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ENGINEERING DATA TRANSMITTAL

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1	HNF-2175	29	0	Engineering Task Plan HTI Cone Penetrometer	SQ	1	1	1

16. KEY

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(G) Reason	(H) Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN
1	1	Design Authority G P Janicek	G P Janicek	2/24/98	S7-12
4	4	Design Agent D B Hagmann	D B Hagmann	2/24/98	H5-61
4	4	A F Noonan			K9-91
1	1	Cog. Mgr. D F Iwatate	D F Iwatate	2/25/98	H5-61
1	1	QA J J Huston	J J Huston	2/25/98	H5-61
1	1	Safety P L Smith	P L Smith	2/24/98	S5-12
1	1	K D Reynolds	K D Reynolds Per Telecon	2/25/98	H1-12
4	4	R M Boger	R M Boger per telecon 3/17/98		S7-12
4	4	C A Esvelt	C A Esvelt per telecon 3/2/98		S7-12
#3	#6	J G Burton			S7-21
#3	#6	W J Kennedy			S7-03
4	4	W S Callaway	W S Callaway 2/25/98		S3-90
4	4	G L Troyer	G L Troyer 2/26/98		T6-50
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623801
SHEET 2 of 2

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HTI/Characterization	G P Janicek	N/A
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1	1	R. S. Popielarczyk				57-	01				
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Signature of EDT Originator / Date	Authorized Representative for Receiving Organization / Date	Design Authority/ Cognizant Manager / Date	[] Approved w/comments [] Disapproved w/comments

Engineering Task Plan
HTI Cone Penetrometer

S. A. Krieg
NUMATEC Hanford Corp, Richland, WA 99352
U.S. Department of Energy Contract DE-AC06-96RL13200

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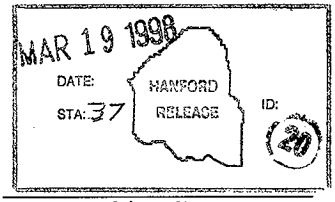
Abstract: The Hanford Cone Penetrometer Platform (CPP) will be used to insert instrumented and soil sampling probes into the soil adjacent to Tank AX-104 to assist in characterizing the waste plume. The scope, deliverables, roles and responsibilities, safety, and environmental considerations are presented in the task plan.

ETN-97-0014



Release Approval Date

Release Stamp

Approved for Public Release

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HTI Cone Penetrometer

1.0 INTRODUCTION

Tank 241-AX-104 (AX-104) is one of four 1 million gallon Single-Shell tanks (SSTs) in the AX tank farm. AX-104 was constructed in 1964 and received primarily high-level PUREX waste. AX-104 was sluiced in 1977 and 1978 and interim isolated in 1982. An estimated 7,000 gallons of high activity dry waste remains in the tank. AX-104 is an "assumed leaker". 8,000 gallons of hazardous chemical and radiolnuclide contaminates are assumed to have leaked to the soil column from AX-104. The makeup, distribution, concentration, and volume of the leaked waste is uncertain. The exact source(s) of leakage are also uncertain (i.e. tank piping vs tank structure).

One of the Hanford Tanks Initiative (HTI) tasks is the characterization of waste leakage plumes adjacent to tank AX-104. This includes mapping the location, extent, and content of waste leakage plumes. This task will be accomplished using cone penetrometer (CP) techniques and equipment. State-of-the-art multi-sensor and soil sampling CP probes will be deployed using the existing Hanford Site Cone Penetrometer platform (CPP).

The "portable" CPP was designed, built, tested, and delivered for use at the Hanford Site in FY-95/96. The CPP represents the present state-of-the-art in CP deployment capability and has the push potential of 35 tons, essential to CP deployment into the Hanford soils. The CPP was originally designed for use in contaminated tank farm environments and specifically to deploy waste characterization sensors directly into Hanford SSTs through tank risers. The HTI plume characterization task will use the CPP for the deployment of probes into the soils around tank AX-104, not into the tank. The unique design and capabilities of the CPP will enable very accurate placement of CP probes in both the surface and sub-surface areas of tank farm soils.

This task plan describes the tasks, deliverables, and responsibilities for deployment and operation of the CPP in the AX tank farm and around tank AX-104.

2.0 SCOPE

2.1 OBJECTIVES

The overall objective of the CPP deployment task is to characterize the vadose zone and soils around tank AX-104. The investigations planned for the CP system will 1) demonstrate the ability of CP technology for vadose zone characterization 2) support the AX Farm Retrieval Performance Evaluation Criteria Assessment (RPECA). This will be achieved using instrumented CP probes and soil sampling probes deployed by the Hanford CPP. This task will also provide all of the documentation, reviews, approvals, system checkouts, training, and operational strategies for a demonstration deployment of the CPP in the AX tank farm for characterization and mapping of the waste plume adjacent to tank AX-104.

2.2 DELIVERABLES

The primary deliverables associated with the CPP deployment task are listed below. These deliverables are described in more detail in paragraph 3.2, *ENGINEERING TASKS*. A more detailed list of deliverables will be prepared for the Acceptance for Beneficial Use (ABU) and Managers checklists that will be used as tools to access readiness to start operations in the AX Farm.

1) Procurement Specification(s) for the CP probes (the multi-sensor and soil sampling probe specification was completed in FY 97)

2) Multi-sensor probe (MSP) procurement including performance characterization, acceptance testing, technical transfer and delivery to Hanford/HTI.

3) Soil sample probe procurement including performance characterization, acceptance testing, technical transfer and delivery to Hanford/HTI.

4) Vendor probe documentation including summary reports, test plans, acceptance test reports, configuration drawings, operating procedures, and characterization/verification data.

5) Excavation permits (for hot and cold deployments)

6) Analytical strategy Document

7) Training plan and supporting documents

8) CPP operating procedures

9) USQ Screening/determination and Hazards Identification and Evaluation

10) Job Control System Work Packages

11) ABU/Managers checklists

12) Grouting strategy document

13) Preliminary siting plan for AX-104 deployment (cold and hot)

14) Draft Fielding Document (completed FY 97 item, HNF-SD-HTI-TI-002)

15) Preliminary Deployment Plan

16) CP Siting/Deployment document

3.0 DESCRIPTION

3.1 FUNCTIONAL (PHYSICAL) DESCRIPTION

This task addresses the need to safely deploy minimum intrusive sensors and sampling tools to more accurately define the extent of tank waste leakage plume contamination in AX farm and to quantify the constituents of concern. The analytical tools and deployment techniques that will be provided by this task will enhance existing commercial CP technologies and methods, improve upon the current plume characterization capabilities, and provide data that will support the HTI RPECA. In addition, the planned deployment approach and advanced sensors will provide a "proof-of-concept" for the design and deployment of future vadose zone surveillance instruments that can be used for other applications both in and out of tank farms.

The Hanford CPP will be used to deploy a new generation of soil sensor, soil sampling, and Raman spectroscopy probes. Small diameter (i.e., 2 inch or less) CP piping strings, with integrated instrument and sampling probes, will be deployed into the soils surrounding tank AX-104. The probes will be emplaced according to a carefully designed deployment and sampling strategy in order to obtain useful, appropriate, and defensible data about plume content and extent. The target depth for deployment of the probes is from 50 to 150 feet below surface. The maximum depths for deployment are expected to vary from hole to hole due to "refusal" (prevention of further downward movement due to resistant soil composition and/or rocks). These probes will provide new data about an expanded suite of potential tank waste leakage plume constituents, and that information will be combined with existing historic data to support waste retrieval and tank/tank farm closure decisions.

The overall task consists of two separate yet interdependent task elements: (1) the design, fabrication, and testing of specialized probes compatible with the existing Hanford CPP equipment; (2) the preparation and implementation of a CP probe deployment event into the soil around SST AX-104. This activity is planned to take place over a two-year period (FY-97 thru FY-98).

Instrumented CP soil sensor probes, similar to those that are planned for this work, have been built, tested, and deployed at other locations during the past few years to depths of greater than 100 feet. CP technology of this type was applied at several locations around the 200 East and 200 West areas in the early 1990's and in FY-96 CP technology was used to emplace four electrical resistance tomography (ERT) vertical electrode arrays to a depth of 130 feet in the 200 East area (non-tank farm) soils. This demonstrated the feasibility of CP sensor deployment into soil conditions and to depths that are considered appropriate for vadose zone characterization in the tank farms.

Different types of CP probes will be used during the planned task: soil multi-sensor probes (MSP), moisture detection probes (MDP), soil sampling probes (SSP), and possibly a Raman Spectroscopy probe (RSP). The MSP and SSP probes are separate and unique units that will be deployed during separate CP push events in close proximity to each other (within 1-2 feet). The probes are deployed by the CPP by attaching them to the front end position of an overall CP piping string. In this position, the probes are essentially additional sections of pipe (approximately 1 meter in length) that are screwed into the pipe string along with all the other piping segments.

The MSP contains a gamma radiation detector, an x-ray fluorescence detector and a tip module (soil stratigraphy, inclinometer, and magnetometer), and will provide data on soil conditions and waste contamination. The MSP will be deployed first at each location. The MSP data and the MDP data will be used to make grouting decisions and determine where SSP sampling should be conducted.

The SSP will be used to obtain multiple discrete soil samples at specified/desired depths in areas where contaminants are suspected or have been found using the MSP as a screening tool. Soil samples are planned to be taken in close proximity to the location where the MSP provides indications of potential contamination (i.e., plume presence). This approach will insure that soil is collected only in locations where contaminants are most likely and also provide additional confidence that metal objects do not lie in the path of the SSP.

The MDP is a resistivity based unit that will detect and measure moisture in the soil. Data on soil moisture will assist in making the decision to grout the probe holes.

The RSP is a single sensor probe with a fiber optic base Raman spectroscopy system that can be used to detect nitrate in the soil. Nitrate presence provides indication of potential contamination in the soil. Use of the RSP is not a high priority task for the initial demonstration effort.

This task will also include demonstration of CP hole closure capability to support regulatory requirements. During this demonstration, a grout tube can be used to close up the potential void space left behind when the MSP, SSP or the MDP is withdrawn. Decisions regarding the need for hole closure (i. e. grouting) will be made in the field following a regulator approved decision process.

3.2 ENGINEERING TASKS

The engineering tasks listed below will be or have been accomplished by the HTI plume characterization team. A more detailed listing of the documentation required for the successful completion of this task will be included in the ABU and Managers checklists that will be prepared to verify readiness.

1) Prepare a procurement specification for the MSP and SSP (this was prepared in FY 97, HNF-SD-HTI-SDS-001).

2) Design and fabricate a MSP. Performance characterize, perform acceptance testing, and deliver the probes to Hanford/HTI.

3) Design and fabricate two SSPs. Performance characterize, perform acceptance testing, and deliver the probes to Hanford/HTI.

4) Complete and document Vendor probe testing activities such as 1) Vendor acceptance Tests (VATs), 2) Construction Acceptance Tests (CATs), and 3) Final Acceptance Tests (FATs).

5) Prepare an excavation permit identifying the appropriate locations in AX farm available for the CPP to push the probes into the soil. The general objective is to push in locations that are close to the tank, and where historical data indicates a waste leakage plume may exist. CP probe push locations have been coordinated with contaminate data needs. CPP/CP probe push locations have been planned to best serve AX-104 Data Quality Objectives (DQOs) for the CP task in support of the RPECA within operational constraints. The permit will identify the number and location of each deployment of the CPP and precisely locate areas of soil for probe deployment. Preliminary planning calls for approximately 10 to 20 individual probe push locations (a push location is a single siting point for the CPP). Six pushes can be made (both new-hole and same-hole) within a 2 foot square surface area) at each CPP push location with different probes without having to move the

CPP. The permit will identify and "map" the location of CP pushes to aid in planning prior to field deployment of the CPP.

6) An Analytical Strategy document will be prepared describing the strategy for use of the MSP, SSP, and MDP correlated with the data needs and data gathered around AX-104. The document will describe the required operations related to field measurement and analytical operations, sample handling, and laboratory analytical results from the MSP and soil samples taken using the SSP. The Analytical Strategy document will be released as a supporting document (HNF-SD-HTI-SP-001).

7) A Training plan will be prepared for the AX-104 CP probe deployment task addressing training requirements for the following:

- CPP operations
- Analytical systems/equipment operations (CP probes and data acquisition system)

Training will primarily consist of general class room overview of CP technology and CPP features and capabilities and On-The-Job-Training (OJT). OJT will include procedure walkdowns and operational training conducted by qualified HTI, PHMC, and ARA personnel. Training will be conducted during a separate cold deployment period in the schedule outside of tank farms/operating areas.

8) Operating procedures will be prepared for the CPP, probes, and associated support activities.

9) A USQ Screening/determination and Hazards Identification and Evaluation will be prepared to review the authorization basis related to deployment and operation of the CPP in the AX farm (both of these items are now in draft form)

10) JCS Work Package(s) will be prepared by the Production Control Planners addressing mobilization and equipment set up and checkout during cold deployment runs and in the AX farm.

11) A modified ABU/Managers checklist will be prepared and signed off by the appropriate approvers. The completed check list will be used as a tool to access readiness of the Cone Penetrometer to start operations.

12) A grouting strategy document (HNF-2048) will be prepared that will define the method(s)/processes that will be used to determine the need to grout the CP hole. The grouting strategy document along with this task plan will satisfy the requirements for the Drilling

and Abandonment Plan for this excavation.

13) A preliminary siting plan was prepared in FY 97 to identify potential CPP/CP probe push locations around AX-104. The excavation permit will finalize the siting plans. The general objective is to push in locations that are close to the tank, and where historical data indicates a plume may exist. A preliminary siting plan (contained in the fielding document) identified the number and location of each potential deployment of the CPP. Preliminary planning calls for deployment of the CPP at approximately 10 to 20 push locations with up to six pushes being made within a 2 foot square surface area at each CPP location. The siting plan information will be expanded and incorporated into an excavation permit.

14) A fielding document was prepared that captures all of the FY 97 documentation related to the AX-104 plume characterization task and maintains it as a referencable source. Included in the document are preliminary procedures, reports, analysis, studies, drawings, siting plan, deployment plan, analytical strategy, etc. At the completion of the task, the fielding document will be released into the document control system as a draft supporting document (HNF-SD-HTI-TI-002).

15) A preliminary deployment Plan for the CPP was prepared in FY 97. The plan was included as an attachment to the Fielding document and will not be released as a separate supporting document. The plan addressed the following subjects related to the CPP:

- CP task overall operation sequence
- Roles and Responsibilities
- Operating Procedures
- Staffing
- Equipment checkout and training

16) CP Siting/Deployment Document

Prepare a CP Siting/Deployment document that updates the information in the preliminary deployment plan and preliminary siting plan that were prepared last FY.

3.3 VERIFICATION

The overall philosophy of the CP probe deployment task is, that it is a demonstration. The task will demonstrate the capability to use CP to deploy instrumented and soil sampling probes in a tank

farm to characterize contamination extent and content. This includes specific demonstration of the capabilities of the MSP and SSP probes. The capabilities and performance of the new probes will first be verified through an acceptance testing process at the vendor site as described in the probe specification document HNF-SD-HTI-SDS-001, section 3.6. Field deployment at a cold Hanford location will also verify CPP and CP probe functions prior to tank farm use.

The Hanford CPP is an existing system that will be used to deploy the CP probes into the tank farm soils. The CPP will undergo a series of cold tests at the *Mock Tank A-105 Leak Test Site* in 200 East area prior to hot deployment in the AX tank farm. The CPP will be reviewed and inspected for features, performance, and capabilities that are specifically related to the HTI AX-104 plume characterization task. CPP maintenance and serviceability work will be conducted prior to initiating support to the HTI CP probe task. The determination of readiness to start operations in the AX farm will be made in accordance with a modified ABU process (see paragraph 3.8).

3.4 PROCUREMENT/FABRICATION TASKS

The procurement/fabrication task will be accomplished through design/fabrication/testing activities of the MSP and SSP at the vendor's location. These probes are procured in accordance with the requirements of the specification document, *Specification for Soil Multisensor and Soil Sampling Cone Penetrometer Probes, HNF-SD-HTI-SDS-001.*

3.5 INSTALLATION TASKS

No permanent equipment or system installations are performed during this task. The CPP is placed at specific locations in the tank farm using a crane. The placement of the CPP and CP pipe and instruments is temporary and both are removed at the completion of the CPP operations. The CP probes are pushed into the soil to perform analysis and to take samples and are then withdrawn and removed. All support equipment is mobile, self-contained and will also be removed at the completion of the deployment.

3.6 ACCEPTANCE TESTING

Acceptance testing for the HTI CP task will be limited to vendor activities regarding the preparation of the MSP and SSP. There are three types of acceptance tests for the probes: vendor acceptance tests (VATs), general construction acceptance tests (CATs), and final acceptance tests (FATs). All acceptance testing will be the responsibility of the Probe vendor and will be successfully completed at the vendor's location before the

equipment is released for transfer and/or shipping to Hanford. Final acceptance test procedures and test reports will be prepared and included as part of the Vendor's information and report submittal. Acceptance test activities (i.e., test plans) will be proposed by the Vendor and approved by HTI and may include focus on such product aspects as:

- Confirmation that the requirements of the CP probe specification have been met (design verification)
- Checkout of wiring continuity and electrical protective devices
- Performance characterization of MSP instruments
- Testing of all instrumentation loops to ensure they function properly and respond within required times/parameters
- Adjustment and setting of controllers, limit switches, and other similar devices
- Equipment bench-testing and laboratory checkout
- Performance confirmation that the probes operate as a complete unit (coupled with a CP string) as planned/required

VATs will be performed by the Vendor to demonstrate that fabrication, assembly, installation, construction, and performance requirements cited in the probe specification have been met. The VATs will be performed at the Vendor's facilities. The Vendor will develop and submit test procedures to HTI, as required and appropriate for the equipment procurement specifications. These procedures will be reviewed and approved by HTI to ensure that testing specified is adequate to demonstrate compliance with equipment specifications. Performance of the VATs by the Vendor will be witnessed by members of the HTI staff where deemed appropriate.

The Vendor will perform CATs on individual components and subsystems during fabrication/assembly of the probes. The CATs should include standard construction tests such as cleanliness inspection, electrical continuity checks, pre- and post-installation checks, as appropriate. The CATs may be conducted according to existing Vendor guidelines and practice. The CATs shall be conducted by the Vendor and documented as part of the overall task records. The Vendor will perform and monitor all CATs to ensure that proper test documentation is prepared and included as part of the final submittal documentation. The CATs may be observed by HTI, or the documentation may be provided to HTI, when requested during the course of the task.

The FATs will represent the final testing performed by the Vendor and witnessed by HTI before the equipment will be released for shipment/transfer. The Vendor will perform and/or monitor all FATs and ensure that proper test documentation is prepared and included as part of the vendor information. The FATs will be prepared, issued, and performed by the Vendor and witnessed by HTI staff representatives.

3.7 INTERFACES

There are limited physical interfaces with tank farms. The CPP does not operate inside any of the underground waste storage tanks or in conjunction with any of the tank farm systems. There will be a defined deployment route for movement of the CPP into and out of the tank farms. The CPP is transported on a flatbed trailer and off-loaded with a site crane along this defined route.

HTI organizational interfaces are depicted on figure 1. Additional organizational and procedural interfaces will be defined in the ABU and Managers checklists.

3.8 Acceptance for Beneficial Use

Since there is no future mission for the CPP, there will not be a turnover to operations. A modified ABU process will be used to verify readiness only to deploy in soils surrounding AX-104. At the conclusion of the CP demonstration task, Characterization Project Operations will be responsible for storing the CPP in a controlled equipment storage area.

4.0 ROLES AND RESPONSIBILITIES

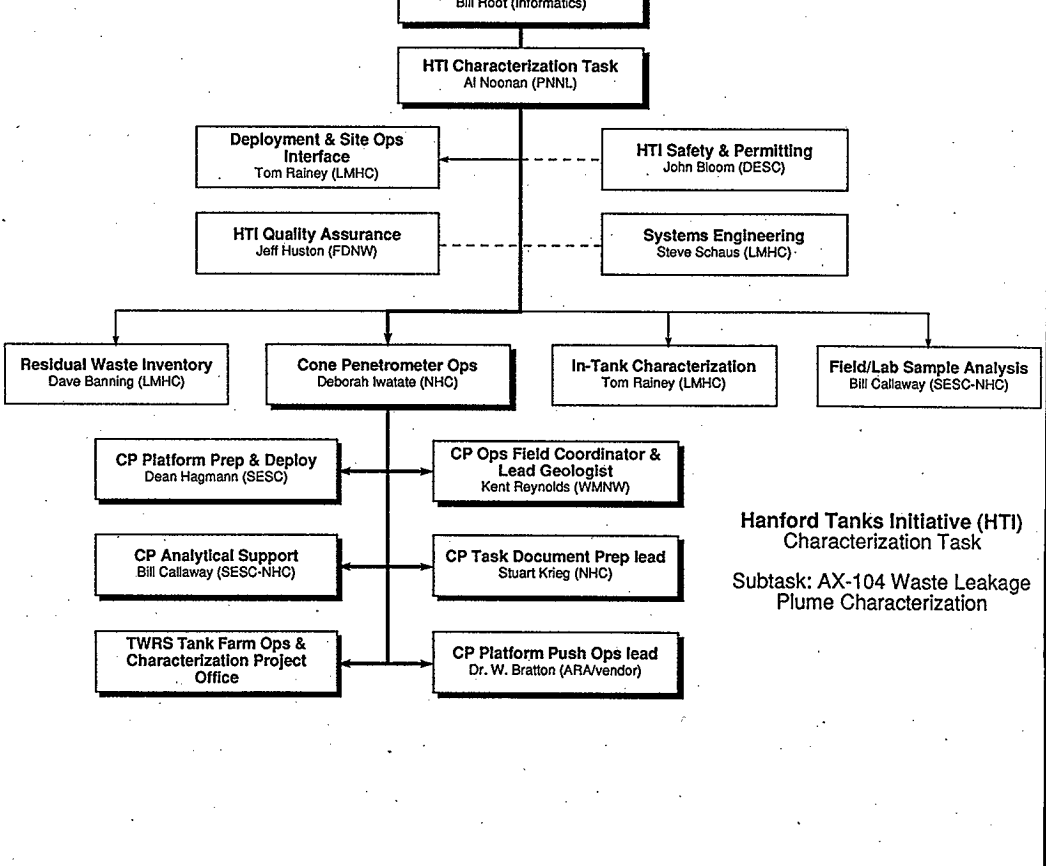
The overall HTI organizational responsibilities for the completion of this task are shown on figure 1. The overall organizational flow is down from "HTI Project" to "Cone Penetrometer Operations" as indicated by the heavy line. The work will be managed by the "Cone Penetrometer Applications" function under the direction of D. F. Iwatate. The higher level HTI roles and responsibilities are contained in Letter SESC-97-273, *Roles and Responsibilities for the Hanford Tanks Initiative (HTI) Project*.

The overall roles and responsibilities for the CP deployment task are defined in the following paragraphs.

4.1 Cone Penetrometer Applications

1. Provide Project Management services for the Cone Penetrometer demonstration task related to deployment of the CPP into the AX tank farm.

FIGURE 1 ROLES AND RESPONSIBILITIES



2. Provide design agent services for the CP probes and associated equipment provided by Cone Penetrometer Applications (CPA).

3. Provide QA overview, review, and approval for the CPA Engineering activities, procurements, and procedures.

4. Develop the modified ABU checklist used to verify readiness to start.

5. Prepare and/or coordinate the plans and procedures required for deployment and operation of the CPP in the 200 East Area 105-A Mock Tank Leak Test Site (LTS) and the AX tank farm. This effort includes obtaining operating, maintenance, calibration, etc. procedures from the CPP vendor as well as coordinating the preparation of the safety and authorization basis documentation.

6. Prepare the Procurement specification(s) and procure the multi-sensor, soil sampling, and moisture detection CP probes for deployment in AX tank farm and the LTS.

7. CPP Design Agent.

8. "Designated User" for CPP.

9. Prepare Final Reports documenting the results of the demonstration and characterization activities.

10. Final disposition of all hardware and documents except for the CPP which is the responsibility of CPO to store.

4.2 Tank Waste Operations

1. Approval Authority for start-up of the CP operations in AX tank farm.

2. Issue Letter of Intent (LOI) to use the modified ABU procedure as the method to determine readiness for operation.

3. Provide training services for CPP operations personnel.

4.3 Characterization Project Operations

1. Provide technical overview of the CPP tank farm activities and readiness to operate process.

2. Provide operations support including CPP operators and operational lead personnel.

3. Provide tank farm related maintenance services including craft personnel for the CPP and associated systems.

4. Transport/handling of soil samples after retrieval as required.

5. Operate support equipment.

6. Provide JCS work package planner services.

7. Develop approved JCS work package(s) for the CP deployment in tank farms.

8. Prepare formal CPO procedures (as required) using the procedures provided by CPA as a basis (see 4.1-5).

4.4 Characterization Engineering

1. Design Authority for the CPP.

2. Provide Tank Farm Cognizant engineering review/approval services.

3. Provide characterization field engineering services including CPO procedure preparation and interfacing with Packaging Engineering.

4.5 Double Shell Tank Engineering

1. Supply tank dome loading overview and approval.

4.6 Nuclear Safety and Licensing

1. Preparation and release of the Hazards Identification and Evaluation document for the CP operations in tank farms.

2. Prepare/disposition the USQ S/D for the CP operations in tank farms.

4.7 Environmental/Safety/Health and QA

1. Oversee the implementation of DOE orders, and federal, state, and local laws and regulations as required; and provide guidance and policy direction for CP operations in the tank farms.

2. Provide professional services in the areas of environmental permitting and oversight, nuclear safety, industrial safety, industrial hygiene, fire protection, emergency preparedness, and quality assurance. These services are both support and

independent oversight functions for the CP Activity, which will maintain and improve public safety, safe and healthful working conditions, and the safety of the environment.

3. Provide QA/QC services for The CPP operations in tank farms.

4. Provide radiological control engineering services.

5. Provide Radiological Control Technician services in the tank farms.

4.8 Crane & Rigging Services (DynCorp)

1. Prepare handling and rigging procedures.

2. Provide crane and rigging equipment and personnel.

4.9 Analytical Technology (NHC)

1. Operation of the CP Probes.

2. Field and Laboratory data collection.

4.10 Materials and Physical Science (CEC)

1. Manage Analytical activities.

2. Development of the analytical strategy for the soil samples.

3. Field and Laboratory data collection evaluation

4.11 Waste Management Federal Services Inc, NW Operations

1. Preparation and approval of the excavation permit(s).

2. Preparation of the siting plan to identify appropriate locations to push the CP probes into the AX tank farm soils.

3. Provide CCP support staff as needed i.e. pipe handling operations on the CPP.

4. Develop CP grouting operation and CP hole closure strategy.

5. Provide Washington State licensed drillers for operating the CPP.

6. Field coordination services for the CPP, crane/rigging, and tank farms operations staff.

7. Provide supervisory/geologist oversight of the CPP tank farm operations.

8. Preparation of Waste Disposal Plan.

4.12 Applied Research Associates Inc.

1. Technical support for the CP push operations.

2. Prepare draft operating procedures for the CPP.

3. Provide Operating Personnel for the CPP.

4. Provide on-the-job training for TWRS personnel on the CPP.

5. Operation of the grout system.

4.13 Army Corp of Engineers Waterways Experiment Station

1. Technical lead for the CP probe design, fabrication, and testing.

2. Design, fabricate, and deliver the multi-sensor and soil sample probes for the CP.

3. Test and characterize the multi-sensor and soil sample probes for the CP.

4. Provide technical support for the CP probes.

4.14 TRW Systems Integration Group

1. Provide Systems Engineering support for the CP task.

2. Provide recommendation on cost effectiveness of developing requirements traceability for the CPP and probes.

5.0 COST

The funding for this task, including support from other organizations identified in section 4.0, are included in the HTI Characterization budget and no additional funding is required from other sources.

6.0 SCHEDULE

The Cone Penetrometer deployment schedule is shown in attachment A.

7.0 QUALITY ASSURANCE

Compliance is mandatory to the Quality Assurance Program Description

(QAPD), number HNF-MP-599, for all activities and products associated with HTI.

8.0 SAFETY AND ENVIRONMENTAL

All training, testing, installation, and operational efforts will be conducted in accordance with the appropriate Hanford Site safety, environmental, and quality assurance requirements as specified in the Project Hanford Policies and Procedures (PHPP).

A USQ Screening/Determination will be performed to determine whether installation and operation of the CPP is bounded by the Basis for Interim Operation (BIO) and other authorization basis documents (see paragraph 3.2-9).

9.0 SYSTEMS ENGINEERING

Systems Engineering for this task will be conducted in accordance with the *HTI Systems Engineering Management Plan (SEMP), HNF-SD-HTI-SEMP-001.* The general systems engineering products for HTI Characterization are described in table 3-1 of the HTI SEMP.

10.0 CLOSEOUT COSTS

This task is not a project and there are no offsite cost commitments other than the probe procurement. There are no closeout costs associated with the on site work, therefore closeout costs are not applicable to this task.

11.0 REFERENCES

1) *HTI Systems Engineering Management Plan, HNF-SD-HTI-SEMP-001.*

2) *Specification for Soil Multisensor and Soil Sampling Cone Penetrometer Probes, HNF-SD-HTI-SDS-001.*

3) *HTI Cone Penetrometer Analytical Strategy Document, HNF-SD-HTI-SP-001, DRAFT.*

4) *HTI Cone Penetrometer Grouting Strategy, HNF-2048, DRAFT.*

5) *Cone Penetrometer Fielding Document, HNF-SD-HTI-TI-002, DRAFT*

6) *Hazard Identification and Evaluation for Deploying the Cone Penetrometer in the Tank arm for Vadose Zone Characterization, HNF-SD-WM-HEI-012.*

7) *Unreviewed Safety Question Screening/Determination for Operation of Cone Penetrometer System for Vadose Zone Waste Plume, TF-97-0876.*

8) *Roles and Responsibilities for the Hanford Tanks Initiative (HTI) Project, Letter SESC-97-273.*

9) *Quality Assurance Program Description (QAPD), HNF-MP-599.*

10) *Tank Waste Remediation System Basis for Interim Operation, HNF-SD-WM-BIO-001, rev 0.*

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ATTACHMENT A

CONE PENETROMETER DEPLOYMENT SCHEDULE

2-19-98
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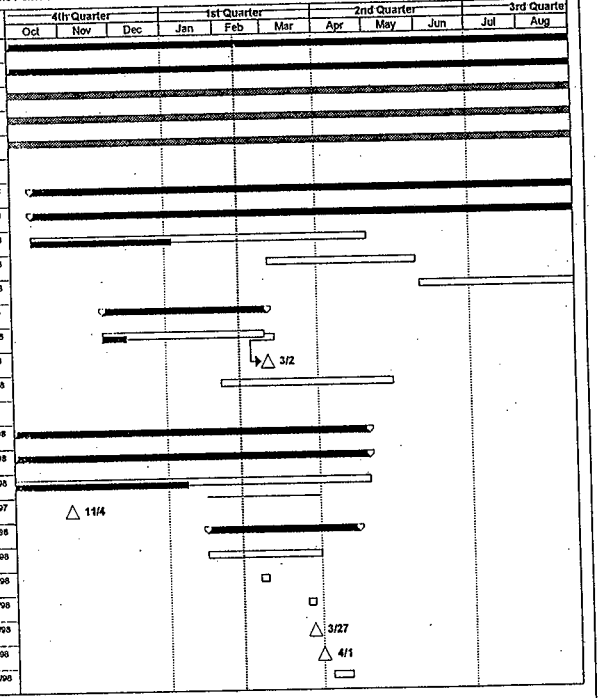
HTI/Plume Characterization Subtask (Cone Penetrometer Soil Sensor and Sampler Probes Deployment)

ID	Task Name	Start	End
1	HTI/CP Probe Deployment at AX-104	10/1/97	9/30/98
2	SYSTEM INTEGRATION & MANAGEMENT (D25V1)	10/1/97	9/30/98
3	HTI/CP NHC (D. Iwatate)	10/1/97	9/30/98
4	HTI/CPP WMNW (K Reynolds, et al)	10/1/97	9/30/98
5	HTI/CPP SESC (D. Hagmann)	10/1/97	9/30/98
6			
7	ANALYTICAL SUPPORT (D25V2)	10/13/97	9/30/98
8	Analytical Support to CP Field Operations	10/13/97	9/30/98
9	Support to CP Probe Engineering	10/13/97	4/30/98
10	Support to Cold Deployment	3/2/98	5/29/98
11	Support to Hot Deployment	6/1/98	9/30/98
12	Analytical Equipment Preparation	11/24/97	3/2/98
13	Identification, procurement, preparation	11/24/97	2/27/98
14	* Analytical equipment ready for HTI/CP tasks	3/2/98	3/2/98
15	Staff Training (Analytical)	2/2/98	5/15/98
16			
17	CP PROBE ENGINEERING (D25V3)	10/1/97	4/30/98
18	Army/WES - Phase I	10/1/97	4/30/98
19	CP Probe Fabrication (FY-97/98)	10/1/97	4/30/98
20	* Phase I FAT Completed	11/4/97	11/4/97
21	Army/WES - Phase II	1/23/98	4/24/98
22	CP Probe Calibration & MSP DAS - Completion	1/23/98	3/31/98
23	HTI/WES Documentation/QA meeting at Vicksburg	2/23/98	2/27/98
24	CP Probe Phase II/Final Acceptance Test (Vicksburg)	3/23/98	3/27/98
25	* Phase II FAT Completed	3/27/98	3/27/98
26	* CP Probes Transfered/Enroute to Hanford T-04-98-523	4/1/98	4/1/98
27	CP Probe Tech Transfer Deployment (Hanford)	4/6/98	4/17/98



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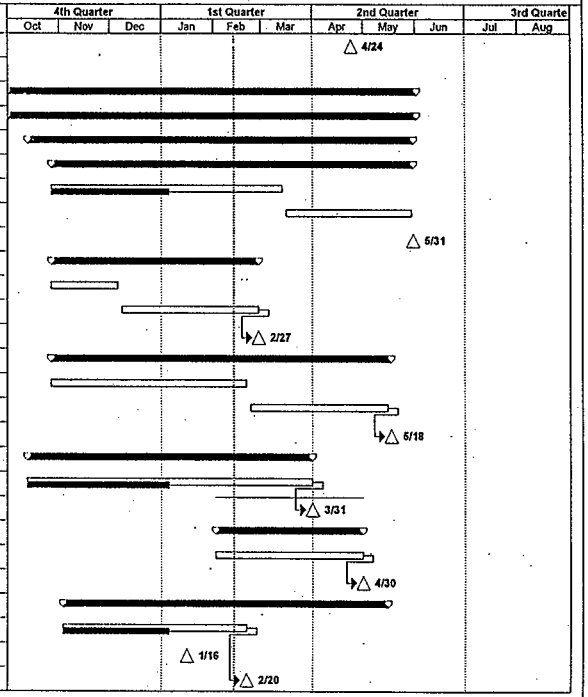
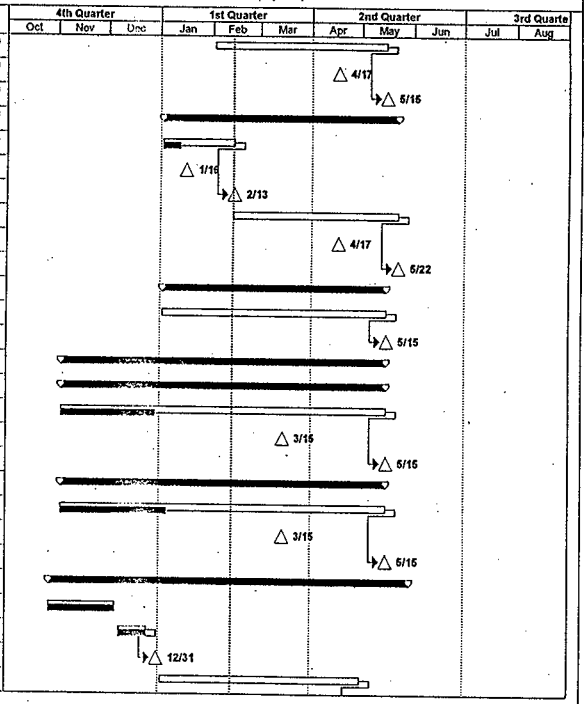
HTI/Plume Characterization Subtask (Cone Penetrometer Soil Sensor and Sampler Probes Deployment)

ID	Task Name	Start	End
28	* Tech Transfer Deployment Complete	4/24/98	4/24/98
29			
30	CP PROBE DEPLOYMENT PREPARATION (D25V4)	10/1/97	6/1/98
31	Document Preparation	10/1/97	6/1/98
32	Analytical Documentation Preparation	10/13/97	5/31/98
33	Field Procedures (Smplg, smpl hndlg, trans, data	10/27/97	5/31/98
34	DRAFT preparation	10/27/97	3/13/98
35	FINAL preparation (w/review & comment)	3/16/98	5/28/98
36	* Complete & Release Field Procedures	5/31/98	5/31/98
37	Lab Procedures	10/27/97	2/27/98
38	DRAFT preparation	10/27/97	12/5/97
39	FINAL preparation (w/review & comment)	12/8/97	2/27/98
40	* Complete & Release Field Procedures	2/27/98	2/27/98
41	Data analysis & Packaging	10/27/97	5/18/98
42	DRAFT preparation	10/27/97	2/20/98
43	FINAL preparation (w/review & comment)	2/23/98	5/15/98
44	* Complete & Release Field Procedures	5/18/98	5/18/98
45	CP Probe DQO (Banning)	10/13/97	3/31/98
46	DQO Preparation	10/13/97	3/31/98
47	* Complete & Release	3/31/98	3/31/98
48	Analytical QA Plan	2/2/98	4/30/98
49	Sampling plan (SAP) Rev. 0 preparation (Banni	2/2/98	4/30/98
50	* QA Plan Approved/Released as SD Doc	4/30/98	4/30/98
51	Engineering Task Plan (ETP) (S. Krieg)	11/3/97	5/15/98
52	Prepare Rev. 0	11/3/97	2/20/98
53	DRAFT available for review	1/16/98	1/16/98
54	Complete/issue Rev. 0	2/20/98	2/20/98



HTI/Plume Characterization Subtask (Cone Penetrometer Soil Sensor and Sampler Probes Deployment)

ID	Task Name	Start	End
55	Prepare Rev. 1	2/2/98	5/15/98
56	DRAFT Rev. 1 available for review	4/17/98	4/17/98
57	Complete/issue Rev. 1	5/15/98	5/15/98
58	Acceptance for Beneficial Use (ABU) (SK & D Dobson	1/2/98	5/22/98
59	Prepare Rev. 0	1/2/98	2/13/98
60	DRAFT available for review	1/16/98	1/16/98
61	Complete/issue Rev. 0	2/13/98	2/13/98
62	Prepare Rev. 1	2/13/98	5/22/98
63	DRAFT Rev. 1 available for review	4/17/98	4/17/98
64	Complete/issue Rev. 1	5/22/98	5/22/98
65	CP Probe Excavation Permit for AX-104 (Reynolds/C	1/2/98	5/15/98
66	Preparation	1/2/98	5/15/98
67	* Complete & release of FINAL	5/15/98	5/15/98
68	CPP Tank Farm Procedures Preparation (DH)	11/3/97	5/15/98
69	CPP Procedures for Fielding (DH & CO)	11/3/97	5/15/98
70	Preparation	11/3/97	5/15/98
71	* CPP TF Procedures Rev. A complete	3/15/98	3/15/98
72	* CPP TF Procedures Rev. 0 complete	5/15/98	5/15/98
73	CPP Operation Procedures (ARA)	11/3/97	5/15/98
74	Preparation	11/3/97	5/15/98
75	* CPP Operation Procedures complete (Rev. A)	3/15/98	3/15/98
76	* CPP Operation Procedures complete (Rev. 0)	5/15/98	5/15/98
77	CP Grouting Strategy (K. Lindsey/DB Stevens)	10/27/97	5/29/98
78	DRAFT preparation	10/27/97	12/5/97
79	FINAL preparation (w/review & comment)	12/8/97	12/24/97
80	* Complete & release of FINAL	12/31/97	12/31/97
81	Review closure strategy w/DOE and Ecology	1/2/98	4/30/98



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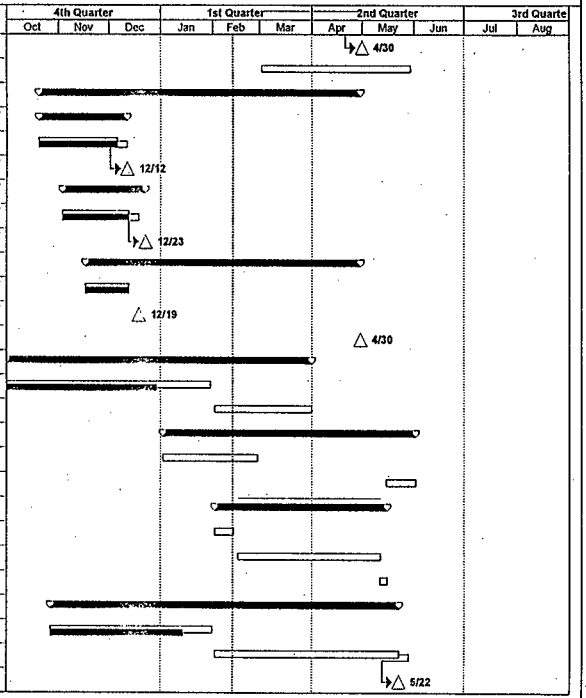
HTI/Plume Characterization Subtask (Cone Penetrometer Soil Sensor and Sampler Probes Deployment)

ID	Task Name	Start	End
82	Finalize closure strategy w/DOE and Ecology	4/30/98	4/30/98
83	HTI/CP Hole Closure Logic document prep/app/relea	3/2/98	5/29/98
84	Safety & Permitting (DI & J Bloom)	10/20/97	4/30/98
85	HI&E Document (J. Bloom/B. Grams)	10/20/97	12/12/97
86	FINAL Document prepared/reviewed	10/20/97	12/5/97
87	* HI&E Document Complete/Issued	12/12/97	12/12/97
88	USQ Screening (J. Bloom/B. Grams)	11/3/97	12/23/97
89	Screening process underway	11/3/97	12/12/97
90	USQ Screening Completed/letter issued	12/23/97	12/23/97
91	TWRS Authorization Basis Update... as needed	11/17/97	4/30/98
92	A/B Update process underway	11/17/97	12/12/97
93	* A/B Update completed/letter issued	12/19/97	12/19/97
94	Revisit/finalize safety findings prior to hot deploy	4/30/98	4/30/98
95	Resolve Ecology & WDOH Questions (DI & N Homan)	10/1/97	3/31/98
96	Initial meetings with WDOH	10/1/97	1/30/98
97	Followup/closure meeting(s) with WDOH	2/2/98	3/31/98
98	Operations doc prep for cold/hot deployment	1/2/98	6/1/98
99	WPs for Cold Deployment	1/2/98	2/27/98
100	JCSs for Hot Deployment	5/15/98	6/1/98
101	Radiation work permits (RWPs)	2/2/98	5/15/98
102	DRAFT AX-104 CP RWP	2/2/98	2/13/98
103	Walkdown operations w/RWP	2/16/98	5/11/98
104	Review & Revise RWP	5/11/98	5/15/98
105	Labor and Readiness Issues	10/27/97	5/22/98
106	ORR/RA/ABU Decision Process (DDobson/RShupe)	10/27/97	1/31/98
107	Implement ABU/readiness process	2/2/98	5/22/98
108	* Obtain [TWRS] approval to deploy in AX tank farm	5/22/98	5/22/98



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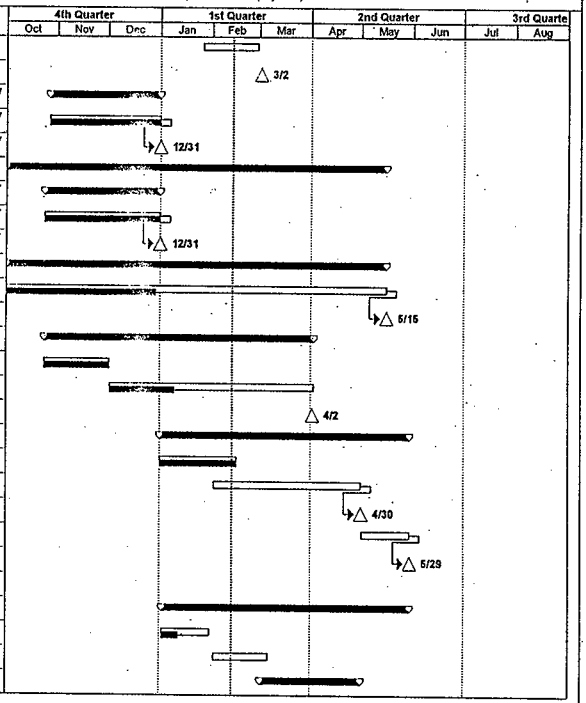
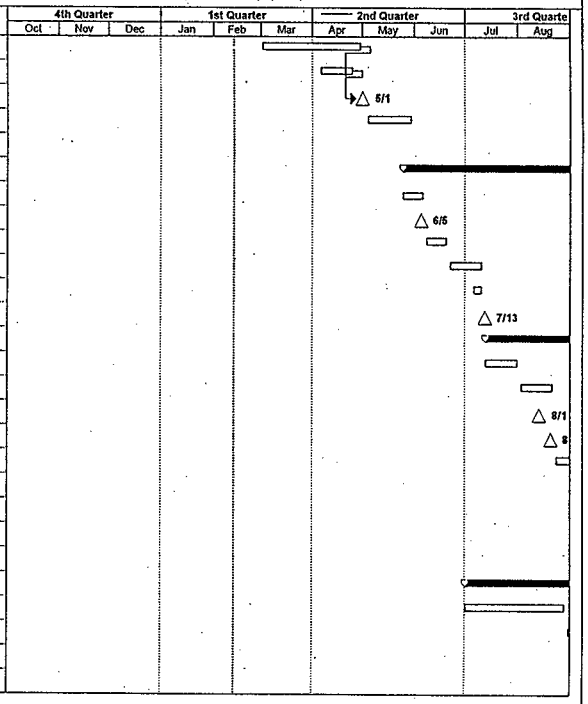
HTI/Plume Characterization Subtask (Cone Penetrometer Soil Sensor and Sampler Probes Deployment)

ID	Task Name	Start	End
109	Plant Forces Work Review	1/26/98	2/27/98
110	Complete/resolve all PF issues	3/2/98	3/2/98
111	Ready Test/Cold Deployment Site (KR)	10/27/97	12/31/97
112	Conduct site preparation activities	10/27/97	12/31/97
113	* Cold Deployment site ready for HTI/CP service	12/31/97	12/31/97
114	Hanford CPP Preparation (DH)	10/1/97	5/15/98
115	CPP Repair & Upgrade "Project" (AE & ARA)	10/24/97	12/31/97
116	Conduct R&U Tasks	10/24/97	12/31/97
117	* CPP Repair & Upgrade Completed	12/31/97	12/31/97
118	CPP Maintenance & Instrument Calibration	10/1/97	5/15/98
119	Identify, plan, implement M&C activities	10/1/97	5/15/98
120	* Complete all M&C activities	5/15/98	5/15/98
121	ARA Equipment, materials, staff prep (Deb/Dean)	10/24/97	4/2/98
122	Identify EM&S, prepare plan and SOW/TO	10/24/97	12/1/97
123	Equipment & material procure from ARA	12/2/97	4/2/98
124	* All E&M onsite ready for HTI service	4/2/98	4/2/98
125	Deployment Staff Training/Preparation	1/1/98	5/29/98
126	Identify training needs/develop plan	1/1/98	2/15/98
127	Carry out training plan	2/2/98	4/30/98
128	* Prelim. Training completed	4/30/98	4/30/98
129	Complete training to final signoff	5/1/98	5/29/98
130	* Training completed to support CP deployment	5/29/98	5/29/98
131			
132	CP SENSOR/SAMPLER COLD DEPLOYMENT (D26V5)	1/2/98	5/29/98
133	Leak Test Site (LTS) #1 Activities	1/2/98	1/30/98
134	Leak Test Site (LTS) #2 Activities	2/2/98	3/6/98
135	"Official" CPP/CP Probe Cold Deployment (LTS #3) Activit	3/2/98	5/1/98



HTI/Plume Characterization Subtask (Cone Penetrometer Soil Sensor and Sampler Probes Deployment)

ID	Task Name	Start	End
136	Hanford CPP/CP probe LTS prep tasks	3/2/98	4/29/98
137	Army/WES probes and DAS setup and run	4/6/98	4/24/98
138	* Complete CP Probe Cold Deployment T-04-98-524	5/1/98	5/1/98
139	CP Moisture/Lithology tools calibration fielding	5/4/98	5/29/98
140			
141	CP SENSOR/SAMPLER HOT DEPLOYMENT (D25V6)	5/25/98	9/30/98
142	Final staging and coordination with 241-AX operations	5/25/98	6/5/98
143	* Verification of authorization to proceed w/hot deploy	6/5/98	6/5/98
144	Equipment mobilization and setup at 241-AX TF perimeter	6/8/98	6/19/98
145	CPP positioning/setup around AX-104	6/22/98	7/10/98
146	Final preparations for initial push	7/6/98	7/10/98
147	* Begin CP probe AX-104 push operations	7/13/98	7/13/98
148	Conduct AX-104 CP probe push operations	7/13/98	9/30/98
149	Conduct 1st CP location Ops	7/13/98	7/31/98
150	Conduct 2nd CP location Ops	8/3/98	8/21/98
151	* *"Complete" Hot CP Probe Deployment AX-104(Root go*	8/14/98	8/14/98
152	Decision (go/no go) to continue with CP probe push opera	8/21/98	8/21/98
153	Conduct 3rd CP location Ops	8/24/98	9/11/98
154	Conduct 4th CP location Ops	9/14/98	9/28/98
155	* "Complete" Hot CP Probe Deployment AX-104 T-04-98-	9/15/98	9/15/98
156	Conclude AX tf push operations/take down (if no go)	9/25/98	9/30/98
157			
158	CP PROBE DEPLOYMENT DRAFT REPORT (D25V7)	7/1/98	9/30/98
159	Prepare DRAFT document	7/1/98	8/28/98
160	Incorporate summary fielding information	8/31/98	9/28/98
161	* Issue DRAFT report: FY98 CP Probe Deployment T-04-98-5	9/30/98	9/30/98
162			



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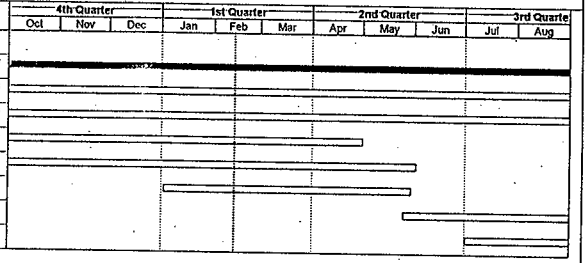
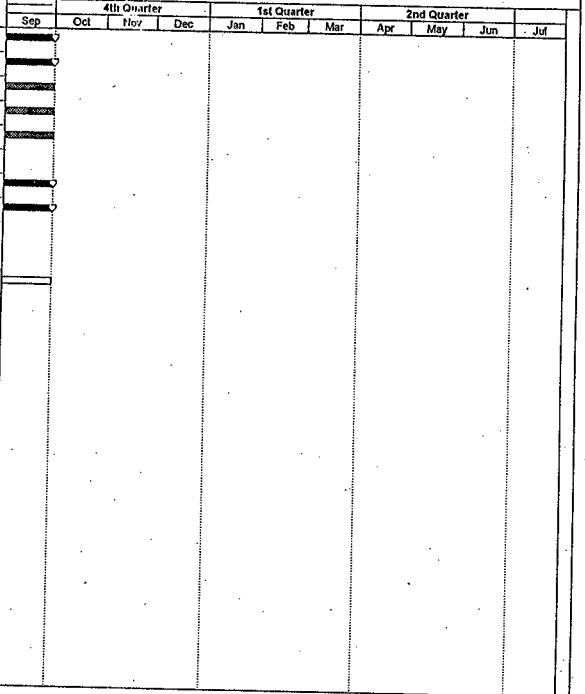
HTI/Plume Characterization Subtask (Cone Penetrometer Soil Sensor and Sampler Probes Deployment)

ID	Task Name	Start	End
163			
164	CP TASK OVERVIEW SCHEDULE	10/1/97	9/30/98
165	System Integration D25V1	10/1/97	9/30/98
166	Analytical Support D25V2	10/1/97	9/30/98
167	CP Probe Engineering D25V3	10/1/97	4/30/98
168	*Probe Deployment Prep D25V4*	10/1/97	6/1/98
169	*Sensor/Sampler Cold Deployment D25V5*	1/2/98	5/20/98
170	*Sensor/Sampler Hot Deployment D25V6*	5/25/98	9/30/98
171	CP (DRAFT) FY98 Activity Report	7/1/98	9/30/98



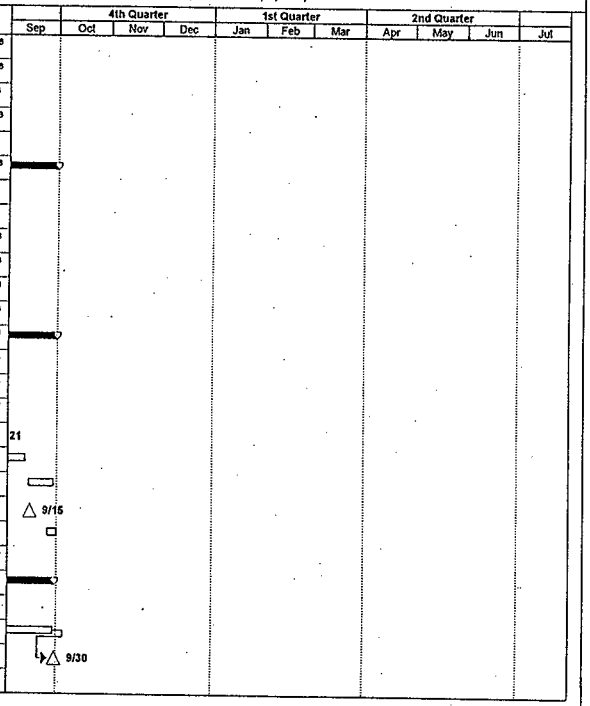
HTI/Plume Characterization Subtask (Cone Penetrometer Soil Sensor and Sampler Probes Deployment)

ID	Task Name	Start	End
1	HTI/CP Probe Deployment at AX-104	10/1/97	9/30/98
2	SYSTEM INTEGRATION & MANAGEMENT (D25V1)	10/1/97	9/30/98
3	HTI/CP NHC (D. Iwatate)	10/1/97	9/30/98
4	HTI/CPP WMNW (K Reynolds, et al)	10/1/97	9/30/98
5	HTI/CPP SESC (D. Hagmann)	10/1/97	9/30/98
6			
7	ANALYTICAL SUPPORT (D25V2)	10/13/97	9/30/98
8	Analytical Support to CP Field Operations	10/13/97	9/30/98
9	Support to CP Probe Engineering	10/13/97	4/30/98
10	Support to Cold Deployment	3/2/98	5/29/98
11	Support to Hot Deployment	6/1/98	9/30/98
12	Analytical Equipment Preparation	11/24/97	3/2/98
13	Identification, procurement, preparation	11/24/97	2/27/98
14	* Analytical equipment ready for HTI/CP tasks	3/2/98	3/2/98
15	Staff Training (Analytical)	2/2/98	5/15/98
16			
17	CP PROBE ENGINEERING (D25V3)	10/1/97	4/30/98
18	Army/WES - Phase I	10/1/97	4/30/98
19	CP Probe Fabrication (FY-97/98)	10/1/97	4/30/98
20	* Phase I FAT Completed	11/4/97	11/4/97
21	Army/WES - Phase II	1/23/98	4/24/98
22	CP Probe Calibration & MSP DAS - Completion	1/23/98	3/31/98
23	HTI/WES Documentation/QA meeting at Vicksburg	2/23/98	2/27/98
24	CP Probe Phase II/Final Acceptance Test (Vicksburg)	3/23/98	3/27/98
25	* Phase II FAT Completed	3/27/98	3/27/98
26	* CP Probes Transfered/Enroute to Hanford T-04-98-523	4/1/98	4/1/98
27	CP Probe Tech Transfer Deployment (Hanford)	4/6/98	4/17/98



HTI/Plume Characterization Subtask (Cone Penetrometer Soil Sensor and Sampler Probes Deployment)

ID	Task Name	Start	End
136	Hanford CPP/CP probe LTS prep tasks	3/2/98	4/29/98
137	Army/WES probes and DAS setup and run	4/6/98	4/24/98
138	* Complete CP Probe Cold Deployment T-04-98-S24	5/1/98	5/1/98
139	CP Moisture/Lithology tools calibration fielding	5/4/98	5/29/98
140			
141	CP SENSOR/SAMPLER HOT DEPLOYMENT (D25V6)	5/28/98	9/30/98
142	Final staging and coordination with 241-AX operations	5/25/98	6/5/98
143	* Verification of authorization to proceed w/hot deploy	6/5/98	6/5/98
144	Equipment mobilization and setup at 241-AX TF perimeter	6/8/98	6/18/98
145	CPP positioning/setup around AX-104	6/22/98	7/10/98
146	Final preparations for initial push	7/8/98	7/10/98
147	* Begin CP probe AX-104 push operations	7/13/98	7/13/98
148	Conduct AX-104 CP probe push operations	7/13/98	9/30/98
149	Conduct 1st CP location Ops	7/13/98	7/31/98
150	Conduct 2nd CP location Ops	8/3/98	8/21/98
151	* *"Complete" Hot CP Probe Deployment AX-104(Root go*	8/14/98	8/14/98
152	Decision (go/no go) to continue with CP probe push opera	8/21/98	8/21/98
153	Conduct 3rd CP location Ops	8/24/98	9/11/98
154	Conduct 4th CP location Ops	9/14/98	9/28/98
155	* "Complete" Hot CP Probe Deployment AX-104 T-04-98-	9/15/98	9/15/98
156	Conclude AX tf push operations/take down (if no go)	9/25/98	9/30/98
157			
158	CP PROBE DEPLOYMENT DRAFT REPORT (D25V7)	7/1/98	9/30/98
159	Prepare DRAFT document	7/1/98	8/28/98
160	Incorporate summary fielding information	8/31/98	9/28/98
161	* Issue DRAFT report: FY98 CP Probe Deployment T-04-98-5	9/30/98	9/30/98
162			



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2/13/98 C:\HTI\CP\SCHED98.R1A

HTI/Plume Characterization Subtask (Cone Penetrometer Soil Sensor and Sampler Probes Deployment)

ID	Task Name	Start	End
163			
164	CP TASK OVERVIEW SCHEDULE	10/1/97	9/30/98
165	System Integration D25V1	10/1/97	9/30/98
166	Analytical Support D25V2	10/1/97	9/30/98
167	CP Probe Engineering D25V3	10/1/97	4/30/98
168	*Probe Deployment Prep D25V4*	10/1/97	6/1/98
169	*Sensor/Sampler Cold Deployment D25V5*	1/2/98	5/29/98
170	*Sensor/Sampler Hot Deployment D25V6*	5/25/98	9/30/98
171	CP (DRAFT) FY98 Activity Report	7/1/98	9/30/98