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1	1	Cog.Eng. GN Boechler	<i>GN Boechler</i>	1/23/97	H5-09			BA Carteret	<i>BA Carteret</i>	3/11/97	K5-22
1	1	Cog. Mgr. CE Hanson	<i>CE Hanson</i>	2/26/97	S7-12			CE Jenkins	<i>CE Jenkins</i>	2/26/97	H6-37
		QA						JC Schofield	<i>JC Schofield</i>	3/11/97	S7-12
		AF Noonan			K9-91			BL Nielsen	<i>BL Nielsen</i>	3/11/97	H5-14
		GA Barnes			H5-09			BE Longtots	<i>BE Longtots</i>	3/11/97	S7-03

18. GN Boechler <i>GN Boechler</i> 1/23/97 Signature of EDT Originator Date		19. TE Rainey <i>TE Rainey</i> 3/11/97 Authorized Representative Date for Receiving Organization		20. CE Hanson <i>CE Hanson</i> 2/26/97 Design Authority/ Cognizant Manager Date		21. DOE APPROVAL (if required) Ctrl. No. <input type="checkbox"/> Approved <input type="checkbox"/> Approved w/comments <input type="checkbox"/> Disapproved w/comments	
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# ENGINEERING TASK PLAN FOR AX-104 RESIDUAL WASTE VOLUME AND INVENTORY DATA COLLECTION

## GN BOECHLER

SESC, Richland, WA 99352

U.S. Department of Energy Contract DE-AC06-87RL10930

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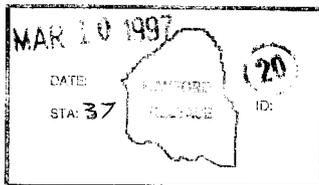
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Abstract: The purpose of this Engineering Task Plan is to document the strategy, equipment and responsibilities of the tasks required to preform the volume and inventory data collection of tank AX-104. The project is a part of the Hanford Tanks Initiative Plan document number WHC-SD-WM-PMP-022 Revision D.

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*Janis R. Bishop* 3 10-97  
Release Approval Date

Release Stamp

Approved for Public Release

ENGINEERING TASK PLAN  
FOR  
AX-104 RESIDUAL WASTE VOLUME AND INVENTORY  
DATA COLLECTION

Engineering Task Plan No: HNF-SD-TWR-ETP-001

Rev. 0

MAR 6, 1997

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## 1.0 INTRODUCTION

The Hanford Tank Initiate (HTI) is a four-year teaming project combining the technical and financial objectives of the U.S. Department of Energy Office of Waste Management (EM-30) and the Office of Science and Technology Development (EM-50). The HTI will provide a basis for design and regulatory decisions affecting the remainder of the tank waste retrieval program. The HTI project objective in this Engineering Task Plan is to conduct residual waste characterization activities sufficient to support retrieval and closure decisions at Tank 241-AX-104.

## 2.0 SCOPE

The scope of the HTI for 241-AX-104 is to establish retrieval performance criteria for closure, characterize residual waste, assess compliance with retrieval performance criteria, and determine readiness for closure.

### 2.1 OBJECTIVES

The objective of this ETP is to support the HTI effort by obtaining the needed volumetric, physical, radiological and chemical information on the residual waste in 241-AX-104. The following is a list of general tasks that will be required to meet the ETP objectives.

- Establish a functions and requirements (F&R) document that clearly states the requirements of the equipment to be utilized in the tank. The document will use the product from the technical basis document as a basis for all its general criteria. The document will specify what will be required from the data retrieval equipment with respect to data objectives, design requirements and operation.
- Manage the efforts for design, procurement, fabrication and testing of the tools and equipment for the required waste measurements. This task includes assuring the most effective and practical equipment alternatives are pursued and verification that the acquired equipment meets the requirements the F&R document has established. The goal of the equipment acquisition strategy, will be to include a fifty percent or better involvement of the private industry for products and /or services outside

SESC. The acquisition strategy shall also consider involvement of the national laboratories, and EM-50 technology development programs.

- Facilitate the transfer of the equipment and technology to field operations. This effort includes establishing adequate training procedures and programs that will assure that TWRS personal can safely operate the equipment.
- Initiate the required safety and readiness documentation needed to install the equipment. This task shall include the strategy plan and schedule for initiating the required documents currently needed for in-tank work. SESC shall also be responsible for assisting with tracking this documentation. However, since these documents will be generated by others, SESC shall not be responsible for guaranteeing these documents will be delivered within the initial schedule.

## 2.2 DELIVERABLES

The following **DOCUMENTS** shall be delivered to the customer, Numatec Hanford Corporation (NHC):

- This Engineering Task Plan that includes visual volume assessments, LDUA deployments and crawler development tasks.
- Safety equipment lists for new equipment as needed
- Functions and Requirements Document that includes visual volume assessment, LDUA deployments and crawler development requirements.
- Procurement specifications for the newly purchased equipment.
- A System Design Description of the final operating equipment as needed
- Acceptance Test Procedures and Reports for all new equipment as needed

- Operational Test Procedures and Reports for new equipment as needed.
- As-Built drawings for all new equipment. These drawings will not necessarily be in H-2 format (i.e. vendor drawings).
- Operating procedures for all new equipment
- Provide interface to operations integrated schedule on weekly basis
- A running schedule that tracks all activities on a weekly basis.
- Biweekly progress reports
- Volume estimate reports
- A final report upon completion of all activities that will include equipment performance evaluation vs F&R specifications, data obtained vs data objectives and a final volume estimate.

The following **EQUIPMENT** shall be supplied to the customer.

- One Crawler which meets the requirements of the Functions and Requirements document HNF-SD-WM-FRD-005.
- Tools to assist with the LDUA that meet the requirements of the Functions and Requirements document HNF-SD-WM-FRD-005.
- One fully functional LDUA. Fully functional is defined as what is needed to meet the Functions and Requirements document HNF-SD-WM-FRD-005.
- One stereo camera system or other topographical mapping system and associated equipment that meets the requirements of the Functions and Requirements document HNF-SD-WM-FRD-005

The following **TASKS** shall be performed:

- Visual assessment of waste on tank bottom , walls and internal equipment. Temperature, depth and gross gamma measurements under opened risers.
- First deployment of the LDUA (Phase I) - Take detailed video footage of the accessible equipment and waste in the tank and possibly taking an initial physical waste assessment.
- Second deployment of the LDUA (Phase II) - Take isotope readings of all equipment and tank waste in the immediate area accessible by the LDUA with a gamma probe. Obtain waste samples from the immediate area accessible by the LDUA. The Phase II deployment shall also utilize a calibrated probe to take physical measurements of the waste as specified.
- Install a crawler which will take isotope readings, depth measurements and take samples from specified navigable locations in the tank.

### 3.0 DESCRIPTION

Descriptions of the equipment described below are intended to be general and give the reader a feel for what will be used. The governing requirements document for the equipment which will be regularly updated as the equipment develops will be HNF-SD-WM-FRD-005. If a discrepancy in descriptions occurs between this task plan and HNF-SD-WM-FDR-005, then HNF-SD-WM-FDR-005 will take precedence.

#### 3.1 FUNCTIONAL DESCRIPTION OF EQUIPMENT

##### VISUAL VOLUME ASSESSMENT

The visual volume assessment task utilizes a stereo-video camera and laser-ruler system to topographically map and measure dimension of waste on the tank bottom, walls and internal equipment. Photogrammetry techniques will then be

applied to convert this information into waste volume estimates. Additional probes to measure waste temperature, height and gross-gamma will be used at the entry riser(s).

- The laser-camera system shall be relatively temperature (<110 F) and radiation tolerant (<200R/hr gamma) and/or easily maintained and position insensitive.
- The temperature sensor shall be able to measure the temperature from any vertical position down to the waste surface
- The gamma detector shall measure the gross gamma count from any vertical position down to the waste surface
- The depth measurement device shall measure the waste depth under the entry riser in one place minimum

#### PHASE I LDUA

The phase I LDUA deployment task will deploy a stereo video camera and possibly a waste scraper tool. The Video camera will be used to obtain close up video tape footage of as much of the tank hardware and waste as possible.

#### PHASE II LDUA

The phase II LDUA deployment task will deploy a calibrated probe, a gamma spectrometer probe and a sampler in the tank. The calibrated probe will be used to measure physical parameters of the tank and waste (ie. tank bottom and waste compressive strength). The gamma probe will be used to measure the ratio of gamma emitting isotopes of the waste located on the tank bottom and other in-tank hardware (Air Lift Circulators [ALC]). The sampler will be used to obtain waste samples from the tank bottom, ALCs, walls, dome and other in-tank hardware.

LDUA Calibrated Probe:

- The calibrated probe system shall measure the force exerted by the probe on the waste.
- The calibrated probe system shall incorporate a calibrated color camera system.
- The calibrated probe shall have a ruler on it that can measure waste depth or depth of penetration to within 1/8"
- The calibrated probe shall not penetrate the bottom of the tank liner.
- The calibrated probe shall measure the tank bottom (ie. conductivity probe)
- The design of the calibrated probe shall maximize the access zone of the LDUA.
- The design of the calibrated probe shall maximize the force capabilities of the LDUA (100 lbf downward).

Simple sampler system requirements for LDUA:

- The simple sampler system shall be capable of sampling hard and soft materials (not liquids).
- The simple sampler system shall obtain at least a 10 gram sample.
- The simple sampler system shall interface with the existing 125 ml grab sample bottles and transport mechanism.
- The simple sampler system shall not damage the tank bottom liner.
- The simple sampler system for the LDUA shall utilize the same riser as LDUA for removal.
- The simple sampler system shall obtain 1 composite sample for the accessible length of ALC.

LDUA phase 2 Gamma probe requirements:

- The maximum outer diameter of the gamma probe shall be 3 ½"
- The gamma probe cable shall be capable of supporting the gamma probe.
- The gamma probe shall not contact the waste.
- The gamma probe shall be 6" to 12" for the waste surface during scans.
- The gamma probe spot size shall be 12".

#### CRAWLER SYSTEM

The crawler will be equipped with a camera, depth measurement tool, sampler, gamma probe and a laser surveying system.

Crawler:

- Crawler shall end up "right-side-up" at the tank bottom when being installed.
- The crawler shall be capable of deploying the camera, depth measuring tool, gamma probe and sampling device.
- The crawler shall fit through a 34" nominal riser.
- The crawler shall be retrievable and capable of being disposed of at the end of the mission.
- The crawler shall be operational in hard and soft waste from 4 to 6 inches deep.

Crawler camera requirements:

- The camera shall be capable of viewing the crawlers relative position and

activities.

Crawler magnetrometer depth tool requirements:

- The depth measurement tool shall measure the depth of waste from 0 to 10 inches  $\pm 1/4$  inch.

Crawler sampler system requirements:

- The sampler system shall be capable of sampling hard and soft materials (not liquids).
- The sampler system shall obtain at least a 10 gram sample.
- The sampler system shall not damage the tank bottom liner.

Crawler Gamma probe requirements:

- The maximum outer diameter of the gamma probe shall be 3 1/2"
- The gamma probe shall not contact the waste.
- The gamma probe shall be 6" to 12" for the waste surface during scans.
- The gamma probe spot size shall be 12".
- The gamma probe shall not utilize count times greater than 30 minutes

Crawler Laser Surveying System

- The laser leveling system shall determine the depth of waste from 0 to 24 inches  $\pm 1$  inch.

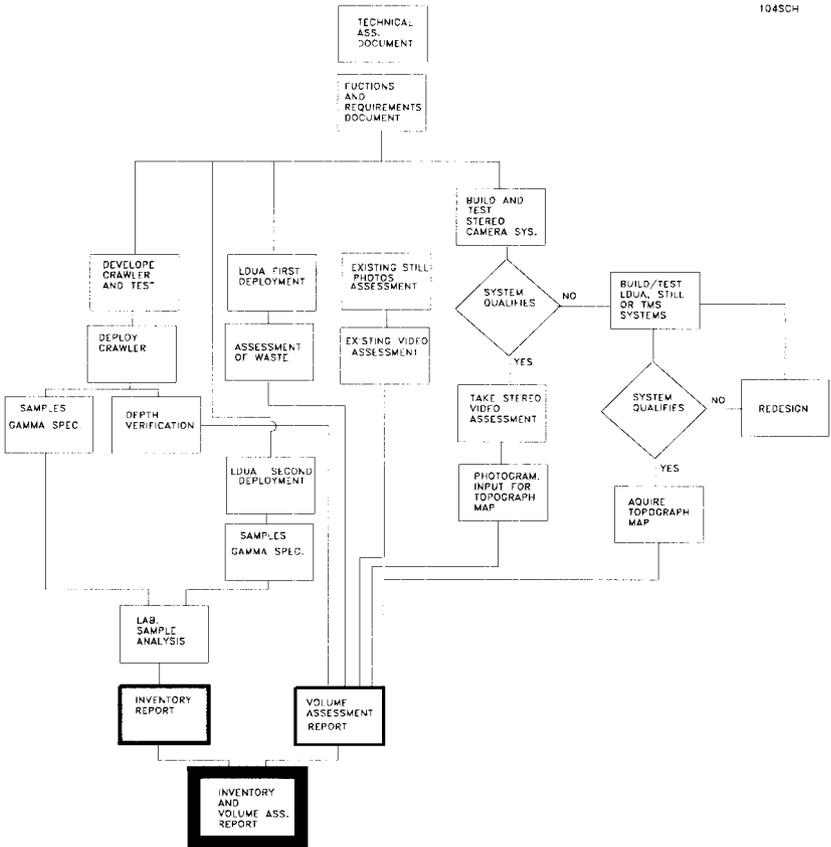
- The laser leveling system shall determine the position of the crawler in the tank.

### 3.2 ENGINEERING TASK PLAN

The following section illustrates and describes the task logic necessary to meet the project objectives.

# PROJECT LOGIC

1045CH



## STEREO VIDEO CAMERA DEPLOYMENT LOGIC

The main thrust of this task will be to develop a topographical map of the waste surface to assist in the volume assessment.

- A stereo video camera with laser-ruler will be developed and tested to verify it's accuracy at the FMEF facility or equivalent.
- If the system proves accurate, it will be installed in the tank to topographically map the waste using photogrammetry techniques..
- If the stereo-video camera/laser-ruler system proves inadequate alternate systems will be investigated such as a LDUA mounted system, a Topographical Mapping System (TMS), or automated machine Language/CAD systems.
- Depth, temperature and gross gamma probes will also be installed to get basic waste physical information that will assist with the design requirements of the crawler and LDUA.

## LDUA PHASE 1 DEPLOYMENT LOGIC:

The main thrust of this task will be to take detailed video footage of the accessible equipment and waste in the tank which will be used for the volume assessment.

- The first items to be completed for the Phase I LDUA deployment are the resolution of technical issues associated with the LDUA. The technical issues mostly deal with the completion of work that was not completed on the system prior to it's deployment into Tank T-106. A few of the tasks that will be performed are qualification testing to allow the LDUA to be deployed in flammable gas tanks and repair and modification to LDUA support equipment.
- The next items to be completed will be procedure updates, work package preparation, training and USQ documentation.

- LMHC plans to verify readiness through the use of a readiness checklist for both the phase I and phase II deployments instead of an Operational Readiness Review (ORR).
- After approval of the facility manager the LDUA Phase I deployment will occur.

#### LDUA PHASE 2 DEPLOYMENT LOGIC:

The main thrust of this task will be to acquire waste samples and gamma spectral readings that will be used in the inventory report.

- For the Phase II tasks, the design and development of a calibrated probe, sampler and gamma probe will take place first. These three tasks will take place in parallel.
- The next items to be completed will be procedure updates, work package preparation, training and USQ documentation. A readiness checklist is planned for the LDUA Phase II activities.
- After successful completion of the development of the Phase II equipment and documentation, the LDUA Phase II deployment will occur

#### CRAWLER DEPLOYMENT LOGIC

The main thrust of this task will be to acquire samples for laboratory analysis, take gamma spectral readings to assess waste homogeneity and to take depth measurements to validate the volume assessment.

- The initial effort will be to evaluate potential crawlers, gamma spectrometers, depth measuring tools and cameras to be used on the system.
- It is anticipated the sampler design to be the critical design path. Therefore, a demonstration evaluation will be initiated with all potential contractors on

a simulated waste test bed. In parallel a independent design effort to design a sampler will be initiated. If the vendor design is sufficient the independent design will be dropped. If the vendor design doesn't meet specifications the independent design will be pursued.

- Contracts will then be let for the crawler, sampler, depth measurement tool, camera and gamma spectrometer. It will be the goal to place as few contracts for equipment development as possible. A minimum of two design reviews will be held, a preliminary and a final, where the NHC will sign off as the customer.
- A contract will also be pursued to initiate the crawler vendor to operate the equipment. If this is not possible, a shared operational contract will be pursued to involve the contractor as much as possible.
- When the equipment specifications are finalized a USQ evaluation will be initiated as well as NEPA documentation and initial operating procedures. Since the equipment will have the design requirements of WHC-SD-WM-JCO-007 specified, a safety assessment is not anticipated as being necessary. However, a preliminary safety assessment (SA) will be started in parallel to the USQ. If the SA results indicate the equipment JCO safety requirements could be reduced, and time permits, a formal SA will be initiated and the design requirements modified.
- Upon successful completion of the Acceptance/Operational Test Procedures and operator training, the ORR will be performed. A Acceptance For Beneficial Use will then turn over the equipment to operations.

#### 4.0 RESPONSIBILITIES

**Numatec Hanford Corporation shall be responsible for the following:**

TOM RAINEY  
MANAGEMENT

- NHC shall be responsible for monitoring SESC's tasks and directing SESC of any scope modifications that would effect the cost or schedule before over-runs occur.
- Initiating any scope changes
- Justifying the methods being used to characterize the waste
- Justifying the volume assessment methods being used

CHUCK JENKINS/ MIKE SUMSION  
VIDEO ASSESSMENT DEPLOYMENT

- Biweekly progress reports
- Weekly schedule reporting
- Preliminary safety equipment list
- Writing the OTP/OTR for the camera system
- Coordination of design, testing and procurement efforts
- Coordination of training and procedures required for deployment
- Coordinate the equipment fabrication and qualification testing of the stereo video camera system
- Coordinating the efforts to deploy stereo video camera/laser-ruler system
- Coordinating the efforts to take the video imaging and FDNW's photogrammetry effort to acquire a final topographical map
- Maintain stereo video camera and volume assessment project files
- Prepare waste volume assessment reports
- Develop and maintain waste volume assessment project information center including equipment, data and files.

*[Signature]* 3/10/97  
 NHC Manager Date

**Flour-Daniel Northwest shall be responsible for the following:**

- Biweekly progress reports *INFORMATION AND DOCUMENTATION PROVIDED TO NHC AS REQUESTED. [Signature]*
- Calibrate the video camera to maximize the accuracy of Photogrammetry work.
- Proof of technique tests will be conducted at the test area at FMEF to demonstrate applicability of the photogrammetry and engineering judgement techniques. *RESULTS OF THE TESTS WILL BE COORDINATED WITH NHC. [Signature]*
- Phase one of the tests consisted of using one x-y position with only the elevation(z) axis changed. The light source remained constant, i.e. one vertical position. The second phase planned for involves the use of two horizontal positions and two vertical positions with varied lighting positions. The deliverables of the testing are the volume estimates for piles constructed within the test bed. Speed and accuracy of the volume estimates will determine feasibility of the technical approach. *A PORTION OF VOLUME AND WRITTEN REPORT WILL BE SENT TO NHC. [Signature]*
- Using engineering judgement and known equipment dimensions of the test bed, perform a volume assessment for waste piles shown in the videotape of the second phase test bed.
- Prepare a letter report conveying results of Phase 1 and Phase 2 tests.

*[Signature]* 3/23/97 *[Signature]* EDNW 3/3/97  
 FDNW Manager Date

**SESC shall be responsible for the following:**

GEOFF BARNES  
 Phase I LDUA deployment:

- Biweekly progress reporting

- Responsible for the Functions and Requirements document
- Weekly schedule reporting
- Functions and requirements document which includes all equipment involved in this task plan. (ie. video camera, crawler etc.)
- Acceptance test reports
- Coordinating training and procedures for deployment
- Initiating and assuring the responsible organization completes all necessary documentation to install the equipment into the tank (USQ, training procedures, readiness checklist, work packages, etc.)

GEOFF BARNES

LDUA SECOND DEPLOYMENT

Phase II LDUA Deployment:

- Biweekly progress reporting
- Weekly schedule reporting
- Preliminary and final safety equipment list
- Acceptance test reports
- Initiating and directing efforts to develop new equipment to be used by the LDUA (ex. sampler, calibrated probe, etc)
- Generating procurement specifications for needed equipment
- Coordinating training and procedures for deployment
- Write the OTP/OTR for all the LDUA equipment
- Initiating and assuring the responsible organization completes all necessary documentation to install the equipment into the tank (USQ, training procedures, readiness checklist, work packages etc.)

- Maintain responsibility for the LDUA equipment until the final ABU has been issued

NICK BOECHLER  
CRAWLER DEVELOPMENT

- Biweekly progress reporting
- Weekly schedule reporting
- Task Plan for all equipment included in this task plan.
- Acceptance test reporting
- Preliminary and final safety equipment list
- Initiating and supervising crawler equipment evaluation studies
- Initiating and monitoring sampler development activities
- Generating procurement specifications for the equipment
- Coordinating all procurement activities
- Delivering one crawler system that utilizes a camera, depth measurement device, gamma spectrometer and a sampling tool
- Coordinating the integration of the equipment into the final working system.
- Initiating and assuring the responsible organizations complete all necessary documentation to install the equipment into the tank (USQ, training procedures, NEPA documentation, ORR etc.)
- Writing the OTP/OTR for the crawler
- Maintain crawler project file

- Maintain responsibility for the crawler equipment until a ABU has been issued

Carl Hanson      3/3/97  
SESC Manager      Date

**Numatec Hanford Corporation Characterization Field Engineering shall be responsible for the following activities on the LDUA, CRAWLER and STEREO CAMERA:**

- Writing Operating procedures
- Provide cog./engineer cog. manager support
- Assisting in all training activities
- Directing preparations of the work packages
- Take the over-all engineering responsibility for the equipment after the final ABU's have been approved and issued
- Provide all signature responsibilities per Table 1

[Signature]      3-10-97      FOR J.S. SAMPFIELD PER TELECON 9:30 AM  
Characterization      Date  
Field Engineering  
Manager (NHC)

**PNNL-LDUA Program Office shall be responsible for the following activities:**

- Resolve all open items from the partial ABU (WHC-SD-WM-ABU-020)
- Perform LDUA flammable gas qualification tests

- Prepare the “World Model” of Tank AX-104
- Provide LDUA hardware and software training for operators and cognizant Engineers
- Modify LDUA Cold Test Cell to Mock-up AX-104 internal congestion
- Provide support to SESC and LMHC as required for readiness checklists, USQ and safety documentation, site preparation and field deployment support.
- Design, develop and test a bottom scraper tool per the functions and requirements identified in WHC-SD-WM-FRD-005.
- Procure gripper

 3/3/97  
PNNL-LDUA Date  
Program Office  
Manager

**Lockheed Martin Hanford Corporation (LMHC) shall be responsible for the following activities:**

- Procurement and testing the stereo laser camera system
- Overview camera work for LDUA
- Operating the stereo camera system in the tank
- Prepare field work packages and obtain signatures as needed on all equipment (stereo camera, LDUA and crawler).
- Determine adequacy of equipment for deployment
- Direct the LDUA deployment operations which will not interfere with characterization milestones or commitments
- Direct the Crawler system deployment which will not interfere with

characterization milestones or commitments

- Taking responsibility for the all equipment after a Acceptance For Beneficial Use has been issued for the equipment

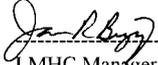
----- 3/3/97  
LMHC Manager      Date

Table 1: Signature Approvals for Cognizant Engineer and Cognizant Manager

Document	SESC	NHC	Design Authority	Char. Field Engineering
Engineering Task P	C	S	-	S
Functions And Requirements	C	S	-	-
Performance Specification	C	S	-	*
Preliminary Design	C	-	-	*
Final Design	C	S	S	-
Procurement	C	-	-	-
System Design Description	C	S	S	*
Acceptance Test and Acceptance Test Report	C	S	-	*
Operating and maintenance procedures	-	S	-	C
Safety Assessment	C	*	S	*
Operational Test	-	C	-	*
Acceptance for Beneficial Use	-	S	-	C
SEL - preliminary	C	S	-	*
SbL - final	S	-	S	C
Readiness Review	-	S	S	C
Work Packages	-	-	S	C

- C: Cognizant Engineer and Cognizant Manager Signature  
S: This organization will co-sign with the cognizant organization.  
\*: Co-signing Organization in the event SESC or cognizant manager does not have all the required training.

## 5.0 SAFETY, ENVIRONMENTAL AND QUALITY ASSURANCE

Signature requirements other than what is in called out in the above table will be determined by safety class per WHC-CM-4-46, Section 9.0, "Safety Classification of Structures, Systems, and Components" and CM-3-5, section 12.7, "Approval of Environmental, Safety, and Quality Affecting Documents"

## 6.0 COST AND SCHEDULE

Since the cost and schedules are dependant on many variables , they are not considered “fixed price or fixed schedules”. However, it will be NHC’s responsibility to control these costs and schedules with input from SESC.

### 6.1 ASSUMPTIONS

A list of the major assumptions for the successful development and deployment of the respective equipment are listed below. The basic assumptions that funding is not cut and management can place the required priorities with operations so scheduling is not a problem, are assumed for each deployment.

#### STEREO CAMERA

- Layoffs don’t effect deployment activities
- No Operational Readiness Review (ORR) or Readiness Assessment (RA) will be required
- No Safety Assessment (SA) will be required
- No Safety Equipment List (SEL) will be required
- Stereo camera /laser ruler qualification testing is successful
- Lasers are approved by Flammable Gas Board (FGB)

#### LDUA PHASE 1

- No ORR or RA will be required
- No SA will be required
- No SEL will be required
- No DOE reviews will be required
- FGB approves the design as meeting JCO control set 2 requirements

- Equipment will fit or can be made to fit on the tank without extensive modifications

#### LDUA PHASE 2

- JCO is approved and does not change the existing requirements
- A reliable sampler can be built
- The Technical Basis document does not change the assumed number of samples to be taken
- The temperature in the tank is low enough for the proper operation of the gamma spectrometer
- No DOE reviews will be required

#### CRAWLER

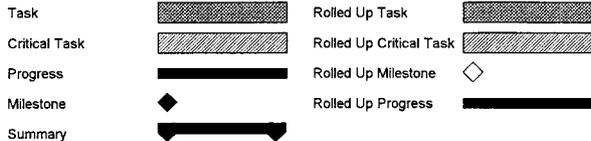
- Slucers are removable and disposable to make 34 inch riser available
- Bidders respond favorably to specification technical , cost and schedule requirements
- Successful bidder can design and build the equipment to meet the JCO control set 2 requirements.
- A reliable sampler can be built
- The Technical Basis document does not change the assumed number of samples to be taken
- The temperature in the tank is low enough for the proper operation of the gamma spectrometer
- The gamma levels and temperature in the tank are low enough for the operation of the crawler camera system

6.2

STEREO VIDEO CAMERA COST AND SCHEDULE

ID	Task Name	Early Start	Early Finish	Cost	1997			
					Qtr 4	Qtr 1	Qtr 2	Qtr 3
1	Visual Volume Ass.	Tue 10/1/96	Thu 7/3/97	\$246,750.00				
2	Revision A	Tue 10/1/96	Thu 10/31/96	\$11,960.00	FDH			
3	Project Planning	Fri 11/1/96	Fri 11/22/96	\$8,320.00	FDH			
4	Design Stereo Video Sys	Mon 10/14/96	Fri 11/29/96	\$4,550.00	LM[0.25]			
5	Fab. System	Mon 12/2/96	Fri 12/27/96	\$27,200.00	FDNW[2]			
6	Qualify System	Mon 12/30/96	Fri 1/24/97	\$31,200.00	LM[2],FDH			
7	Qualify Software	Mon 1/27/97	Fri 2/14/97	\$10,200.00	FDNW			
8	DECISION POINT	Fri 1/24/97	Fri 1/24/97	\$0.00	◆			
9	Write Test Procedures	Mon 1/13/97	Thu 1/30/97	\$7,280.00	NHC			
10	Training	Fri 1/31/97	Wed 2/19/97	\$10,920.00	LM,NHC[0.5]			
11	Test System	Mon 2/17/97	Fri 2/28/97	\$26,000.00	NHC,LM[4]			
12	USQ Evaluation	Mon 1/20/97	Thu 2/6/97	\$3,640.00	DH[0.5]			
13	Work Package	Mon 3/3/97	Tue 3/11/97	\$10,920.00	NHC[3]			
14	Approvals	Wed 3/12/97	Thu 3/20/97	\$3,640.00	NHC			
15	Deploy To Field	Fri 3/21/97	Thu 4/10/97	\$59,720.00	FDNW[6],NHC,SESC,LM[5]			
16	Interpret Data	Fri 4/11/97	Thu 5/22/97	\$15,600.00	NHC			
17	Write Report	Fri 5/23/97	Thu 7/3/97	\$15,600.00	NHC			
18								
19	Slucer removal	Mon 3/24/97	Fri 5/23/97	\$126,600.00				
20	Slucer inspection packag	Mon 3/24/97	Fri 3/28/97	\$2,600.00	LM			
21	Inspect slucer pit	Mon 3/31/97	Fri 4/11/97	\$26,000.00	LM[5]			
22	USQ	Mon 4/14/97	Fri 4/25/97	\$5,200.00	LM			
23	Slucer removal package	Mon 4/28/97	Fri 5/9/97	\$5,200.00	LM			
24	Remove slucer	Mon 5/12/97	Fri 5/23/97	\$87,600.00	LM[9],FDNW[5],SESC			

Project: VOLUME ASSESSMENT  
Date: Tue 3/4/97



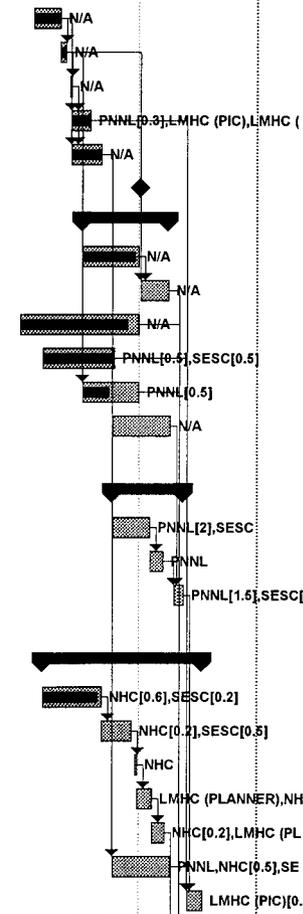
Budget Report as of Tue 3/4/97  
VOLUME ASSESSMENT

ID	Task Name	Fixed Cost	Total Cost	Baseline
24	Remove slucer	\$0.00	\$87,600.00	\$87,600.00
15	Deploy To Field	\$0.00	\$59,720.00	\$10,320.00
6	Qualify System	\$0.00	\$31,200.00	\$31,200.00
5	Fab. System	\$0.00	\$27,200.00	\$13,600.00
11	Test System	\$0.00	\$26,000.00	\$26,000.00
21	Inspect slucer pit	\$0.00	\$26,000.00	\$26,000.00
16	Interpret Data	\$0.00	\$15,600.00	\$15,600.00
17	Write Report	\$0.00	\$15,600.00	\$15,600.00
2	Revision A	\$0.00	\$11,960.00	\$11,960.00
10	Training	\$0.00	\$10,920.00	\$10,920.00
13	Work Package	\$0.00	\$10,920.00	\$10,920.00
7	Qualify Software	\$0.00	\$10,200.00	\$10,200.00
3	Project Planning	\$0.00	\$8,320.00	\$8,320.00
9	Write Test Procedures	\$0.00	\$7,280.00	\$7,280.00
22	USQ	\$0.00	\$5,200.00	\$5,200.00
23	Slucer removal package	\$0.00	\$5,200.00	\$5,200.00
4	Design Stereo Video Sys.	\$0.00	\$4,550.00	\$4,550.00
12	USQ Evaluation	\$0.00	\$3,640.00	\$3,640.00
14	Approvals	\$0.00	\$3,640.00	\$3,640.00
20	Slucer inspection package	\$0.00	\$2,600.00	\$2,600.00
8	DECISION POINT	\$0.00	\$0.00	\$0.00
18				
		<b>\$0.00</b>	<b>\$373,360.00</b>	<b>\$310,350.00</b>

6.3

LDUA FIRST DEPLOYMENT  
COST AND SCHEDULE

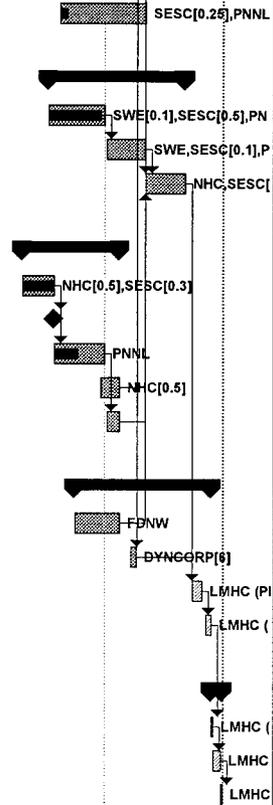
ID	Name	Early Start	Early Finish	Qtr			
				Oct	Nov	Dec	Jan
1	LDUA PHASE I DEPLOYMENT	Wed 10/30/96	Tue 3/4/97	[Summary Bar]			
2							
3	RESOLVE TECHNICAL ISSUES W/ LDUA DE	Wed 10/30/96	Fri 1/17/97	[Summary Bar]			
4	MDS SURVEY, DECON & RELEASE	Wed 11/6/96	Tue 11/19/96				
5	MOVE LDUA TO CTF	Wed 11/20/96	Fri 11/22/96				
6	VPM SLIPPAGE	Mon 11/25/96	Mon 11/25/96				
7	REPLACE BOOT/CLAMP	Tue 11/26/96	Thu 12/5/96				
8	RESOLVE SHOULDER CAMERA PROB	Tue 11/26/96	Wed 12/11/96				
9	NCR DISPOSITION	Thu 1/2/97	Thu 1/2/97				
10	LDUA QUALIFICATION TESTING	Mon 12/2/96	Thu 1/16/97	[Summary Bar]			
11	UPDATE QUALIFICATION TEST P	Mon 12/2/96	Tue 12/31/96				
12	PERFORM QUALIFICATION TEST	Thu 1/2/97	Thu 1/16/97				
13	RESOLVE SAFETY ASSESSMENT ITEM	Wed 10/30/96	Tue 12/31/96				
14	AX-104 WORLD MODEL DEVELOPMEN	Mon 11/11/96	Wed 12/18/96				
15	CALIBRATE LDUA INSTRUMENTS	Mon 12/2/96	Tue 12/31/96				
16	REPAIR LDUA FORCE, MOMENT SENS	Wed 12/18/96	Fri 1/17/97				
17							
18	SCRAPER TOOL	Wed 12/18/96	Fri 1/24/97	[Summary Bar]			
19	DESIGN	Wed 12/18/96	Mon 1/6/97				
20	FABRICATE	Tue 1/7/97	Mon 1/13/97				
21	TEST	Mon 1/20/97	Fri 1/24/97				
22							
23	LDUA TRAINING AND PROCEDURES UPDA	Mon 11/11/96	Mon 2/3/97	[Summary Bar]			
24	REVISE POPS	Mon 11/11/96	Wed 12/11/96				
25	REVIEW POPS	Thu 12/12/96	Fri 12/27/96				
26	APPROVE POPS	Mon 12/30/96	Mon 12/30/96				
27	WORK PACKAGE PREP.	Tue 12/31/96	Tue 1/7/97				
28	WORK PACKAGE APPROVAL	Wed 1/8/97	Tue 1/14/97				
29	CTF TRAINING SETUP	Wed 12/18/96	Fri 1/17/97				
30	OPERATOR TRAINING (REFRESHER)	Mon 1/27/97	Mon 2/3/97				



Project: LDUA PHASE 1 DEPLOYME  
Date: Wed 3/5/97

Task		Rolled Up Task	
Critical Task		Rolled Up Critical Task	
Progress		Rolled Up Milestone	
Milestone		Rolled Up Progress	
Summary			

ID	Name	Early Start	Early Finish	c	
				Oct	Mar
31	SOFTWARE ENG TRAINING	Sun 12/8/96	Wed 1/22/97		
32					
33	LDUA READINESS ASSESSMENT	Mon 12/2/96	Wed 2/12/97		
34	PREPARE MOU	Mon 12/2/96	Tue 12/31/96		
35	PREPARE CHECKLIST	Thu 1/2/97	Wed 1/22/97		
36	PERFORM READINESS ASSESSMENT	Thu 1/23/97	Wed 2/12/97		
37					
38	SAFETY DOCUMENTATION	Mon 11/18/96	Wed 1/8/97		
39	FILL OUT STANDING ORDER CHECKLI	Mon 11/18/96	Wed 12/4/96		
40	PRESENT CHECKLIST TO FGAB	Wed 12/4/96	Wed 12/4/96		
41	ANALYZE NON-COMPLIANCE WITH SO	Thu 12/5/96	Tue 12/31/96		
42	PREPARE USQ DOCUMENTATION	Mon 12/30/96	Wed 1/8/97		
43	FGAB APPROVAL	Thu 1/2/97	Wed 1/8/97		
44					
45	PREPARE SITE ACCESS TO LDUA	Mon 12/16/96	Wed 2/26/97		
46	TANK LAYOUT DRAWINGS	Mon 12/16/96	Wed 1/8/97		
47	INSTALL UTILITIES	Wed 1/15/97	Fri 1/17/97		
48	SETUP EQUIPMENT @ AX FARM	Mon 2/17/97	Fri 2/21/97		
49	INSTALL LDUA	Mon 2/24/97	Wed 2/26/97		
50					
51	LDUA PHASE 1 DEPLOYMENT AND DATA C	Thu 2/27/97	Tue 3/4/97		
52	COMPLETE CAMPAIGN	Thu 2/27/97	Thu 2/27/97		
53	REMOVE EQUIPMENT	Fri 2/28/97	Mon 3/3/97		
54	TRANSPORT TO STORAGE	Tue 3/4/97	Tue 3/4/97		



Project: LDUA PHASE 1 DEPLOYME Date: Wed 3/5/97	Task		Rolled Up Task	
	Critical Task		Rolled Up Critical Task	
	Progress		Rolled Up Milestone	
	Milestone		Rolled Up Progress	
	Summary			

ID	Task Name	Fixed Cost	Total Cost	Baseline
48	SETUP EQUIPMENT @ AX FARM	\$0.00	\$30,800.00	\$30,800.00
19	DESIGN	\$0.00	\$19,254.40	\$19,254.40
29	CTF TRAINING SETUP	\$0.00	\$19,120.00	\$19,120.00
49	INSTALL LDUA	\$0.00	\$18,480.00	\$18,480.00
14	AX-104 WORLD MODEL DEVELOP	\$0.00	\$17,400.00	\$17,400.00
41	ANALYZE NON-COMPLIANCE WIT	\$0.00	\$14,416.00	\$14,416.00
35	PREPARE CHECKLIST	\$0.00	\$12,888.00	\$12,888.00
31	SOFTWARE ENG TRAINING	\$0.00	\$10,440.00	\$10,440.00
36	PERFORM READINESS ASSESSME	\$0.00	\$9,888.00	\$9,888.00
47	INSTALL UTILITIES	\$0.00	\$9,360.00	\$9,360.00
30	OPERATOR TRAINING (REFRESHE	\$4,598.40	\$9,196.80	\$9,196.80
15	CALIBRATE LDUA INSTRUMENTS	\$0.00	\$8,480.00	\$8,480.00
7	REPLACE BOOT/CLAMP	\$0.00	\$8,248.00	\$8,248.00
46	TANK LAYOUT DRAWINGS	\$0.00	\$7,800.00	\$2,600.00
21	TEST	\$0.00	\$7,720.00	\$7,720.00
53	REMOVE EQUIPMENT	\$0.00	\$7,332.00	\$7,332.00
24	REVISE POPS	\$0.00	\$7,328.00	\$7,328.00
52	COMPLETE CAMPAIGN	\$0.00	\$5,888.00	\$5,888.00
20	FABRICATE	\$0.00	\$4,240.00	\$4,240.00
34	PREPARE MOU	\$0.00	\$4,224.00	\$4,224.00
25	REVIEW POPS	\$0.00	\$3,760.00	\$3,760.00
27	WORK PACKAGE PREP	\$0.00	\$3,664.00	\$3,664.00
39	FILL OUT STANDING ORDER CHE	\$0.00	\$3,416.00	\$3,416.00
28	WORK PACKAGE APPROVAL	\$0.00	\$1,820.00	\$1,820.00
42	PREPARE USQ DOCUMENTATION	\$0.00	\$1,820.00	\$2,600.00
54	TRANSPORT TO STORAGE	\$0.00	\$1,616.00	\$1,616.00
26	APPROVE POPS	\$0.00	\$520.00	\$520.00
4	MDS SURVEY, DECON & RELEASE	\$0.00	\$0.00	\$0.00
5	MOVE LDUA TO CTF	\$0.00	\$0.00	\$0.00
6	VPM SLIPPAGE	\$0.00	\$0.00	\$0.00
8	RESOLVE SHOULDER CAMERA PR	\$0.00	\$0.00	\$0.00
9	NCR DISPOSITION	\$0.00	\$0.00	\$0.00
11	UPDATE QUALIFICATION TEST PR	\$0.00	\$0.00	\$0.00
12	PERFORM QUALIFICATION TEST	\$0.00	\$0.00	\$0.00
13	RESOLVE SAFETY ASSESSMENT I	\$0.00	\$0.00	\$0.00
16	REPAIR LDUA FORCE, MOMENT S	\$0.00	\$0.00	\$0.00
40	PRESENT CHECKLIST TO FGAB	\$0.00	\$0.00	\$0.00
43	FGAB APPROVAL	\$0.00	\$0.00	\$0.00
2				
17				
22				
32				
37				
44				
50				
		<b>\$4,598.40</b>	<b>\$249,119.20</b>	<b>\$244,699.20</b>

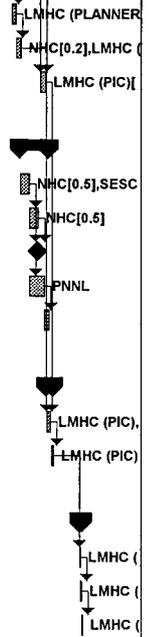
6.4

LDUA SECOND DEPLOYMENT  
COST AND SCHEDULE

ID	Name	Early Start	Early Finish	Q4
1	LDUA PHASE II DEPLOYMENT	Wed 10/30/96	Fri 10/3/97	
2				
3	FUNCTIONS AND REQUIREMENTS DOCUME	Wed 10/30/96	Fri 1/3/97	
4	PREPARE	Wed 10/30/96	Thu 11/14/96	SESC[0.5]
5	REVIEW	Fri 11/15/96	Tue 12/17/96	SESC[0.5]
6	APPROVE	Wed 12/18/96	Fri 1/3/97	SESC[0.5]
7				
8	CALIBRATED PROBE	Mon 1/6/97	Tue 6/10/97	
9	CONCEPTUAL DESIGN	Mon 1/6/97	Fri 1/31/97	SESC[0.5],PNNL[0.5]
10	DIFINITIVE DESIGN/PROCUREMENT SP	Mon 2/3/97	Fri 3/28/97	SESC[0.25],FDNW[0.5],PN
11	FABRICATE/PROCURE	Mon 3/31/97	Fri 5/23/97	SESC,PNNL
12	TEST	Mon 5/26/97	Tue 6/10/97	SESC,PNNL
13				
14	SAMPLER	Mon 1/6/97	Thu 7/31/97	
15	CONCEPTUAL DESIGN	Mon 1/6/97	Fri 2/21/97	SESC[0.5],PNNL[0.5]
16	DIFINITIVE DESIGN/PROCUREMENT SP	Mon 2/24/97	Fri 4/18/97	SESC[0.25],FDNW[0.5]
17	FABRICATE/PROCURE	Mon 4/21/97	Fri 6/27/97	SESC,PNNL
18	TEST	Mon 6/30/97	Thu 7/31/97	SESC,PNNL
19				
20	GAMMA PROBE	Mon 1/6/97	Mon 7/21/97	
21	DIFINITIVE DESIGN	Mon 1/6/97	Fri 3/14/97	SESC[0.1],PNNL[0.1],FDNW
22	FABRICATE/PROCURE	Mon 3/17/97	Fri 5/23/97	SESC[0.5]
23	TEST	Mon 5/26/97	Mon 7/21/97	SESC[0.5]
24				
25	PROCURE TEST GRIPPER	Mon 12/16/96	Wed 2/26/97	
26				
27	LDUA TRAINING AND PROCEDURES UPDAT	Tue 6/3/97	Fri 8/8/97	
28	REVISE POPS	Tue 6/3/97	Mon 6/9/97	NHC[0.6],SESC[0.2]
29	REVIEW POPS	Tue 6/10/97	Mon 6/16/97	NHC[0.2],SESC[0.]
30	APPROVE POPS	Tue 6/17/97	Tue 6/17/97	NHC

Project: LDUA PHASE II DEPLOYMENT Date: Wed 3/5/97	Task		Rolled Up Task	
	Critical Task		Rolled Up Critical Task	
	Progress		Rolled Up Milestone	
	Milestone		Rolled Up Progress	
	Summary			

ID	Name	Early Start	Early Finish	Q4
31	WORK PACKAGE PREP.	Wed 6/18/97	Tue 6/24/97	
32	WORK PACKAGE APPROVAL	Wed 6/25/97	Tue 7/1/97	
33	OPERATOR TRAINING (REFRESHER)	Fri 8/1/97	Fri 8/8/97	
34				
35	SAFETY DOCUMENTATION	Tue 7/1/97	Wed 8/13/97	
36	FILL OUT STANDING ORDER CHECKLIS	Tue 7/1/97	Mon 7/14/97	
37	PREPARE USQ DOCUMENTATION	Tue 7/15/97	Mon 7/28/97	
38	PRESENT CHECKLIST TO FGAB	Mon 7/28/97	Mon 7/28/97	
39	ANALYZE NON COMPLIANCE WITH SOC	Tue 7/15/97	Wed 8/6/97	
40	FGAB APPROVAL	Thu 8/7/97	Wed 8/13/97	
41				
42	PREPARE SITE ACCESS TO LDUA	Mon 8/11/97	Wed 8/20/97	
43	SETUP EQUIPMENT @ AX FARM	Mon 8/11/97	Fri 8/15/97	
44	INSTALL LDUA	Mon 8/18/97	Wed 8/20/97	
45				
46	LDUA PHASE II DEPLOYMENT	Tue 9/30/97	Fri 10/3/97	
47	COMPLETE CAMPAIGN	Tue 9/30/97	Tue 9/30/97	
48	REMOVE EQUIPMENT	Wed 10/1/97	Thu 10/2/97	
49	TRANSPORT TO STORAGE	Fri 10/3/97	Fri 10/3/97	



Project: LDUA PHASE II DEPLOYME Date: Wed 3/5/97	Task		Rolled Up Task	
	Critical Task		Rolled Up Critical Task	
	Progress		Rolled Up Milestone	
	Milestone		Rolled Up Progress	
	Summary			

Budget Report as of Wed 3/5/97  
LDUA PHASE II DEPLOYMENT

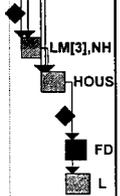
ID	Task Name	Fixed Cost	Total Cost	Baseline
25	PROCURE TEST GRIPPER	\$81,000.00	\$81,000.00	\$81,000.00
17	FABRICATE/PROCURE	\$0.00	\$64,000.00	\$64,000.00
11	FABRICATE/PROCURE	\$0.00	\$51,200.00	\$51,200.00
18	TEST	\$0.00	\$30,720.00	\$30,720.00
43	SETUP EQUIPMENT @ AX FARM	\$0.00	\$30,000.00	\$30,000.00
10	DIFINITIVE DESIGN/PROCUREMENT	\$0.00	\$24,000.00	\$24,000.00
16	DIFINITIVE DESIGN/PROCUREMENT	\$0.00	\$24,000.00	\$24,000.00
15	CONCEPTUAL DESIGN	\$0.00	\$22,400.00	\$22,400.00
44	INSTALL LDUA	\$0.00	\$18,000.00	\$18,000.00
12	TEST	\$0.00	\$15,360.00	\$15,360.00
22	FABRICATE/PROCURE	\$0.00	\$14,000.00	\$14,000.00
21	DIFINITIVE DESIGN	\$0.00	\$13,400.00	\$13,400.00
9	CONCEPTUAL DESIGN	\$0.00	\$12,800.00	\$12,800.00
39	ANALYZE NON COMPLIANCE WITH	\$0.00	\$12,240.00	\$12,240.00
48	REMOVE EQUIPMENT	\$0.00	\$12,000.00	\$12,000.00
23	TEST	\$0.00	\$11,480.00	\$11,480.00
33	OPERATOR TRAINING (REFRESHE	\$0.00	\$7,968.00	\$7,968.00
47	COMPLETE CAMPAIGN	\$0.00	\$6,000.00	\$6,000.00
5	REVIEW	\$0.00	\$5,600.00	\$5,600.00
36	FILL OUT STANDING ORDER CHE	\$0.00	\$4,480.00	\$4,480.00
31	WORK PACKAGE PREP.	\$0.00	\$3,920.00	\$3,920.00
4	PREPARE	\$0.00	\$3,360.00	\$3,360.00
6	APPROVE	\$0.00	\$2,800.00	\$2,800.00
37	PREPARE USQ DOCUMENTATION	\$0.00	\$2,800.00	\$2,800.00
28	REVISE POPS	\$0.00	\$2,240.00	\$2,240.00
29	REVIEW POPS	\$0.00	\$1,960.00	\$1,960.00
32	WORK PACKAGE APPROVAL	\$0.00	\$1,960.00	\$1,960.00
49	TRANSPORT TO STORAGE	\$0.00	\$1,660.00	\$1,660.00
30	APPROVE POPS	\$0.00	\$560.00	\$560.00
38	PRESENT CHECKLIST TO FGAB	\$0.00	\$0.00	\$0.00
40	FGAB APPROVAL	\$0.00	\$0.00	\$0.00
2				
7				
13				
19				
24				
26				
34				
41				
45				
		<b>\$81,000.00</b>	<b>\$481,908.00</b>	<b>\$481,908.00</b>

6.5  
CRAWLER  
COST AND SCHEDULE

ID	Task Name	Early Start	Early Finish	Cost	Quarter		
					Qtr 4	Qtr 1	Qtr
1	FY 97	Fri 11/1/96	Fri 2/20/98	\$862,380.00	[Rollup Bar]		
2	Engineering Task Plan	Mon 12/9/96	Fri 2/28/97	\$27,840.00	[Rollup Bar] SESC		
3	Safety Documentation	Mon 3/3/97	Fri 2/20/98	\$238,136.00	[Rollup Bar]		
4	USQ Evaluation	Mon 3/3/97	Thu 5/1/97	\$40,832.00	[Rollup Bar] BLOOM[2]		
5	Hazards Analysis	Fri 5/2/97	Thu 7/31/97	\$60,320.00	[Rollup Bar] BLOOM[2]		
6	Accident and Controls	Fri 8/1/97	Tue 9/2/97	\$20,880.00	[Rollup Bar] BLOOM[2]		
7	Cost Analysis JCO vs SA	Tue 9/2/97	Thu 9/11/97	\$8,456.00	[Rollup Bar] SESC,NHC,PNL[0.5]		
8	Safety Assessment	Thu 9/11/97	Fri 2/20/98	\$107,648.00	[Rollup Bar] BLOOM[2]		
9	Write Initial scope of work	Fri 11/1/96	Fri 2/28/97	\$0.00	[Rollup Bar]		
10	Request For Interest	Fri 2/28/97	Fri 2/28/97	\$0.00	[Rollup Bar]		
11	Request For Proposal	Mon 3/3/97	Fri 4/4/97	\$11,600.00	[Rollup Bar] SESC		
12	MS 2 RFP Out	Fri 3/21/97	Fri 3/21/97	\$0.00	[Rollup Bar]		
13	Place Order Crawler	Mon 4/7/97	Fri 5/9/97	\$11,600.00	[Rollup Bar] SESC		
14	Design Laser Leveling	Mon 3/3/97	Fri 5/23/97	\$55,680.00	[Rollup Bar] LM,SESC		
15	Fab Laser Leveling sys	Mon 5/26/97	Fri 7/18/97	\$102,400.00	[Rollup Bar] LM[2],FDH FAB[3]		
16	Crawler Design	Mon 5/12/97	Fri 7/11/97	\$50,880.00	[Rollup Bar] VENDOR		
17	Gamma Probe Procurement	Mon 3/10/97	Fri 4/4/97	\$9,280.00	[Rollup Bar] SESC		
18	Gamma Fab	Mon 4/7/97	Thu 5/29/97	\$55,744.00	[Rollup Bar] PNL[2],SESC		
19	Depth Gauge Procurement	Mon 3/10/97	Mon 3/31/97	\$7,424.00	[Rollup Bar] SESC		
20	Depth Gauge Fab	Tue 4/1/97	Tue 6/3/97	\$64,032.00	[Rollup Bar] VENDOR[3]		
21	Sampler Design and Fab	Tue 4/1/97	Thu 7/10/97	\$67,764.00	[Rollup Bar] VENDOR[2]		
22	Crawler Fabrication	Mon 7/14/97	Wed 11/12/97	\$150,000.00	[Rollup Bar]		
23	FY 98	Mon 8/11/97	Mon 5/18/98	\$735,058.00	[Rollup Bar]		
24	Interface Design	Mon 9/1/97	Fri 11/21/97	\$65,280.00	[Rollup Bar] FDH DES[2]		
25	Interface Fabrication	Mon 11/24/97	Fri 2/6/98	\$149,600.00	[Rollup Bar] FDH FAB[5]		
26	Write ATP	Mon 8/11/97	Fri 9/26/97	\$19,488.00	[Rollup Bar] SESC(1.2)		
27	Write OTP	Mon 10/20/97	Fri 12/5/97	\$16,240.00	[Rollup Bar] SESC		
28	Write Procedures	Mon 9/15/97	Mon 11/10/97	\$19,024.00	[Rollup Bar] SESC		
29	Training	Tue 11/11/97	Mon 12/15/97	\$46,400.00	[Rollup Bar] LM[3],NHC		
30	Crawler Testing (ATP)	Thu 11/13/97	Wed 1/21/98	\$139,200.00	[Rollup Bar] VENDOR[2]		

Project: Crawler Development Date: Mon 3/3/97	Task	[Solid Black Box]	Rolled Up Task	[Solid Black Box]
	Critical Task	[Hatched Box]	Rolled Up Critical Task	[Hatched Box]
	Progress	[Thick Solid Black Bar]	Rolled Up Milestone	[Diamond]
	Milestone	[Diamond]	Rolled Up Progress	[Thick Solid Black Bar]
	Summary	[Thick Solid Black Bar]		

ID	Task Name	Early Start	Early Finish	Cost	1997			
					Qtr 4	Qtr 1	Qtr 2	Qtr 3
31	MS 4 OTP COMPLETE	Mon 1/12/98	Mon 1/12/98	\$0.00				
32	Crawler Testing (OTP)	Thu 1/22/98	Tue 2/24/98	\$55,680.00				
33	ORR	Wed 2/25/98	Mon 4/6/98	\$31,552.00				
34	MS 5 DEPLOY CRAWLER	Tue 4/7/98	Tue 4/7/98	\$0.00				
35	Deploy Crawler	Tue 4/7/98	Tue 5/12/98	\$136,864.00				
36	Deploy Crawler (VENDOR)	Tue 4/7/98	Mon 5/18/98	\$55,730.00				



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Project: Crawler Development Date: Mon 3/3/97	Task		Rolled Up Task	
	Critical Task		Rolled Up Critical Task	
	Progress		Rolled Up Milestone	
	Milestone		Rolled Up Progress	
	Summary			

Budget Report as of Tue 3/4/97  
Crawler Development  
G. N. BOECHLER

ID	Task Name	Early Start	Early Finish	Cost
22	Crawler Fabrication	Mon 7/14/97	Wed 11/12/97	\$150,000.00
25	Interface Fabrication	Mon 11/24/97	Fri 2/6/98	\$149,600.00
30	Crawler Testing (ATP)	Thu 11/13/97	Wed 1/21/98	\$139,200.00
35	Deploy Crawler	Tue 4/7/98	Tue 5/12/98	\$136,864.00
8	Safety Assessment	Thu 9/11/97	Fri 2/20/98	\$107,648.00
15	Fab Laser Leveling sys	Mon 5/26/97	Fri 7/18/97	\$102,400.00
21	Sampler Design and Fab	Tue 4/1/97	Thu 7/10/97	\$67,764.00
24	Interface Design	Mon 9/1/97	Fri 11/21/97	\$65,280.00
20	Depth Gauge Fab	Tue 4/1/97	Tue 6/3/97	\$64,032.00
5	Hazards Analysis	Fri 5/2/97	Thu 7/31/97	\$60,320.00
18	Gamma Fab	Mon 4/7/97	Thu 5/29/97	\$55,744.00
36	Deploy Crawler (VENDOR)	Tue 4/7/98	Mon 5/18/98	\$55,730.00
14	Design Laser Leveling	Mon 3/3/97	Fri 5/23/97	\$55,680.00
32	Crawler Testing (OTP)	Thu 1/22/98	Tue 2/24/98	\$55,680.00
16	Crawler Design	Mon 5/12/97	Fri 7/11/97	\$50,880.00
29	Training	Tue 11/11/97	Mon 12/15/97	\$48,400.00
4	USQ Evaluation	Mon 3/3/97	Thu 5/1/97	\$40,832.00
33	ORR	Wed 2/25/98	Mon 4/6/98	\$31,552.00
2	Engineering Task Plan	Mon 12/9/96	Fri 2/28/97	\$27,840.00
6	Accident and Controls	Fri 8/1/97	Tue 9/2/97	\$20,880.00
26	Write ATP	Mon 8/11/97	Fri 9/26/97	\$19,488.00
28	Write Procedures	Mon 9/15/97	Mon 11/10/97	\$19,024.00
27	Write OTP	Mon 10/20/97	Fri 12/5/97	\$16,240.00
11	Request For Proposal	Mon 3/3/97	Fri 4/4/97	\$11,600.00
13	Place Order Crawler	Mon 4/7/97	Fri 5/9/97	\$11,600.00
17	Gamma Probe Procurement	Mon 3/10/97	Fri 4/4/97	\$9,280.00
7	Cost Analysis JCO vs SA	Tue 9/2/97	Thu 9/11/97	\$8,456.00
19	Depth Gauge Procurement	Mon 3/10/97	Mon 3/31/97	\$7,424.00
9	Write Initial scope of work	Fri 11/1/96	Fri 2/28/97	\$0.00
10	Request For Interest	Fri 2/28/97	Fri 2/28/97	\$0.00
12	MS 2 RFP Out	Fri 3/21/97	Fri 3/21/97	\$0.00
31	MS 4 OTP COMPLETE	Mon 1/12/98	Mon 1/12/98	\$0.00
34	MS 5 DEPLOY CRAWLER	Tue 4/7/98	Tue 4/7/98	\$0.00
				<b>\$1,587,438.00</b>

**6.6 COST SUMMARY:**

**FY 97**

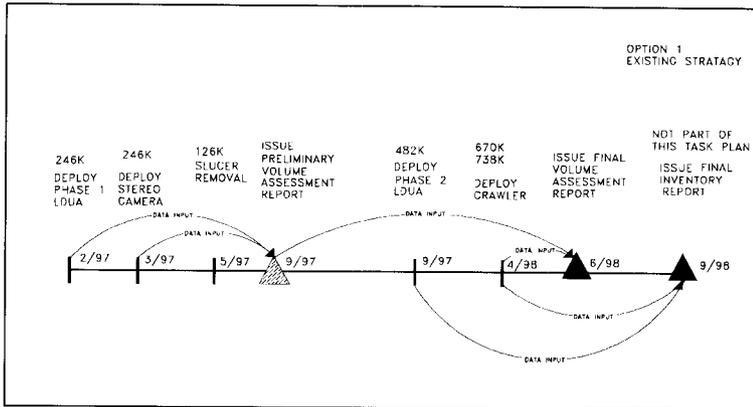
Volume Assessment: \$310 K  
 LDU A Phase 1: \$245 K  
 Slucor Removal: \$126 K  
 LDU A Phase 2: \$482 K  
 Crawler: \$825 K  
 NHC PNNL Mgt \$200 K

**TOTAL \$2,215 K**

**FY 98 Crawler: \$735 K**

**GRAND TOTAL: \$2,950 K**

**6.7 SCHEDULE SUMMARY:**



## 7.0 SYSTEMS ENGINEERING

Systems engineering procedures and practices will be utilized throughout this project. Due to the multiple equipment deployments and varying deployment objectives the same procedures might not be utilize for each case. However, Systems Engineering Procedures WHC-IP-1117 SEP-1.0 through 11.2 will be utilized as needed as well as Configuration Management Technical Baseline procedures CCP-01-04 throughout the project..

## 8.0 CLOSEOUT COSTS

If funding gets cut or delayed on one or all of the tasks (Stereo Camera, LDUA 1 and 2, Crawler) the in progress tasks need some responsible closure. This would include contract closures, project file updating, document closures, equipment storage etc. The cost and time will vary with what stage the task is in. Generally, the farther into the task, the longer it will take to close it out. Below is a estimate of these costs and times for a average close out

STEREO CAMERA	Three weeks and 10K
LDUA 1 and 2	Four weeks and 15K
CRAWLER	Three weeks and 15 K (plus accrued costs and penalties to contractors)

## 9.0 REFERENCES

- WHC-CM-6-1, "Standard Engineering Practices"
- HNF-SD-TD-FRD-005 Rev. 0 "Functions and Requirements for AX-104 Residual Waste Volume and Inventory Data Collection
- HNF-SD-WM-TI-799 Rev. 0 "Technical Basis Document"
- WHC-CM-4-2 "Quality Assurance Program Planning"
- WHC-CM-6-1 Engineering Practices
- WHC-IP-117 Systems Engineering Procedures
- CCP-01-04 Technical Base line Procedures

## DISTRIBUTION SHEET

To Distribution	From Remote Sensing and Sampling Equipment Engineering	Page 1 of 1 Date 03/10/97
Project Title/Work Order AX-104 Residual Waste Volume and Inventory Data Collection, HNF-SD-TWR-ETP-001, Rev. 0/E20133		EDT No. 619906 ECN No. N/A

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