/95

This document was reviewed following the procedures described in WHC-CM-3-4 and is:

APPROVED FOR PUBLIC RELEASE

WHC Information Release Administration Specialist:

Kara M. Broz 9/12/95

Kara M. Broz

SUPPORTING DOCUMENT

1. Total Pages 18

2. Title	3. Number	4. Rev No.
Improving Sample Recovery	WHC-SD-WM-ETP-159	0

5. Key Words	6. Author
Core Sampling, RMCST 2, 3, & 4, Sample Improvements, TSAP Samplers/Bit, Data Collection	Name: R. J. Blanchard Signature Organization/Charge Code 75230/N4054

7. Abstract

This Engineering Task Plan (ETP) describes the tasks, i.e., tests, studies, external support and modifications planned to increase the recovery of the recovery of the waste tank contents using combinations of improved techniques, equipment, knowledge, experience and testing to better the recovery rates presently being experienced.

8. RELEASE STAMP

OFFICIAL RELEASE
BY WHC
DATE SEP 12 1995
Sta. 4

IMPROVING SAMPLE RECOVERY

WHC-SD-WM-ETP-159
REVISION 0

Prepared by:

R.J. Blanchard

Approved By:	Date
R. J. Blanchard Cognizant Engineer	9-11-95
D. W. Hamilton, Manager Characterization Equipment Design	9/11/95
G. A. Harvey Safety	9/11/95
M. L. McElroy Quality Assurance	9-11-95

Concurrence:

G. J. Bogen 9-11-95	R. N. Dale 9/11/95	G. P. Janicek 9/11/95
J. F. McCormick 9-11-95	G. L. Ralston per telecon 9/11/95	D. L. Smalley 9/11/95

Table of Contents

1.0 Introduction

Characterizing the waste in the underground storage tanks at the Hanford Site is supported by sampling the tanks to obtain representative samples for analysis. This is done using numerous techniques and equipment that has been developed for use in the environment and field conditions at the Hanford site. To date the recovery of samples using the equipment available is unacceptable and needs to be improved.

2.0 Scope

2.1 Objectives

The objectives of this plan are to increase the recovery of the waste tank contents using combinations of improved techniques, equipment, knowledge, experience and testing to better the recovery rates presently being experienced, (i.e., rotary mode sampling, 38% and auger sampling, 50%). This task plan will be updated on a regular basis to reflect new modifications and tests as well as the completion of existing items, i.e., test reports, additional references, changes in organizations and schedule dates. To achieve this goal, the following steps will be taken; Engineering will, prepare test plans to investigate procedural and hardware changes to improve recovery. These tests will be performed in the test labs i.e., 305 building or off-site, test site i.e., rock slinger pit, 200W area, and in actual field sampling tasks.

Implement procedural and hardware changes recommended by outside experts, including the U.S. Corps of Engineers (USCOE) and the Tank Sampling Assistance Panel (TSAP), and as a result of testing.

Continue to evaluate and test off-the-shelf commercial sampling tools, and seek commercial advice and assistance.

Develop a sampling matrix to assist with sampler selection and operating parameters for each type or combination of wastes types needing recovery to define the waste characteristics.

Operations will, prior to starting field work, continue to improve planning and gathering of helpful data prior to sampling to improve the tool, techniques and sampling location selection. This is to include, but not be limited to increased use of photography, video and historical data. Provide support for the Sampling Activities Technical Team (SATT) meetings to assist with the planning and selection of techniques and equipment for each sampling task planned.

Operations will, in the field, make necessary procedural changes to include improvements to procedures equipment. Examples already incorporated are; changing out the sampler when waste transition layers are encountered (USCOE and TSAP recommendation), sampling on a continuous bases once sampling has started (USCOE recommendation), increasing the rotational speed that can be used without nitrogen purge

gas, and using the push mode sampler in the Rotary Mode Core Sample Truck when soft layers can be pushed instead of rotary sampled.

Use the assistance of outside sampling experts that have been qualified to accompany, observe and recommend. In addition, provide for the observation and review of sampling practices by "Expert Drillers" to help with improved sample recovery and practices.

2.2 Deliverables

2.2.1 Key Parameters

A letter report will be issued that identifies key parameters associated with core and auger sampling. Key parameters are defined as those variables and waste characteristics that might affect recovery of the tank waste media.

Responsible Individual(s): Roy Blanchard and George Janicek
Completion Date: August 16, 1995

2.2.2 Data Collection

Data from the following sources and activities will be collected and compiled in a central file;

- X-rays of each core segment
- Sampling Data sheets
- Laboratory extrusion reports
- Operations logs
- Engineering logs
- Strip charts/Data logger files
- Sampling Activities Technical Team meeting minutes

Responsible Individual(s): Roy Blanchard
Completion Date: Ongoing

2.2.3 Data Base

A data base of all key parameters will be established and maintained updated in a timely manner to account for all sampling data generated during the sampling tasks.

Responsible Individual(s): Roy Blanchard
Completion Date: Ongoing

2.2.4 Data Reduction/Analysis

Field sampling data and testing data will be analyzed for the purpose of determining how key parameters affect sample recovery, and to identify additional data needs (including tests and studies), and to identify changes in equipment and procedures that will increase sample recovery.

Recommended drilling parameters will be presented at the SATT meetings before each sampling task.

Responsible Individual(s): TSAP members and SATT
Completion Date: Prior to the start of each core.

2.2.5 Improvement Changes

Engineering Change Notices (ECN) will be prepared and released to implement TSAP and SATT recommended changes to improve sample recovery. The following is a list of initial modifications that have been identified (additional items will be added when identified). Initial recommendations to be incorporated are;

A) Modification to incorporate "Slow Rotation" capabilities on Rotary Mode Core Sample Truck #2.

   Responsible Individual(s): Jeff Smalley
   Deliverable: Work Package, Ready for work
   Completion Date: October 13, 1995

B) Modification to incorporate rotation mode in core sample truck #1.

   Responsible Individual(s): Jeff Smalley
   Completion Date: On hold

2.2.6 Studies/Tests

Numerous tests and studies will be performed to help identify and quantify the effects of different key parameters on sample recovery. The following is a list of initial studies and tests that have been identified (additional items will be added when identified);

A) "Rotary Mode Core Sampling Percent Volume Sampler Recovery Engineering Study", WHC-SD-WM-ES-352.

   Responsible Individual(s): Robert Dale
   Deliverable: Release Engineering Study
   Completion Date: September 29, 1995

B) "Phase 'A' Test Plan for New Core Samplers", WHC-SD-WM-TP-379.

   Responsible Individual(s): Greg Bogen/Jim McCormick
   Deliverable: Released Test Plan
   Completion Date: July 26, 1995

C) "Test Plan For Auger Sampler Improvements", WHC-SD-WM-TP-357, Rev.0

Responsible Individual(s): Peter Francis
Deliverable: Released Test Plan
Completion Date: April 27, 1995

"Test Report for Auger Sampler Improvement Testing", WHC-SD-WM-TRP-241, Rev. 0

Responsible Individual(s): Keith Witwer
Deliverable: Released Test Report
Completion Date: August 11, 1995

D) "Engineering Feasibility Study, Addition of slow rotation capabilities without purge gas, RMCST", WHC-SD-WM-ES-TBD

Responsible Individual(s): Jim Criddle
Deliverable: Release Engineering Study
Completion Date: October 31, 1995

E) "Qualification Test, TSAP large opening drill bit", WHC-SD-WM-QT-TBD

Responsible Individual(s): Greg Bogen/Greg Ralston
Deliverable: Release Qualification Test
Completion Date: October 31, 1995

2.2.7 Quarterly Reports

Quarterly reports will be issued to documents the core and auger sampling recovery trends. Reports issued will be supporting documents and follow the guidelines of section 3.2 concerning "Engineering Task Number" (ETN).

Responsible Individual(s): Roy Blanchard
Deliverable: Quarterly Report
Completion Date: See Schedule, section 5.0

2.2.8 Data Storage

The data produced under this task plan will be released and controlled by the Document Control Services (DCS). Engineering Task Numbers (see section 3.2) will be used to provide traceability and tracking. Document Control Services is responsible for maintaining the data base that controls all design data generated under this ETP.

Responsible Individual(s): Roy Blanchard
Deliverable: All Documents generated under this ETP
Completion Date: See schedule, section 5.0

3.0 Description

3.1 Physical Description

3.1.1 Rotary Mode Sampling

The rotary mode core sampling system will be modified physically and/or procedurally to incorporate improvements determined from the various studies and tests noted in section 2.2. Recommendations for improving the process and equipment have been made by the TSAP (after their February 14-14, 1995 meeting) and by the USCOE (reference USCOE report dated February 1995). These recommendations are being evaluated and new samplers and bits developed to test for improvements. The results of these tests, and actual field results will be incorporated into the system operating procedures where applicable. The idea and plan is to increase the available tools (sampler types, bits, and procedures) to allow as much operator flexibility as possible to obtain core samples that will meet our needs for tank characterization quality objectives.

See figures 1, 2 & 3 for new configurations of samplers being tested per section 2.2.6 B.

3.1.2 Push Mode Sampling

The improvements that are discovered and incorporated into the rotary mode core sample trucks, noted in section 3.1.1, will be incorporated into the push mode where applicable, especially in the area of using a variety of samplers. In addition, for the push mode truck the addition of the capability to rotate either in a bumping mode or in a slow rotational mode would greatly open up the operating window for using this truck in tanks where the need for rotating to obtain samples is required or desired.

3.1.3 Auger Sampling

Since the auger sampler was developed in early 1991, the intended use has been expanded way beyond its original mission. As a result the present recovery figures do not meet expectations and in certain sample media types the sample obtained will not remain in the auger assembly during retrieval operations. Modifications to the present system design have been developed and are being tested per section 2.2.6 C. The results of these tests will be incorporated into the design and sampling procedures to improve the recovery capabilities. See reference 7 for details of recommendations.

3.2 Engineering Tasks

Those items associated with "Improving Sample Recovery" and noted in this ETP will fall under the Engineering Task Number (ETN) 95-0050. The activities are subdivided into common sub-tasks, denoted by the same ETN plus an alpha character suffix (e.g., 95-0050-A).

Sub-task	Suffix
Key Parameters	A
Data Collection	B
Data Base	C
Data Reduction/Analysis	D
Improvement Changes	E
Studies/Tests	F
Quarterly Reports	G
Data Storage	H
TSAP Reports/minutes	I
SATT meeting minutes	J

The support of the Tank Sampling Assistance Panel (TSAP) will be required to review our progress and to continue to help develop methods and equipment to help obtain the most cost effective and timely ways to improve our sampling recovery (see appendix A for Charter and membership). This team is made up of recognized experts in the field of sampling in hazardous waste environments and their experience and backgrounds can be tapped to help solve our present sampling short comings. The principles of concurrent engineering will continue to be practiced by assembling the Tank Sampling Technical Team (SATT) on a regular basis to discuss the results of previous sampling efforts and upcoming plans.

The purpose of these meetings is to assemble the total team that will be involved with the sampling task and review the plans rational for the new task and the lessons learned from the previous sampling efforts. See appendix B for the SATT charter and membership.

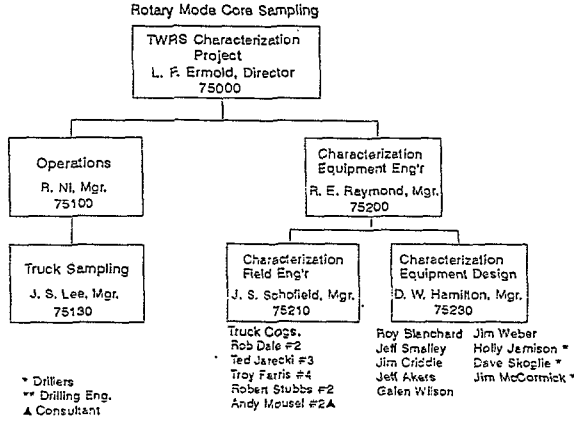
The presently defined tasks noted in section 2.2 will require the support of a variety of organizations and will be defined in detail in sections 4.0 and 5.0, in the form of Cost Account Plan - Work Sheets, and schedules.

4.0 Organization

4.1 Rotary Mode Core Sampling

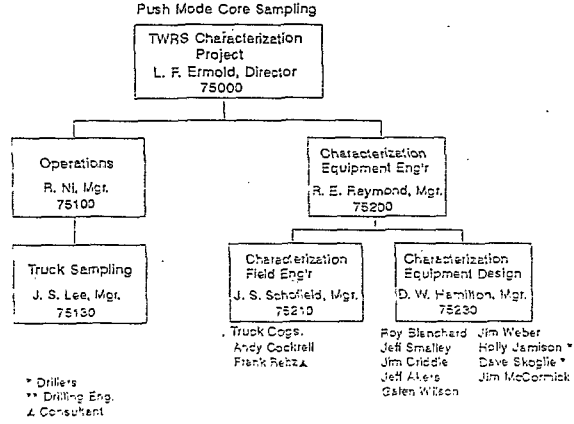
The rotary mode organization chart is noted below. The Characterization Project Operations manager, Randy Ni, is supported By his direct report, Jim Lee, Manager of Truck Sampling. Characterization Field Engineering support is provided by John Schofield, Manager who directly reports to Rick Raymond, Manager of Characterization Equipment Engineering, and by Characterization Equipment Design, Managed by Dennis Hamilton. Randy

Ni and Rick Raymond report to Len Ermold, Director, TWRS Characterization Project. The field cognizant engineers for the rotary mode trucks are, Andy Mousel, RMCST #2, Ted Jarecki, RMCST #3, and Troy Farris, RMCST #4. In addition, Rob Dale and Robert Stubbs assist with RMCST #2.



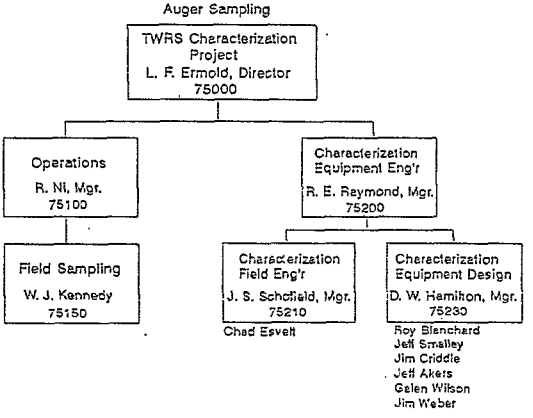
4.2 Organization for Push Mode Core Sampling

The push mode core sampling organization chart is essentially the same as the Rotary mode organization chart with the exceptions of the differences in Cognizant Field engineer assignments under John Schofield. The cognizant engineer for push mode sampling is Andy Cockrell with assistance from Frank Reitz.



4.3 Organization for Auger Sampling

The organization for auger sampling is noted below. The Characterizations Project Operations manager, Randy Ni, is supported by his direct report, Wally Kennedy, manager Field Sampling. Characterization Field Engineering support is provided by John Schofield, manager who directly reports to Rick Raymond, Manager of Characterization Equipment Engineering, and by Characterization Equipment Design, managed by Dennis Hamilton. Randy Ni and Rick Raymond report to Len Ermold, Director, TWRS Characterization Project. The field cognizant engineer for auger sampling is Chad Esvelt.



5.0 Schedule

A detailed schedule of the tasks noted in this task plan is provided in Appendix C. The schedule has been reviewed and approved by each responsible individual on the concurrence list in Appendix D. Signatures on the concurrence list designates agreement with the schedule shown in Appendix C and is acceptance of the responsibility to perform to the schedule.

6.0 Cost Estimate

The cost for the tasks noted in this Engineering Task Plan is controlled by Dennis Hamilton, Manager of Characterization Equipment Design is the Cost Account Manager for these tasks.

7.0 Quality Assurance

The approval designator for the tasks noted is SQ, requiring review and approvals by safety and quality organizations. The activities noted in this plan fall under criteria numbers T0.1, T3.6, T4.3, T4.4 and T5.3 in the document approval matrix of WHC-CM-3-5, dated August 7, 1995.

8.0 References

1. WHC-CM-3-5, Document Control and Record Management Manual, Westinghouse Hanford Company, Richland, Washington.

2. USCOE, Geotechnical Report, "Evaluation of Sampling Tools and Activities used for Characterization of the Hanford Single Shell High Level Tanks Waste", February 1995.

3. WHC, April 7, 1995, Letter, L.F. Ermold to L. Erickson, "Response to transmittal of United States Army Corps of Engineers Report - Evaluation of Sampling Tools and Activities used for Characterization of the Hanford High Level Tank Wastes".

4. WHC, Engineering Study, WHC-SD-WM-ES-352 Rev. 0, "Rotary Mode Core Sampling Percent Volume Sampler Recovery Engineering Study", Rob Dale.

5. WHC, Test Plan, WHC-SD-WM-TP-379 Rev. 0, "Phase 'A' Test Plan for New Core Samplers", Greg Bogen.

6. WHC, Test Plan, WHC-SD-WM-TP-357 Rev. 0, "Test Plan For Auger Sampler Improvements", Peter Francis.

7. WHC, Test Report, WHC-SD-WM-TRP-241, Rev. 0, "Test Report for Auger Sampler Improvement Testing", Keith Witwer.

8. WHC, Engineering Study, WHC-SD-WM-ES-TBD Rev. 0, "Engineering Feasibility Study, Addition of Slow Rotation Capabilities without Purge Gas, RMCST", Greg Ralston

9. WHC, Qualification Test, WHC-SD-WM-QT-TBD Rev. 0, "TSAP Large Opening Drill Bit", Greg Bogen/Greg Ralston

10. WHC, Design Specification, WHC-SD-WM-SDS-004, Rev. 0, "Design Specification for Core Sampling Tools", Greg Bogen

11. WHC, Engineering Study, WHC-SD-WM-ES-353, Rev. 0, "Engineering Study for Multiple Core Samplers", Greg Bogen.

TANK SAMPLING ASSISTANCE PANEL (TSAP)
(UPDATED AS OF 8/4/95)

CHARTER:

Help Westinghouse Hanford Company determine the most cost affective and timely way to Improve WHC's ability to recovery Waste Tank Samples to satisfy the needs of our customers.

This team will be made up of recognized experts in the field of sampling in Hazardous waste environments so that their experience and backgrounds can be tapped to improve the present WHC sampling systems and where necessary recommend additions to complete the Characterization Program objectives. The team will work very close with the "Sampling Activity Technical Team" and assist and propose system modifications and procedures improvements. One of the first tasks after becoming familiar with the WHC present sampling systems will be to review the recommendations made by the USACE from their January 4 & 5, 1995 visit.

Chairperson: Don Moak, Consultant
Water Development Hanford, Inc

Co-Chairperson: Roy Blanchard, Senior Principle Engineer
Characterization Equipment Engineering, WHC

Members;

Jim McCormick - Consultant
Science Applications International Corporation (SAIC)

Christopher Koerner - Consultant (P.E.) - TCAP Member
Radian Corporation

Jack Powers - Consultant (P.E.) - TCAP Member

Mark Vispi, USACE
Manager, Earth Quake Engineering & Earth Science,
Waterways Experiment Station

Joe Gatz, Consultant
Retired from Waterways Experimental Station
Supervisory Geologist, Chief Engineering Geology Branch
(new member)

Jakcobus (Jake) Archuletta - Los Alamos National Laboratory

Paul Hernandez - DOE-RL

John Silko - Geologist, DOE-RL
(new member)

Greg Bogen, Engineer
Characterization Equipment Engineering, WHC

SAMPLING ACTIVITIES TECHNICAL TEAM (SATT)
(updated as of 4/14/95)

Charter:

Review field sampling process/procedures/equipment for areas of improvement to increase sample recovery percentage and efficiency of operations. Determine solutions to system problems and track performance. Specify in pre-sampling meetings the "Sampling Plan and Requirements" which consider recovery requirements, tank waste profile and type, best sequence/procedure, results of past sampling efforts, etc.

The concept of the team is to be a FOCUSED concurrent effort of ALL involved functions, i.e., Characterization Equipment Engineering, Characterization Plant Engineering (Cognizant Engineer's), Characterization Technical Support (TCP/DQO/Tank profiles), 222-S Laboratory, Operations (Operators), Geotechnical Engineering, and DOE-RL.

Co-Chairpersons, Roy Blanchard and John Schofield.
Secretary - NEED TO REPLACE

Members (Primary);

Characterization Equipment Improvements - Jeff Smalley

Characterization Plant Engineering - Robert Dale/Ted Jarecki/Andy Cockrell/Troy Farris

Characterization Plans, Coordination and Reports - Jaiduk Jo

222-S Laboratory - Keith Fuller

Geotechnical Engineering Services - Jim McCormick

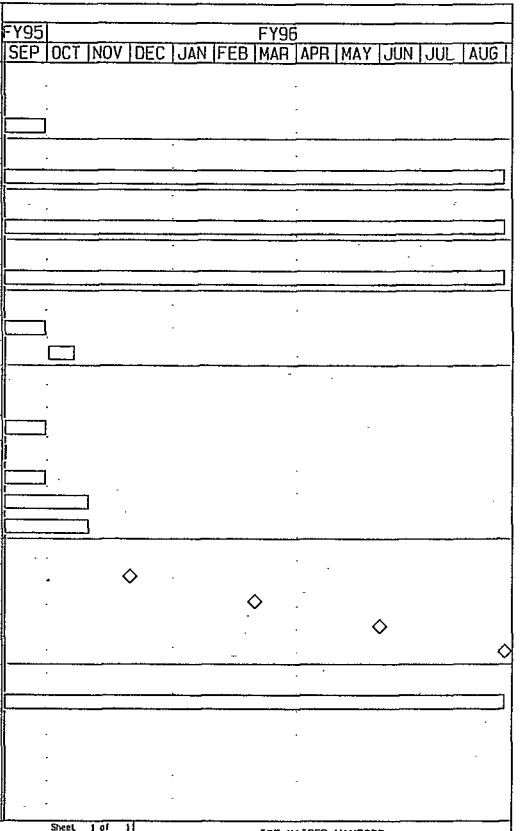
DOE-RL - Paul Hernandez
- John Silko

Operations - Jim Lee/Wally Kennedy
- Operators

Characterization Maintenance - Bill Shoemake

Characterization Prog. Man., Operations Interface - George Stanton

ACTIVITY DESCRIPTION	EARLY START	EARLY FINISH
KEY PARAMETERS	1SEP95	29SEP95
DATA COLLECTION (ONGOING)	1SEP95	30AUG96
DATA BASE (ONGOING)	1SEP95	30AUG96
DATA REDUCTION / ANALYSIS	1SEP95	30AUG96
IMPROVEMENT CHANGES		
(A) SMALLEY / ECN PREPARATION	1SEP95	29SEP95
(B) SMALLEY / WORK PACKAGE	20CT95	20OCT95
STUDIES / TESTS		
(C) BOGAN	27APR95A	27APR95A
(A) DALE	1SEP95	29SEP95
(B) BOGAN	1SEP95	1SEP95
(C) WINTER	1SEP95	29SEP95
(D) CRIDDLE	1SEP95	31OCT95
(E) RALSTON	1SEP95	31OCT95
QUARTERLY REPORTS		
SUBMIT FIRST QUARTER REPORT		30NOV95
SUBMIT SECOND QUARTER REPORT		29FEB96
SUBMIT THIRD QUARTER REPORT		31MAY96
SUBMIT FOURTH QUARTER REPORT		30AUG96
DATA STORAGE	1SEP95	30AUG96



Plot Date 6SEP95
Data Date 1SEP95
Project Start 10CT92
Project Finish 30SEP97 A

(c) Primavera Systems, Inc.

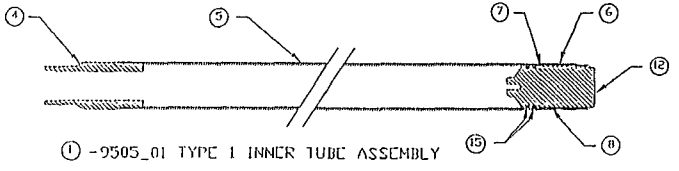
Activity Bar/Early Dates
Critical Activity
Progress Bar
Milestone/Flag Activity

Sheet 1 of 1

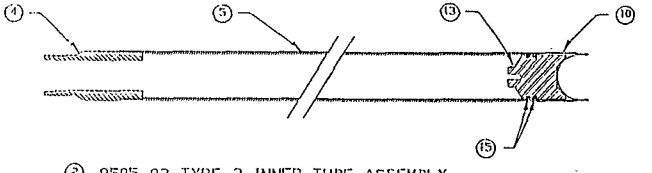
TASK PLAN SCHEDULE

ICF KAISER HANFORD

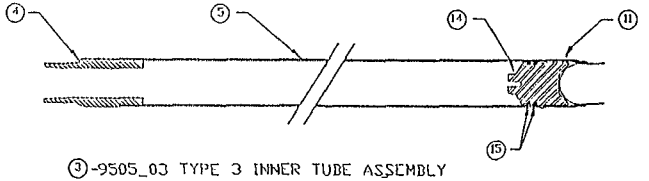
Date	Revision	Checked	Approved



① -9505_01 TYPE 1 INNER TUBE ASSEMBLY



② -9505_02 TYPE 2 INNER TUBE ASSEMBLY



③-9505_03 TYPE 3 INNER TUBE ASSEMBLY

QUANTITY			ITEM NUMBER	PART NUMBER	DESCRIPTION	MATERIAL/REFERENCE
		X	1	9505_06	TYPE 1 INNER TUBE ASSEMBLY	
	X		2	9505_02	TYPE 2 INNER TUBE ASSEMBLY	
X			3	9505_03	TYPE 3 INNER TUBE ASSEMBLY	
1	1	1	4	9505_04	TYPE 1&2 INNER TUBE CAP	ASSE 1026 PER NOTE #3
1	1	1	5	9505_05	TYPE 1&2 INNER TUBE	MODIFIED L/F PART# 53119-P PER NOTE #1
		1	6	9505_06	TYPE 3 CYPELINED CASE	MODIFIED L/F PART# 53119 PER NOTE #1
		1	7	9505_07	TYPE 3 STOP PINS	L/F PART# 53128
		1	8	9505_08	TYPE 3 CYPELINED, HARD PACK STYLE	L/F PART# 65334
		1	9	9505_09	TYPE 3 CYPELINED, FULL CLOSURE	MODIFIED L/F PART# 65334
	1		10	9505_10	TYPE 2 CASE, FULL CLOSURE	ASSE 1019 / ASSE 336 PER NOTE #1
1			11	9505_11	TYPE 3 CASE, FULL CLOSURE	ASSE 1019 / ASSE 336 PER NOTE #1
		1	12	9505_12	TYPE 1 PISTON	ASSE 1019 PER NOTE #1
	1		13	9505_13	TYPE 2 PISTON	ASSE 1009 PER NOTE #1
1			14	9505_14	TYPE 3 PISTON	ASSE 1009 PER NOTE #1
1	1	1	15	9505_15	TYPE 1,2,3 PISTON O-RINGS	PARKER 2-228 N9O-N 70
AR	AR	AR	16	9505_16	GREASE HIGH VACUUM	DOW CORNING #55
AR	AR	AR	17	9505_17	ANTI-SEIZE LUBRICANT	FEL-PRO C5-5191 GRADE #2 PTFE

GENERAL NOTES (UNLESS OTHERWISE SPECIFIED)

1. BREAK ALL SHARP EDGES AND REMOVE ALL BURRS
2. UNLESS OTHERWISE SPECIFIED, MACHINED SURFACES TO BE 125/.
3. TO POSITION THE PISTON FOR PINTLE ROD ASSEMBLY, THE LOWER EDGE OF THE O-RING GROOVE MUST BE 0.50 - 0.70 INCHES INSIDE THE INNER TUBE PIN THREAD. LUBRICATE O-RING GROOVE AND O-RING SURAFCE WITH PART NO. 9505_16.
4. LUBRICATE WITH PART NO. 9505_17, HAND TIGHTEN, UNSCREW, REMOVE EXCESS LUBRICANT, RE-TIGHTEN, TORQUE TO 30 - 50 FOOT POUNDS.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES
DECIMALS ANGULAR
.XX ± .05 ± 0.5°
.XXX ± .010
DO NOT SCALE DRAWING

DRAWN HMP DATE 05/23/95
CHECKED
DESIGN

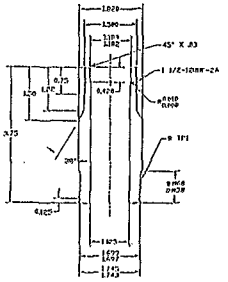
QD Design and Fabricating, Inc.
4558 Parkland Circle, Salt Lake City, Utah 84117 Phone (801) 359 5006

WESTINGHOUSE HANDFORD COMPANY
PROTOTYPE INNER TUBE ASSEMBLIES

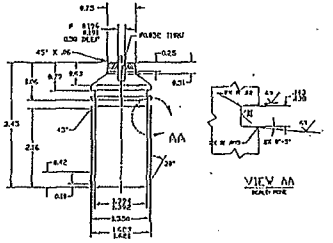
SIZE D | DWG NO. 9505 | REV
SCALE NONE | SHEET 1 OF 3

Figure 1

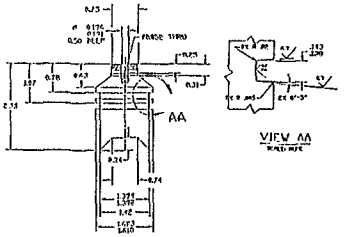
REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED



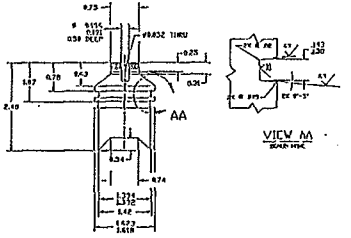
9505_04 TYPE 1,2,3 INNER TUBE CAP



9505_12 TYPE 1 PISTON



9505_13 TYPE 2 PISTON

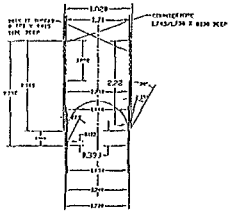


9505_14 TYPE 3 PISTON

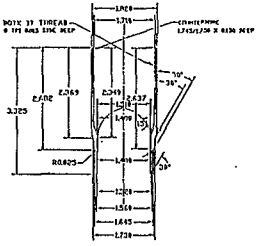
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: DECIMALS ANGULAR .XX ± .03 ± 0.5° .XXX ± .010 DO NOT SCALE DRAWING		QD Design and Fabricating, Inc. 4358 Hayford Circle, Salt Lake City, Utah 84117 Phone (801) 277-5048	
		WESTINGHOUSE HANDFORD COMPANY PROTOTYPE INNER TUBE ASSEMBLIES	
DRAWN HMP	DATE 05/23/93	SIZE D	DWG NO. 9505 REV
CHECKED		SCALE NONE	SHEET 2 OF 3
DESIGN			

Figure 2

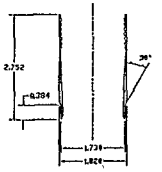
REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED



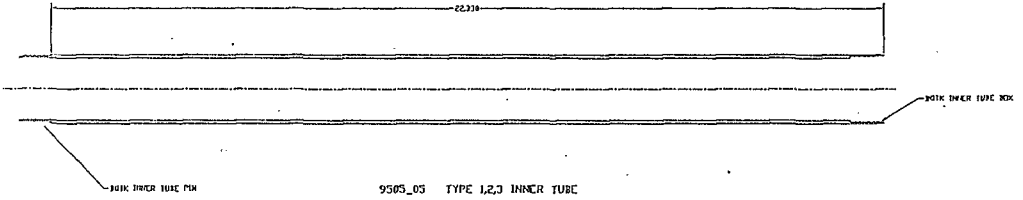
9505_10 TYPE 2 CASE, FULL CLOSURE



9505_11 TYPE 3 CASE, FULL CLOSURE



9505_06 TYPE 1 CORELIFTER CASE



9505_03 TYPE 1,2,3 INNER TUBE

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES DECIMALS .XX ± .05 .XXX ± .010 DO NOT SCALE DRAWING ANGULAR ± 0.5°	QD Design and Fabricating, Inc. 4558 Rayford Circle, Salt Lake City, Utah 84117 Phone: (801) 509-5800	
	WESTINGHOUSE HANDFORD COMPANY PROTOTYPE INNER TUBE ASSEMBLIES	
DRAWN HMP DATE 05/23/95	SIZE D	DWG NO. 9505 REV
CHECKED	SCALE NONE	SHEET 3 OF 3
DESIGN		

Figure 3