# 6500m HOV Project Stage 1: A-4500 HOV

# **Integrated Master Schedule**

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WOODS HOLE OCEANOGRAPHIC INSTITUTION WOODS HOLE, MA 02543

# **Document Control Sheet**

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# 1.0 Baseline Integrated Master Schedule

Once complete, the schedule and cost estimate were combined into a cost and resource loaded integrated master schedule. Budgeted hours and dollars were then time-phased to generate a cash flow projection and staffing charts for the program and individual resources. Scope, schedule, cost and resource data are now fully integrated in the P3 scheduling tool, which will serve as the basis for our Earned Value Management System.

# 2.0 Work Breakdown Structure (WBS)

The project scope is broken into five major headings to produce the work breakdown structure (WBS). The breakdown has major headings for project management, certification/ classification, the A-4500 HOV, support equipment, and construction and test. The vehicle breakdown represents the major sub-systems of the A-4500 HOV. Technical leads worked individually or together to estimate each work package under the WBS.

#### 2.1 Work Breakdown Dictionary

The WBS dictionary is a narrative that describes in detail the scope and features of the A-4500 HOV. The preferred design option includes modifications to the *Alvin* frame to install the new personnel sphere, which will have both wire and fiber optic penetrators. All syntactic foam will be replaced with 6500 m rated foam. There are also new designs for the main ballast system soft tanks, manipulator mounts, science basket, life support system, and internal arrangement. In addition, the A-4500 HOV will have a new command and control system, and an upgraded lighting and imaging system. The vehicle will continue to use lead acid batteries with a 120 volt bus. A full description can be found in the *A-4500 HOV Work Breakdown Structure and Dictionary*.

# 2.2 Work Packages

The WBS elements have been further broken down into work packages by discipline. This approach served to identify the responsible technical leads, who then identified detailed activities that were then logically sequenced and estimated. Cost estimating worksheets include pricing for the preliminary design, final design, procurement and fabrication. For the purpose of this IMS document, the schedule and cost estimating worksheets are organized by the work packages.

A list of work packages is shown in Table 1.

Work Pkg ID	Work Package Description
000	Historical Information
002-01	Project Management
002-02	Project Management Plans
002-03	Preliminary Design Report
002-04	Final Design Report
003	Classification/Certifiction
A00	A00 General Information
A02-01	A02-01 External Arrnagement
A02-03	A02-03 Penetrators
A02-06C	A02-06 Internal Arrangements, Core Components
A02-06E	A02-06 Internal Arrangement, Electrical
A02-06M	A02-06 Internal Arrangement, Mechanical
A04	A04 Frame & Structural Components
A06	A06 Fixed Buoyancy Assemblies
A08	A08 Skins, Fairings and Sail
A10	A10 Main Battery Systems
A12-01	A12-01 Junction Boxes
A12-03D	A12-03 Data Bottle
A12-03P	A12-03 Power Bottle
A14	A14 Main Ballast System
A16	A16 Variable Ballast System
A18	A18 Propulsion Control System
A20	A20 Main Hydraulic System
A22	A22 Mercury Trim System
A24	A24 Life Support Systems
A26	A26 Compensation System
A28	A28 Service Releases
A30	A30 Manipulators
A32	A32 Operational Equipment & Controls
A34	A34 Science Data System, Electrical
A34-AA	A34 Science Data Sys Imaging / Illumination
A36	A36 Command, Control & Computing
B50	A50 Support Equip. General Support
B52	A52 Support Equip. Launch and Recovery System
A54	Support Equip. Shipboard Modifications
OV	Construction
ST	Integration and Test

# Table 1. Work Package List

# 3.0 Schedule Development

#### 3.1 Summary Schedule

The summary schedule is depicted in the Gantt/Bar Chart in Figure 1. Activities are organized into the WBS. Project management activities have been summarized into a single line. The activities are grouped and then summarized to the second level of the WBS representing the A-4500 HOV's major system components. Support equipment, construction, and integration and test have also been summarized to single lines. Figure 1 contains summary information including the duration, early start, early finish and total float. Note: the narrow portion of the bar represents non-work periods for that element of work.

+ Project Management	Activity ID	Activity Description	Early Start	Early Finish		9 N D	IFM		2010 I I I	AS		IFN	2011 I I A	S		TR
Classification/Certification         OlocTos         28DEC11           + Classification/Certification         010CT09         01SEP11           Vehicle A-4500	+ Proie	ct Management														
+ Classification/Certification Vehicle A-4500 + A00 General Information A00 General Information A010 Sphere and Attachments 31 JUL09A A02 SEP10 + A04 Frame and Structural Comp. A06 Fixed Buoyancy A06 Fixed Buoyancy A07 Fixed Buoyancy A08 Skins, Fairings and Sails A08 Skins, Fairings and Sails A09 OCT10 A04 OCT10 A13 JUL09A A13 JUL09A A14 Main Ballast Stytem A16 Variable Ballast System A17 A18 Propulsion System A18 Propulsion System A19 OFFEB10 A11 ANI0 A13 JUL09A A13 JUL09A A14 Main Ballast Stytem A14 Main Ballast Stytem A14 Main Ballast Stytem A14 Main Hydraulic System A14 A00 Main Hydraulic System A14 More A14 Main Ballast Stytem A14 Main Ballast Stytem A15 Main Ballast Stytem A14 Main Bal			03OCT05A	28DEC11										$\diamond$		
010CT09       01SEP11       0100000000000000000000000000000000000	+ Class	ification/Certification														
Vehicle A-4500         + A00 General Information         31,UL09A       02SEP10         + A01 Sphere and Attachments         + A04 Frame and Structural Comp.         31,UL09A       21,UN11         + A04 Frame and Structural Comp.         31,UL09A       19NAY11         + A06 Fixed Buoyancy			01OCT09	01SEP11		$\diamond$				-						
+ A00 General Information 31,UL09A 02SEP10 + A01 Sphere and Attachments 31,UL09A 12JUN11 + A04 Frame and Structural Comp. + A04 Frame and Structural Comp. + A06 Fixed Buoyancy + A06 Fixed Buoyancy + A08 Skins, Fairings and Sails + A08 Skins, Fairings and Sails + A08 Skins, Fairings and Sails + A10 Battery Systems + A10 Battery Systems + A10 Battery Systems + A10 Battery Systems + A12 Power Control and Distribution + A12 Power Control and Distribution + A14 Main Ballast Styem + A16 Variable Ballast System + A16 Variable Ballast System + A18 Propulsion System + A18 Propulsion System + A19 Oper	Vehicle	A-4500														
+ A01 Sphere and Attachments         31JUL09A       21JUL09A         + A04 Frame and Structural Comp.         31JUL09A       19MAY11         + A04 Frame and Structural Comp.         31JUL09A       19MAY11         + A08 Fixed Buoyancy       31JUL09A         + A08 Skins, Fairings and Sails       15JUL11         + A08 Skins, Fairings and Sails       15JUL11         + A10 Battery Systems       040CT10         040CT10       05AUG11         + A12 Power Control and Distribution       15JUL11         + A14 Main Ballast Styem       230CT09         230CT09       23JUL11         + A18 Propulsion System       11JANI0         11JANI0       2JUN11         + A20 Main Hydraulic System       11JANI0         11JANI0       2JUN11         * A20 Main Hydraulic System       11JANI0         * Main Ballast Stytem       11JANI0         * Main Ballast System       11JUL02         * Main Ballast System       11JUL02         * Main Ballast System       11JANI0         * Main Ballast System       11JANI0         * Main Ballast System       11JUL02         * Main Ballast System       11JUL02         * Main Ballast System       11JANI0<	+ A00	General Information														
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+ A04 Frame and Structural Comp. + A04 Frame and Structural Comp. 31,JUL09A 19MAY11 + A06 Fixed Buoyancy 31,JUL09A 13,JUL11 + A08 Skins, Fairings and Sails + A08 Skins, Fairings and Sails + A10 Battery Systems 4 A12 Power Control and Distribution 31,JUL09A 05,JUL11 + A12 Power Control and Distribution 31,JUL09A 05,JUL11 + A12 Power Control and Distribution 4 A12 Power Control and Distribution 4 A12 Power Control and Distribution 4 A14 Main Ballast Styem 4 A16 Variable Ballast System 4 A16 Variable Ballast System 4 A16 Variable Ballast System 4 A17 Populsion System 4 A18 Propulsion System 4 A19 Over 11,JAN10 23,JUN11 + A20 Main Hydraulic System 4 CP/innvers Systems, Inc. 8 CP/innvers Systems, Inc.	+ A01 S	Sphere and Attachments								I						
+ A06 Fixed Buoyancy + A06 Fixed Buoyancy 31,JUL09A 19MAY11 + A08 Fixed Buoyancy 31,JUL09A 13,JUL11 + A08 Skins, Fairings and Sails 4 A08 Skins, Fairings and Sails 4 A10 Battery Systems 4 A10 Battery Systems 4 A12 Power Control and Distribution 4 A12 Power Control and Distribution 4 A12 Power Control and Distribution 4 A14 Main Ballast Styem 4 A16 Variable Ballast System 4 A16 Variable Ballast System 4 A18 Propulsion System 4 A20 Main Hydraulic Syste			31JUL09A	21JUN11				+ + +			+ +					
+ A06       Fixed Buoyancy       31JUL09A       13JUL11         + A08       Skins, Fairings and Sails       15JUL11         + A08       Skins, Fairings and Sails       15JUL11         + A08       Skins, Fairings and Sails       15JUL11         + A10       Battery Systems       04OCT10       05AUG11         + A12       Over Control and Distribution       13JUL09A       05JUL11         + A14       Main Ballast Styem       01OCT09       28JUN11         + A16       Variable Ballast System       01OCT09       22JUL11         + A18       Propulsion System       01OCT09       22JUL11         + A20       Main Hydraulic System       09FEB10       05AUG11         Sent Information       Sent Information       Sent Information         Sent Information       Sent Informat	+ A04 ]	Frame and Structural Comp.	21 11 11 00 4	101/14/1/1												
+ A00       71,10L09A       13,10L11         + A08       Skins, Fairings and Sails         -       15,10L11         + A10       Battery Systems         040CT10       05AUG11         + A12       Power Control and Distribution         -       31,10L09A         + A14       Main Ballast Styem         -       230CT09         -       230CT09         -       010CT09         22,10L11       -         + A18       Propulsion System         -       11,1AN10         -       010CT09         -       010CT09         -       010CT09         -       -         -       010CT09         -       -         -       010CT09         -       -         -       010CT09         -       -         -       -         -       010CT09         -       -         -       -         -       -         -       010CT09         -       -         -       010CT09         -       -         <	+ 106 1	Fived Buoyeney	31JUL09A	19NIA Y 11												
+ A08 Skins, Fairings and Sails  + A08 Skins, Fairings and Sails  + A10 Battery Systems  - 04OCT10 05AUG11 + A12 Power Control and Distribution  + A14 Main Ballast Styem  - 23OCT09 28JUN11 + A16 Variable Ballast System  - 01OCT09 22JUL11 + A18 Propulsion System - 11JAN10 23JUN11 + A20 Main Hydraulic System - 09FEB10 05AUG11  - 09FEB10 05AUG11  - 00FEB10 05AUG11  - 00FEB10 05AUG11  - 00FEB10 05AUG11  - 00FEB10 05AUG11 - 00FEB10 05AUG1 - 00FEB10 - 00FEB10 05AUG1 - 00FEB10			31.П.Д.09А	13.IUI.11		$\sim$				1						
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+ A10 Battery Systems       04OCT10       05AUG11         + A12 Power Control and Distribution       31,UL09A       05JUL11         + A14 Main Ballast Styem       23OCT09       28JUN11         + A16 Variable Ballast System       01OCT09       22JUL11         + A18 Propulsion System       01OCT09       22JUL11         + A20 Main Hydraulic System       01SEP05       AL28         Sinch Date       01SEP05       AL28         Sinch Date       01SEP05       Sincet 1 of 2         Sinch Date       01SEP05       Sincet 1 of 2         Sinch Date       01SEP05       Sincet 1 of 2         Sincet 1 of 2       Voods Hole Oceanographic Institution SSOOM HOV Project Stage 1: A-4500 HOV Figure 3.1 Summary Schedule by WBS       Sincet 1 of 2         Woods Hole Oceanographic Institution Stage 1: A-4500 HOV Figure 3.1 Summary Schedule by WBS       Sincet 1 of 2				15JUL11						-						
Image: system         04OCT10         05AUG11           + A12         Power Control and Distribution         31,JUL09A         05JUL11           + A14         Main Ballast Styem         010CT09         28,JUN11           + A16         Variable Ballast System         010CT09         22,JUL11           + A18         Propulsion System         010CT09         22,JUL11           + A20         Main Hydraulic System         09FEB10         05AUG11	+ A10 ]	Battery Systems														
+ A12 Power Control and Distribution 31JUL09A 05JUL11 + A14 Main Ballast Styem 23OCT09 28JUN11 + A16 Variable Ballast System 01OCT09 22JUL11 + A16 Variable Ballast System 11JAN10 23JUN11 + A18 Propulsion System 009FEB10 05AUG11 Start Date minh Date 009FEB10 05AUG11 Woods Hole Oceanographic Institution 6500m HOV Projects Stage 1: A-4500 HOV Figure 3.1 Summary Schedule by WBS			04OCT10	05AUG11												
31JUL09A     05JUL11       + A14     Main Ballast Styem       23OCT09     28JUN11       + A16     Variable Ballast System       010CT09     22JUL11       + A18     Propulsion System       11JAN10     23JUN11       + A20     Main Hydraulic System       09FEB10     05AUG11	+ A12 l	Power Control and Distribut	ion													
+ A14 Main Ballast Styem 230CT09 28JUN11 + A16 Variable Ballast System 010CT09 22JUL11 + A18 Propulsion System 11JAN10 23JUN11 + A20 Main Hydraulic System 09FEB10 05AUG11 Start Date Shet1 of 2 28DCT09 00Finavera Systems, Inc.			31JUL09A	05JUL11			1				1	1 1				-
23OC109       28JUN11         + A16       Variable Ballast System         01OCT09       22JUL11         + A18       Propulsion System         -       11JAN10       23JUN11         + A20       Main Hydraulic System         -       09FEB10       05AUG11         Start Date       01SEP05 200C011       AL28         Start Date       01SEP05 06NOV09 01:52       Model Hole Cceanographic Institution 6500m HOV Project Stage 1: A-4500 HOV Figure 3.1 Summary Schedule by WBS       Image: Comparison of the comparison of	+ A14 I	Main Ballast Styem														
A 16 Variable Ballast System          010CT09       22JUL11         + A18 Propulsion System         11JAN10       23JUN11         + A20 Main Hydraulic System         09FEB10       05AUG11			230C109	28JUN11			<b>_</b>			1						-
Image: Constraint of the system     Constraint of the system       + A18 Propulsion System     11JAN10     23JUN11       + A20 Main Hydraulic System     09FEB10     05AUG11	+ A16	Variable Ballast System	0100700	<b>22 H H 11</b>												
Image: start Date       09FEB10       05AUG11         Start Date       01SEP05       AL28         Start Date       010CT09       Woods Hole Oceanographic Institution         06NOV09 01:52       06NOV09 01:52         0e Primavera Systems, Inc.       0		Pronulsion System	010(109	22JULII												
Hard Hydraulic System     Docume       Image: the system of the system     09FEB10       Of the system     09FEB10       Of the system     01SEP05       Star Date     01SEP05       Sheet 1 of 2     28DEC11       Of the system     01SEP05       Other of the system     01SEP05       Of the system     06NOV09 01:52       Woods Hole Oceanographic Institution       6500m HOV Project       Stage 1: A-4500 HOV       Figure 3.1 Summary Schedule by WBS			11.JAN10	23.IUN11												
Operation     Operation       09FEB10     05AUG11       Start Date     01SEP05       Finish Date     28DEC11       Data Date     01OCT09       Nu Date     06NOV09 01:52       @ Primavera Systems, Inc.     AL28	+ A20 I	Main Hydraulic System		20001111						   						
Start Date Finish Date Data Date Run Date © Primavera Systems, Inc. Start Date 01SEP05 AL28 01SEP05 28DEC11 01OCT09 06NOV09 01:52 © Primavera Systems, Inc.			09FEB10	05AUG11												
Start Date     01SEP05     AL28     Sheet 1 of 2       Finish Date     28DEC11     01OCT09     Woods Hole Oceanographic Institution       Gato Date     06NOV09 01:52     Woods Hole Oceanographic Institution       Bun Date     06NOV09 01:52     6500m HOV Project       Stage 1:     A-4500 HOV       Figure 3.1 Summary Schedule by WBS     1930			· · · ·		<u> </u>											
	Start Date Finish Date Data Date Run Date	© Primavera Systems, Inc.	01SEP05 / 28DEC11 01OCT09 06NOV09 01:52	AL28 Woods H Figure 3.	ole Oceanog 6500m HOV Stage 1: A-4 1 Summary S	graphic / Projec 1500 H0 Schedu	: Institutio ct DV ule by WB	Sheet 1 o n S	f 2				HOL SOON	I930	THE INSTITUTION	

Activity	Activity	Early	Early					
ID Č	Description	Start	Finish	2009 S O N D	IFMA	<u>2010</u>		SONDI
+ A22 ]	Mercury Trim System							
		14APR11	08JUL11					
+ A24 ]	Life Support & Habitability							
		07JAN10	02AUG11					
+ A26 (	Compensation System		I					
		10DEC09	07DEC10					
+ A28 J	Releases and Cutters							
		<b>01OCT09</b>	14JAN11					
+ A30 I	Manipulators							
	-	24FEB10	09JUN11					
+ A32 (	Operational Equipment							
		10DEC09	25FEB10					
+ A34 §	Science Interface Systems							
		01SEP09A	08AUG11		<			
+ A36 (	Command and Control							
		16OCT09	01NOV10					
+ Navig	ation, Communication & Tr	acking						
		22MAR10	22JUN11					
+ Const	truction							
		02NOV10	09NOV11					
+ Integ	ration and Test							
		11AUG11	10NOV11					

### **3.2 Detailed Schedule**

The detailed schedule is illustrated in Figure 2 and contains over 475 activities. The list of activities is organized by work package for ease of use with the cost estimating worksheets. The top section contains key milestones so that the Project Management Team can quickly see the overall project status. Each activity line shows the activity identification number, description of the work, duration, early start, early finish, total float.

Once the project begins, this report will be updated to include actual start, actual finish dates, percent complete. The original baseline bars will be included in the bar view so that the team will be able to visually see activity variances in addition to the total float.

Activity	Activity	Oria	Early	Early	Total	Budgeted													
ID	Description	Dur	Start	Finish	Float	Cost	S	2009 O N I	DJ	FM	AM	2010 J   J   A	S	) N D	JF	MA	<u>20</u> M J	11 JAS	DJE
6500m	HOV Project									1			1						
Total		1,584	03OCT05A	28DEC11	0	31,722,893.98				1									
Stage 1:	A-4500 HOV																		
Histor	ical Information									i I I									
0000	Begin Project	0	03OCT05A			0.00													
0001	Historical 2005	63*	03OCT05A	30DEC05A		238,025.10				   									
0002	Historical 2006	256*	03JAN06A	29DEC06A		900,177.96													
0003	Historical 2007	257*	02JAN07A	31DEC07A		5,176,003.16				I I I									
0004	Historical 2008	258*	02JAN08A	31DEC08A		6,312,281.00													
0005	Historical 2009	103*	02JAN09A	30SEP09A		2,959,953.94							1						
Projec	t Management																		
Genera	Oversight				_		{	, , , , , , , , , , , , , , , , , , ,											
0107	Project Management during Preliminary Design	40*	01OCT09A	30NOV09	4	140,427.92				, , ,									
0110	Project Management during Final Design	177*	01DEC09	12AUG10	4	670,238.72			-ii-i-,	_,	, î		1			   			
0160	Project Management during Procure & Fabrication	179*	13AUG10	02MAY11	4	693,407.26													
0190	Project Management during Construction	86	03MAY11	01SEP11	4	412,126.92				   							  î		
0192	Project Management during Sea Trials	44	02SEP11	04NOV11	35	18,147.40													
Projec	t Management Plans									i I I							 1 I 1 I		
Meeting	ss & Data Collection	1	1		T 1					I I		1							
0105	Meet with National Science Foundation	1	16JUL09A	16JUL09A		0.00				   									
0230	Identify Science Requirements	1	17JUL09A	17JUL09A		0.00				I I I									
0280	Conduct Scoping Meeting	1	21JUL09A	21JUL09A		0.00										1			
Project	Execution Plan									1									
0236	Project Management Draft Plans	33	17JUL09A	30SEP09A		0.00													
0430	Prepare Outline: Project Execution Plan	1	17JUL09A	17JUL09A		0.00				   									
0431	Prepare 1st Draft: Project Execution Plan	12	20JUL09A	31AUG09A		0.00													

4 OCEANOGRAPHIC INSTITUTION Start Date 01SEP05 AL28 Sheet 1 of 19 Early Bar Finish Date 28DEC11 Progress Bar Data Date 01OCT09 Woods Hole Oceanographic Institution 6500m HOV Project Figure 3.2 Detailed Activities Critical Activity Run Date 06NOV09 01:53 © Primavera Systems, Inc.

Activity	Activity	Orig	Early	Early	Total	Budgeted		200	3				20	10						20.	11			
ID	Description	Dur	Start	Finish	Float	Cost	S		j D	J	F	M A I	ΛĴ	JA	S C	NE	L (	FM	AN	ΛJ	JA	S O	ND	JE
0433	Internal Review/Comment: Project Execution Plan	3	01SEP09A	15SEP09A		0.00		I I I	1															-
0435	External Review/Comment: Project Execution Plan	3	15SEP09A	30SEP09A		0.00		I I I						   										
0237	Project Management Final Plans	22	01OCT09A	02NOV09	1	212,884.04													-					
0437	Prepare 2nd Draft: Project Execution Plan	10	01OCT09A	15OCT09	22	0.00																		
0439	Internal Review/Comment: Project Execution Plan	10	16OCT09	29OCT09	22	0.00					i			i I							i I			
0441	External Review/Comment: Project Execution Plan	3	30OCT09	03NOV09	22	0.00			1				1											
Vehicle 1	Design Plan										1										I I			
0235	Prepare Outline: Vehicle Design Plans	1	17JUL09A	17JUL09A		0.00		I I I	1		1			   							   			
0240	Identify Technical Requirements	1	20JUL09A	20JUL09A		0.00		I I I																
0250	Identify Candidate Designs	1	22JUL09A	22JUL09A		0.00																		
0260	Conduct Trade-off Study	5	23JUL09A	29JUL09A		0.00		I I I			Ì			- - - -										
0270	Select Preferred Vehicle	1	30JUL09A	30JUL09A		0.00			1	1					 						   	   	     	
0442	Prepare 1st Draft: Venicle Design Plans	10	31JULU9A	31AUG09A		0.00																		
0443	Evternal Review/Comment: Vehicle Design Plans	3	165ED09A	105EP09A		0.00		I I I																
0447	Prepare 2nd Draft: Vehicle Design Plans	10	010CT09A	150CT09	27	0.00																		
0449	Internal Review/Comment: Vehicle Design Plans	5	160CT09	22OCT09	27	0.00																		
0452	External Review/Comment: Vehicle Design Plans	3	230CT09	27OCT09	27	0.00					-													
Project	Management Plan							-		1	1						1							
0275	Collect Detailed Schedule Information	2	17 11 11 00 0	20 11 11 09 4		0.00		į.	i.		i.			Ì		11		Ì			i.		i i	
0275	Prenare Cost Worksheets	3	22.IUI 09A	2000E09A		0.00		I I I																
0279	Prepare Integrated Master Schedule	4	22JUL09A	27JUL09A		0.00		I I I			i I I			i I I							i I I			
0281	Prepare WBS & Dictionary	1	22JUL09A	22JUL09A		0.00		I I I I																
0470	Prepare Outline: Project Management Plan	1	22JUL09A	22JUL09A		0.00		I I I																
0380	Conduct Team Review: Interactive Master Schedule	1	28JUL09A	28JUL09A		0.00		   	 		1		   		   				   		   	 	1 1 1 1 1 1	   
0390	Prepare Cost Book	5	29JUL09A	04AUG09A		0.00																		
0410	Revise Integrated Master Schedule	3	29JUL09A	31JUL09A		0.00		I I I																
0480	Prepare 1st Draft: Project Management Plan	10	30JUL09A	11AUG09A		0.00		I I I			   										   			
0550	Internal Review/Comment: Project Management Plan	2	13AUG09A	15SEP09A		0.00		I I I																
0560	External Review/Comment: Project Management Plan	2	16SEP09A	30SEP09A		0.00					   													
0570	Prepare 2nd Draft: Project Management Plan	10	01OCT09A	15OCT09	33	0.00								-	 									

Activity	Activity	Orig	Early	Early	Total	Budgeted		2009	)			201	0						2011				
ID	Description	Dur	Start	Finish	Float	Cost	S	Q N	D	JFN		ΛJ	JA	S O	ND	JF	M	AM	JJ	AS	0	۱D	JE
0590	External Review/Comment: Project Management Plan	2	16OCT09	19OCT09	33	0.00						1					   					   	
Risk Ma	nagement Plan																						
0285	Prepare Risk Worksheets	3	03AUG09A	07AUG09A		0.00																	
0291	Prepare Outline: Risk Management Plan	1	05AUG09A	05AUG09A		0.00																	
0286	Prepare Risk Register	5	17AUG09A	21AUG09A		0.00																Ì	
0492	Prepare 1st Draft: Risk Managment Plan	10	21AUG09A	28AUG09A		0.00		i I				i										i I	
0494	Internal Review/Comment: Risk Managment	2	01SEP09A	15SEP09A		0.00		i I I														i I I	
0495	EXTERNAL Review of Risk Mngt Plan & Register	2	15SEP09A	30SEP09A		0.00			   											     		I I I	
0498	Prepare 2nd Draft: Risk Managment Plan	10	01OCT09A	15OCT09	31	0.00		ן א ו									   			     		   	
0501	Internal Review/Comment: Risk Managment	2	16OCT09	19OCT09	31	0.00							 									I I I	
0503	External Review/Comment: Risk Managment Plan	2	20OCT09	21OCT09	31	0.00																	
Conting	ency Management Plan										1												
0500	Prepare Outline: Contingency Managment Plan	3	03AUG09A	05AUG09A		0.00																	
0502	Prepare 1st Draft: Contingency Managment Plan	10	06AUG09A	19AUG09A		0.00																	
0504	Internal Review/Comment: Contingency Managment	2	20AUG09A	15SEP09A		0.00																l L	
0506	External Review/Comment: Contingency Managment	2	16SEP09A	30SEP09A		0.00		i I I															
0508	Prepare 2nd Draft: Contingency Managment Plan	10	01OCT09A	15OCT09	31	0.00		י א ו									   					I I I	
0511	Internal Review/Comment: Contingency Managment	2	16OCT09	19OCT09	31	0.00						l l										I.	
0513	External Review/Comment: Contingency Managment	2	20OCT09	21OCT09	31	0.00		ľ															
Acquisit	ion Plan							1					į										
0510	Prepare Outline: Acquisition Plan	1	20JUL09A	20JUL09A		0.00																	
0512	Prepare 1st Draft: Acquisition Plan	10	21JUL09A	31AUG09A		0.00		i I I				i										i I I	
0514	Internal Review/Comment: Acquisition Plan	3	01SEP09A	15SEP09A		0.00		1												1 I 1 I 1 I		l I I	
0516	External Review/Comment: Acquisition Plan	3	16SEP09A	30SEP09A		0.00		1									   			     		l l l	
0518	Prepare 2nd Draft: Acquisition Plan	10	01OCT09A	15OCT09	22	0.00		ນ 1															
0522	Internal Review/Comment: Acquisition Plan	10	16OCT09	29OCT09	22	0.00																I I I	
0524	External Review/Comment: Acquisition Plan	3	30OCT09	03NOV09	22	0.00																- - 	
Quality	Control/Assurance Plan								įΤ														
0520	Prepare Outline: QC/QA Plan	1	20JUL09A	20JUL09A		0.00								1									
0535	Prepare 1st Draft: QC/QA Plan	10	21JUL09A	21AUG09A		0.00																	
0545	Internal Review/Comment: QC/QA Plan	3	24AUG09A	15SEP09A		0.00								1									
0555	External Review/Comment: QC/QA Plan	3	16SEP09A	30SEP09A		0.00						l l		1								l L L	

Activity	Activity	Orig	Early	Early	Total	Budgeted		20	)09				20	10							201	11				
ID	Description	Dur	Start	Finish	Float	Cost	s	0	N	DJ	FN		MJ	JA	S	O N	D	JF	Μ	AM	J	JA	S	D N	DJ	Ε
0565	Prepare 2nd Draft: QC/QA Plan	10	01OCT09A	15OCT09	22	0.00		C	 										   	   						
0575	Internal Review/Comment: QC/QA Plan	10	16OCT09	29OCT09	22	0.00													   	l L I			1			
0585	External Review/Comment: QC/QA Plan	3	30OCT09	03NOV09	22	0.00							   							l I I						   
Environ	mental Health & Safety Plan	•			•								1		1	1				1		1				1
0530	Prepare Outline: Health & Safety Plan	1	20JUL09A	20JUL09A		0.00														i i						
0532	Prepare 1st Draft: Health & Safety Plan	10	21JUL09A	20AUG09A		0.00			     																	
0534	Internal Review/Comment: Health & Safety Plan	3	21AUG09A	15SEP09A		0.00			-  -  -																	- - -
0536	External Review/Comment: Health & Safety Plan	3	15SEP09A	30SEP09A		0.00			i I I						 	i I I				i L		 				i I I
0538	Prepare 2nd Draft: Health & Safety Plan	10	01OCT09A	15OCT09	22	0.00		Ci	l l l							   			   	I I I	     					   
0542	Internal Review/Comment: Health & Safety Plan	10	16OCT09	29OCT09	22	0.00																	1			
0544	External Review/Comment: Health & Safety Plan	3	30OCT09	03NOV09	22	0.00										-										
Transist	ion Plan								i i				į			į				Ì		I				
0540	Prepare Outline: Transition Plan	1	22JUL09A	22JUL09A		0.00																				
0541	Prepare 1st Draft: Transition Plan	10	23JUL09A	19AUG09A		0.00			-     																	-
0543	Internal Review/Comment: Transition Plan	3	20AUG09A	15SEP09A		0.00			i I I							I I I				Î I I		i I I				i I I
0546	External Review/Comment: Transition Plan	3	16SEP09A	30SEP09A		0.00			l l l				   			   			 	l I I	1   					   
0547	Prepare 2nd Draft: Transition Plan	10	01OCT09A	15OCT09	22	0.00		C	   																	   
0549	Internal Review/Comment: Transition Plan	10	16OCT09	29OCT09	22	0.00			   																	-
0551	External Review/Comment: Transition Plan	3	30OCT09	03NOV09	22	0.00									   	i I I				i L		i I I				i I I
0101	Complete Project Management Plans	0		03NOV09	22	0.00		ſ				1			1					1		   	   			
Prelim	inary Design Report								1						1		1					1				
Prelimir	ary Design Readiness Review								i -		i i		i.	l i	i l	i	i I		1	i.	¦	I.	i			÷
0099	Prepare Preliminary Design	89	17JUL09A	23NOV09A		126,955.88	ŀ																			
0104	Conduct 1st Dry Run with Team	1	16SEP09A	16SEP09A		0.00	11													i I I						-
0106	Revise Presentation	5	17SEP09A	25SEP09A		0.00	•	I	l L L										 	l l l	 					   
0102	Prepare Presentation Outline	1	21SEP09A	21SEP09A		0.00	11																			   
0103	Prepare Presentation	4	22SEP09A	25SEP09A		0.00	]	1																		
0108	Conduct 2nd Dry Run with Internal WHOI Advisors	1	25SEP09A	25SEP09A		0.00			     																	- - -
0112	Refine Presentation for Readiness Review	5	25SEP09A	25SEP09A		0.00			I I I				   		 	   				I I I						   
0122	Conduct Readiness Review	3	28SEP09A	29SEP09A		0.00			l l l							   				I I I	     					
0100	NSF Provide PDR Agenda (not provided)	0	30SEP09A			0.00			   							   			   	   						   

Activity	Activity	Orig	Early	Early	Total	Budgeted		2009				201	0					2	011				
ID	Description	Dur	Start	Finish	Float	Cost	S		DJ	FM	AN	I J	JA	s o	ND	JF	MA	M	JJ	AS	ON	D	JE
Prelimi	nary Design Report									1 1			1 1								1	-	-
0124	Advisors Provide Review Comments	5	30SEP09A	01OCT09A		0.00						Î I I								I I I			
0126	Revise PDR Documents	5	01OCT09A	07OCT09	17	0.00						1 1 1											  - 
0128	Revise PDR Presentation Outline	1	08OCT09	08OCT09	17	0.00						L L L								   			
0132	Prepare PDR Presentation	5	03NOV09	09NOV09	1	0.00																	
0133	Conduct 1st PDR Dry Run with Team	1	10NOV09	10NOV09	1	0.00																	
0134	Revise PDR Presentation	5	12NOV09	18NOV09	1	0.00														-			
0136	Conduct 2nd PDR Dry Run w/Internal WHOI Advisors	1	19NOV09	19NOV09	1	0.00						I I I								   			
0138	Refine Presentation for PDR	10	20NOV09	04DEC09	1	0.00						I I I								   			
0141	NSF Conduct PDR Review	3	07DEC09	09DEC09	1	0.00																	
<b>Final</b>	Design Report																	· · · · · · · · · · · · · · · · · · ·					
Enginee	ering Review									i i		Ì.	1 1	i i	i i			i i	Ì	Ì	i i	i l	
0561	Conduct EXTERNAL Engineering Review	3	27AUG10	31AUG10	4	0.00																	
0571	Engineer Review Report	10	01SEP10	15SEP10	4	0.00																	
Final D	esign Report											1								1	1	1 I	
1999	Compile Mechanical Final Design	0		30JUN10	2	0.00														   			
1998	Prepare Final Design	65	01JUL10	01OCT10	2	132,032.52														   			   
8000	Compile Final Design Documents	1	15SEP10	15SEP10	4	0.00																	
8100	Review/Approve Final Design Documents	10	16SEP10	29SEP10	4	0.00																	
8300	Issue Final Design Documents (Sept, 2010)	0		01OCT10	2	0.00						i t								-			
Classi	fication/Certifiction											1 1 1											   
Genera	l Oversight											1								1	1		
0115	ABS Certification during Preliminary Design	40*	01OCT09	30NOV09	4	28,800.00						I I I								   			
0120	ABS Certification during Final Design	177	01DEC09	12AUG10	4	218,157.04			-11														
0170	ABS Certification during Procure & Fabrication	179	13AUG10	02MAY11	4	224,781.73														-			
0200	ABS Certification during Construction	86	03MAY11	01SEP11	4	167,874.84														_			
ABS Ce	ertification Plan									1 1	1		1	1					1		1	įΤ	Ē
0125	Prepare/Submit Draft ABS Classification Plan	5	10DEC09	16DEC09	44	0.00																	
0135	ABS Review/Comment on ABS Plan	22	17DEC09	20JAN10	44	0.00			Ľ.														
0145	Incorporate Comments on ABS Plan	22	21JAN10	22FEB10	44	0.00																	
0155	Submit Final ABS Plan (by 01MAY10)	5	23FEB10	01MAR10	44	0.00																	   

Activity	Activity	Orig	Early	Early	Total	Budgeted	20	09					2010	)						2011				
ID	Description	Dur	Start	Finish	Float	Cost	SO	N	DJ	F	M A	M	JJ	A	S O	ND	JF	M	AM	JJ	AS	O N	D	JE
Existing	Equipment Group											1 1		i i	i i	I					I.	i		- 1
0139	Begin ABS Submittal Process	0	10DEC09		1	0.00															L L L	1		
0140	Prepare ABS Submittal: Existing Equip Group	10	10DEC09	23DEC09	100	0.00										1								
0150	ABS Review/Comment: Existing Equip Group	22	24DEC09	27JAN10	100	0.00																-		
0220	Resolve Issues with ABS : Existing Equip Group	44	28JAN10	31MAR10	100	0.00																		
0290	Finalize/Submit ABS Submittal: Existing Equip Gr	5	01APR10	07APR10	100	0.00															Ì	-		
Genera	Group											1 1		1 1	1	Ì	1	1		1	l I	İ		1
9000	Prepare ABS Submittal: General Group	10	10DEC09	23DEC09	100	0.00															Ì			
9010	ABS Review/Comment: General Group	22	24DEC09	27JAN10	100	0.00			Ц.	ı; ;														
9020	Resolve Issues with ABS : General Group	44	28JAN10	31MAR10	100	0.00															l l l	I I I	1 1 1	
9030	Finalize/Submit ABS Submittal: General Group	5	01APR10	07APR10	100	0.00															l l l	I I I		
Mechar	ical Equipment Group											1 1		1 1	1	i					1	i		
9040	Prepare ABS Submittal: Mech Equip Group	10	10DEC09	23DEC09	1	0.00																   		
9050	ABS Review/Comment: Mech Equip Group	20	24DEC09	25JAN10	1	0.00				li i											i i	-		
9060	Resolve Issues with ABS : Mech Equip Group	20	26JAN10	23FEB10	1	0.00															Î	i I I	Î Î Î	
9070	Finalize/Submit ABS Submittal: Mech Equip Group	3	24FEB10	26FEB10	1	0.00												 			l l l	I I I	1 1 1	
Pressur	e Vessel Group														1	1					I	Ì		
9080	Prepare ABS Submittal: Pressure Vessel Group	10	10DEC09	23DEC09	102	0.00																		
9090	ABS Review/Comment: Pressure Vessel Group	22	24DEC09	27JAN10	102	0.00																-		
9100	Resolve Issues with ABS : Pressure Vessel Group	44	28JAN10	31MAR10	102	0.00																		
9110	Finalize/Submit ABS Submittal: Pressure Vessel G	3	01APR10	05APR10	102	0.00															l l		l I I	
Ballast	Group														1	1					I I		1	
9120	Prepare ABS Submittal: Main Ballast Group	10	10DEC09	23DEC09	1	0.00															I I I	I I I	1 1 1	
9130	ABS Review/Comment: Main Ballast Group	20	24DEC09	25JAN10	1	0.00															l l l	   		
9140	Resolve Issues with ABS : Main Ballast Group	20	26JAN10	23FEB10	1	0.00															ĺ			
9150	Finalize/Submit ABS Submittal: MainBallast Group	3	24FEB10	26FEB10	1	0.00															ĺ			
Electric	al Installation Group															1		¦ [			i T	i i	¦ [	
9160	Prepare ABS Submittal: Elec Install Group	10	10DEC09	23DEC09	1	0.00														i	i I I	i		
9170	ABS Review/Comment: Elec Install Group	20	24DEC09	25JAN10	1	0.00								· · · · · · · · · · · · · · · · · · ·		 					i I I	- - -		
9180	Resolve Issues with ABS : Elec Install Group	20	26JAN10	23FEB10	1	0.00															l I I			
9190	Finalize/Submit ABS Submittal: Elec Install Grp	3	24FEB10	26FEB10	1	0.00																	   	
Emerge	ncy Systems Group															1								-
9200	Prepare ABS Submittal: Emergency Sys Group	10	10DEC09	23DEC09	102	0.00																		

Activity	Activity	Orig	Early	Early	Total	Budgeted	2	009				20	010						20	11			
ID	Description	Dur	Start	Finish	Float	Cost	SC	ND	J	FN	A I	MJ	JA	S	O N	DJ	FM	A	ΛJ	JA	SC	N	DJE
9210	ABS Review/Comment: Emergency Sys Group	22	24DEC09	27JAN10	102	0.00																	
9220	Resolve Issues with ABS : Emergency Sys Group	44	28JAN10	31MAR10	102	0.00														l L L			
9230	Finalize/Submit ABS Submittal: Emergency Sys Grp	3	01APR10	05APR10	102	0.00	2																
Ballast (	Group, Syntactic Foam																			l.			
9240	Prepare ABS Submittal: Ballast Group, Foam	10	10DEC09	23DEC09	1	0.00														ļ			
9250	ABS Review/Comment: Ballast Group, Foam	20	24DEC09	25JAN10	1	0.00																	
9260	Resolve Issues with ABS : Ballast Group, Foam	20	26JAN10	23FEB10	1	0.00														Î Î			
9270	Finalize/Submit ABS Submittal: Ballast Grp, Foam	3	24FEB10	26FEB10	1	0.00														l l			
Life Sup	port Group																			I.			
9320	Prepare ABS Submittal: Life Support Group	10	10DEC09	23DEC09	102	0.00														l L			
9330	ABS Review/Comment: Life Support Group	22	24DEC09	27JAN10	102	0.00																	
9340	Resolve Issues with ABS : Life Support Group	44	28JAN10	31MAR10	102	0.00																	
9350	Finalize/Submit ABS Submittal: Life Support Grou	3	01APR10	05APR10	102	0.00														   			
Procedu	re and test Group													1						L L			
9360	Prepare ABS Submittal: Procedure & Test Group	10	10DEC09	23DEC09	102	0.00	2													l L			
9370	ABS Review/Comment: Procedure & Test Group	22	24DEC09	27JAN10	102	0.00																	
9380	Resolve Issues with ABS : Procedure & Test Group	44	28JAN10	31MAR10	102	0.00				, , , , , , , , , , , , , , , , , , ,										l l			
9390	Finalize/Submit ABS Submittal: Procedure & Test	3	01APR10	05APR10	102	0.00								1									1
Manuals	Group													1						I I			1
9400	Prepare ABS Submittal: Manuals Group	10	10DEC09	23DEC09	102	0.00	2										     			l I I		$\begin{array}{ccc} I & I \\ I & I \\ I & I \end{array}$	
9410	ABS Review/Comment: Manuals Group	22	24DEC09	27JAN10	102	0.00														l l			
9420	Resolve Issues with ABS : Manuals Group	44	28JAN10	31MAR10	102	0.00																	
9430	Finalize/Submit ABS Submittal: Manuals Group	3	01APR10	05APR10	102	0.00														Ì			
9435	Complete ABS Submittal Process	3	08APR10	12APR10	100	0.00																	
A00 G	eneral Information																						
5660	Resume EE Preliminary Design	0	31JUL09A			0.00																	
5670	Develop Preliminary Electrical Architecture	50	31JUL09A	03SEP09A		0.00														l l			
5697	Develop Propulsion Control Architecture	10	14AUG09A	11SEP09A		0.00														l l l			
5730	Complete Preliminary Design Elec Architecture	1	14SEP09A	14SEP09A		0.00																	
5681	Begin Electrical Final Design Activities	0	10DEC09		11	0.00																	
5682	Design Monitoring Alarm Interface to Battery Sys	5	10DEC09	16DEC09	125	8,874.36																	

Activity	Activity	Orig	Early	Early	Total	Budgeted	2009		2	010					2011		
ID	Description	Dur	Start	Finish	Float	Cost	SOND	JFM		JJA	SON	DJI	FM	AM	JJ	ASO	JE
5690	Build/Test EE Prototype: Command Structure	40	10DEC09	08FEB10	40	22,345.88											
5693	Build/Test EE Prototype: Controls	40	09FEB10	06APR10	40	45,744.64											
5695	Build/Test EE Prototype: Propulsion	10	07APR10	20APR10	40	20,628.16											
5698	Develop Hydraulic Control Architecture	40	21APR10	16JUN10	40	48,007.44											
5735	Complete Electrical Schematics and Specs	66	02JUN10	02SEP10	11	46,744.42							1				
Kev M	ilestones																
0010	Begin Project	0	01JUN09A			0.00							   				
0012	Begin Long Lead Procurement Activities	0	01JUN09A			0.00											
0020	Authorize NTP for Final Design	0	10DEC09		1	0.00											
0030	Begin Procurement Activities	0	04OCT10		12	0.00					•						
0060	Complete Procurement Activities	0		14FEB11	26	0.00											
0040	Alvin Certification Expires (April, 2011)	0	01APR11*		0	0.00							•	I			
0080	Launch Alvin Vehicle (4500m)	0		08SEP11	0	0.00										•	
9900	Schedule Contingency	31	14NOV11	28DEC11	0	0.00											
9999	Complete Project	0		28DEC11	0	0.00											
A02 S	phere & Attachments																
7270	Determine External Tabs and Lug Placement	40	31JUL09A	07OCT09	556	22,688.64							l l				
7280	Prepare Prel Design Documents: Sphere & Attach	10	14AUG09A	07OCT09	94	12,793.80											
0300	Perot Sys Project Management during Final Design	350	01OCT09A	25FEB11	18	198,874.76											
5410	Continue Construct of the Sphere/Hull	230*	01OCT09A	31AUG10	0	1,600,000.00											
7290	Compile Mechanical PDR Documentation	10	22DEC09	06JAN10	2	5,672.16											
1002	Final Design: Sphere & Attachments	20	05FEB10	05MAR10	2	29,611.44							   				
5447	Procure & Fabricate Sphere Attachments	10	08MAR10	19MAR10	300	5,898.96											
5440	Install Penetrators & Test Sphere	84	01SEP10	04JAN11	0	674,269.00											
5470	Complete & Deliver Sphere/Hull	54	05JAN11	23MAR11	0	550,468.79											
A02-03	Penetrators																
1090	Prepare Penetrator Final Design & Specifications	12	01OCT09	19OCT09	0	24,558.59											
1110	Submit Penetrator Spec to ABS and Vendors	0		19OCT09	0	0.00											

Activity	Activity	Orig	Early	Early	Total	Budgeted	2009	9				2010						2	011				
ID	Description	Dur	Start	Finish	Float	Cost	SON	I D	JF	M /	AM	JJ	A S	0	ND.	JFI	MA	MJ	J	AS	0 N	D	JE
1120	ABS Review Comment on Spec: Penetrators	10	20OCT09	02NOV09	0	0.00		I I I															
1130	Vendor Provide Penetrator Quotes	10	20OCT09	02NOV09	5	0.00		I I I															
1140	Incorporate ABS Comments: Penetrator Spec	5	03NOV09	09NOV09	0	10,016.64	]	I I I															
1150	ABS Approve Penetrator Specification	0		09NOV09	0	0.00				1				1	1						1		
1160	Issue Purchase Order for Penetrators	5	10NOV09	17NOV09	0	6,692.04																	
1170	Vendor Evaluate Penetrator Test Requirements	10	18NOV09	02DEC09	0	11,889.00																	
1180	Vendor Manufacture/Deliver Penetrators	30	03DEC09	15JAN10	0	265,801.51																	
A02-0	6 Internal Arrangement, Electrical							I I I	i i						1			 	1				
							]		1														
1057	Prepare Final Panel Schematic	40	07JAN10	05MAR10	22	21,879.18		l I I															
1058	Design Panels	40	08MAR10	30APR10	22	22,528.80		1 1 1														1   1   1	
1059	Design Penetrator Enclosure	10	03MAY10	14MAY10	22	3,744.00		l I I															
0164	Fabricate Internal Panels & Equip Cases	40	02NOV10	30DEC10	2	0.00																	
0162	Fabricate Internal Sphere Wiring Harness	88	03JAN11	06MAY11	30	75,060.00		I. I.															
0166	Assemble & Bench Test Internal Panels & Equip	43	03JAN11	04MAR11	75	0.00		I I	1									1					
0168	Outfit Internal Panels & Equip - Mockup Birdcage	88	03JAN11	06MAY11	30	0.00		i L						i i					ļ		i		
0169	Test Installed Internal Comm & Control Birdcage	100	03JAN11	24MAY11	2	0.00		I I I												   		1 	
A02-0	6 Internal Arrangement, Mechanical									-													
									į		i i					i i				į.	i.	1	i.
7265	Resume Mechanical Preliminary Design	0	31JUL09A			0.00														-			
7320	Determine Internal Arrangements	10	31JUL09A	07OCT09	556	112,686.16																	
7330	Buildup Internal Sphere Mockup	175	03AUG09A	31MAR10	230	62,794.19				-									ļ		i		
5555	Assemble Birdcage	10	01OCT09	15OCT09	526	23,749.92		l I I															-
5560	Install New Components into Birdcage	20	16OCT09	13NOV09	526	27,216.00	]	   										   		   		1   1   1	
1000	Begin Mechanical Final Design	0	07JAN10		2	0.00																	
1050	Final Design: Internal Arrangement	30	08MAR10	16APR10	2	23,855.40																	
7332	Initial Fix Layout & Integrate Finished Comp'ts	11	01APR10	15APR10	230	0.00																	
3100	Procure: Birdcage	20	04OCT10	01NOV10	112	6,259.68																	
7090	Fabricate & Assemble: Birdcage	30	02NOV10	15DEC10	112	0.00																	
3104	Complete Fix Layout & Integrate Finished Comp'ts	16	25MAY11	16JUN11	2	0.00		1										Ľ,					
	1				· · · · · ·		· · · ·					_			-	1 1							

Activity	Activity	Orig	Early	Early	Total	Budgeted	2009		1		2	010						20	011				
	rame & Structural Components	Dur	Start	Finish	Float	Cost	SÓNC	J	F	MA	ΜJ	JA	SC	DNC	) J	FM	Α	ΜJ	J	AS	0	1 D	JE
AU4 r	rame & Structural Components								i											i I I		i I	
7340	Prepare Design & Calculations for Frame Mods	10	31JUL09A	06AUG09A		5,672.16	6		- - -														
7350	Prepare Prel Design Documents: Frame Mods	10	07AUG09A	13AUG09A		5,672.16	6													i i i			
0310	Final Design: Frame & Structural Components	20	07JAN10	04FEB10	2	11,457.72	2		į.														
0320	Procure: Frame & Structural Componen	20	04OCT10	01NOV10	94	0.00	0													i I I			
0322	Fabricate: Frame & Structural Componen	18	02NOV10	29NOV10	94	137,874.96	6		i I I											i I I		i I I	
A06 F	ixed Buoyancy Assemblies								   													   	
									i				i							į			i
7360	Determine Shape & Location of Foam Blocks	40	31JUL09A	07OCT09	84	9,018.18	8		1											I I I			
7370	Calculate Adjustable Fixed Ballast Weight	10	31JUL09A	07OCT09	84	9,018.18	8		   											I I I		   	
1190	Prepare Purchase & Test Spec: Syntactic Foam	20	01OCT09	29OCT09	183	6,692.04	4																
7380	Prepare Prel Design Documents: Fixed Buoyancy	10	08OCT09	22OCT09	84	19,315.44	4																
1210	Obtain Navy Concurrance on Spec	5	30OCT09	05NOV09	183	0.00	0		   														
1220	Modify & Submit Foam Specification to ABS	10	06NOV09	20NOV09	183	21,092.04	4		     						1					I I I		   	
1230	ABS Review/Comment on Foam Spec	20	23NOV09	21DEC09	183	0.00	0		i I I											i I I		i I	
1255	NSF Issue NTP for Foam Purchase	0	10DEC09		138	0.00	0	>	i I											Ì		i I	
1235	Respond to ABS Comments on Foam Spec	10	22DEC09	06JAN10	183	3,479.94	4	E	i I I											Î I I			
1280	Purchase/Manufacture/Shape Syntactic Foam	233	04JAN10	06DEC10	138	1,556,509.76	6		- ' ' ' ' î		1 1									I I I		   	
1290	Vendor Shape/Glass Syntactic Foam	241	04JAN10	16DEC10	138	1,556,509.76	6	Ľ	 											   		1	
1100	Final Design: Fixed Buoyancy Assemblies	10	07JAN10	21JAN10	114	25,741.44	4		1														
1240	WHOI/ABS Resolve Issues with Foam Spec	10	07JAN10	21JAN10	183	12,858.84	4		1														
1250	ABS Approve Foam Spec	0		21JAN10	183	0.00	0													i I I			
1260	Procure Syntactic Foam Vendor	5	22JAN10	28JAN10	183	3,479.94	4		ļ											I I I			
1270	Vendor Qualify Syntactic Foam	20	29JAN10	26FEB10	183	114,400.00	0															   	
1310	Pressure Test All New Syntatic Foam	213	17FEB10	20DEC10	138	0.00	0				ן חו	- tu		- U 1' - , 0 1, - , 1 1,	]					I I I		   	
1312	Fit New Syntactic Foam to Personnel Sphere Templ	136	17JUN10	03JAN11	138	0.00	0		1		[				II :								
A08 S	kins, Fairings and Sail								   													   	
7200	Determine Shane of Skins Fairings & Sail	20	01007004	00NOV00	2	15 702 56	6		1														
7660	Propara Dral Dasign Documenta: Skins/Eair /Sail	10	1000/094	0705000	2	10 067 49			   		·   									i L L			
7060	rrepare Frei Design Documents: Skins/Fair./Saii	ιð	TUNOVUS	U/DEC09	2	12,867.48			i I		1		1			i I				i I		 	

Activity	Activity	Orig	Early	Early	Total	Budgeted	2009		20	)10				201	1	
1200	Final Design: Skins, Fairings & Sail	52	19APR10	30JUN10	Float 2	25,540.92	SOND	JFM	AMJ	JAS	S O N I	DJF	MAN	<u>1</u> ],	JAS	DJE
3400	Procure: Skins, Fairings & Sail	20	01JUL10	29JUL10	120	0.00										
3402	Fabricate: Skins, Fairings & Sail	124	30JUL10	28JAN11	120	105,300.27										
A10 N	Aain Battery Systems													1		
6485	Procure Lead Acid Battery Cells	1	04OCT10	04OCT10	133	375.73										
6487	Fabricate & Deliver Lead Acid Battery Cells	30	05OCT10	17NOV10	133	34,112.00										
A12-0	1 Junction Boxes															
4505	Determine Deminerate (Dee Desires Institut Des	00	0100700	0000700	07	00.001.00										
1595	Determine Requirements/Pre-Design: Junction Box	20	0100109	2900109	37	22,321.98										
1600	Final Design: Junction Boxes	40	22MAR10	14MAY10	34	28,910.04										
3800	Procure: (2) Junction Boxes	21	04OCT10	02NOV10	30	0.00										
3802	Fabricate: (2) Junction Boxes	41	03NOV10	04JAN11	30	40,954.82										
3804	Assemble: (2) Junction Boxes	83	05JAN11	03MAY11	30	0.00										
3806	Fit New: (2) Junction Boxes to Frame	19	08JUN11	05JUL11	6	0.00										
A12-0	3 Data Bottle													1		
5870	Identify Requirements: Data Bottle	26	10DEC09	19JAN10	24	2,262.78										
5880	Prototype Selected Components: Data Bottle	30	20JAN10	03MAR10	24	21,595.86										
1500	Final Design: Data Pressure Housing (Bottle)	30	05FEB10	19MAR10	34	20,990.61										
5890	Develop Schematic: Data Bottle	20	04MAR10	31MAR10	24	9,256.32										
5930	Design Chassie: Data Bottle	20	01APR10	28APR10	24	11,522.52										
5935	Revise Schematic: Data Bottle	10	29APR10	12MAY10	24	2,314.08										
3700	Procure: Data Pressure Housing(Data)	21	04OCT10	02NOV10	82	0.00										
5920	Purchase Components: Data Bottle	66	04OCT10	10JAN11	82	0.00										
3702	Fabricate: Data Pressure Housing(Data)	91	03NOV10	17MAR11	82	65,982.17										
5922	Fabricate Components: Data Bottle	46	11JAN11	17MAR11	82	70,526.78										
A12-0	3 Power Bottle															1
					, ,											
7670	Determine Overall Dimensions & Specs: Power Bot.	10	31JUL09A	13AUG09A		8,243.28										
7680	Prepare Prel Design Documents: Power Bottle	20	14AUG09A	27AUG09A		8,243.28										
5770	Identify Requirements: Power Bottle	40	10DEC09	08FEB10	11	2,715.34										

Activity	Activity	Orig	Early	Early	Total	Budgeted	2009 2010 2011
1400	Final Design: Power Pressure Housing (Bottle)	20	07JAN10	04FEB10	34	8,325.72	S O N D J F M A M J J A S O N D J F M A M J J A S O N D J E
5772	Complete Design of Lanecon Software Interface	10	20JAN10	02FEB10	15	13,176.90	
5780	Prototype Selected Components: Power Bottle	59	09FEB10	03MAY10	11	35,205.66	
5790	Develop Schematic: Power Bottle	20	04MAY10	01JUN10	11	9,256.32	
5860	Design Chassie: Power Bottle	20	02JUN10	29JUN10	11	4.286.52	
5865	Bevise Schematic: Power Bottle	10	30.IUN10	14.1111 10	105	2 776 90	
3600		61	0400710	03 14011	100	2,110.00	
5050	Purchase Componente: David Petile	104	0400710	0704011		0.00	
5050		104	0400110		90	91,073.00	
5852	Assemble Components: Power Bottle	31	02DEC10	18JAN11	123	2,813.98	
3602	Fabricate: Power Pressure Housing(Pwr)	84	04JAN11	03MAY11	49	41,858.37	
A14 N	Iain Ballast System						
7285	Prepare Weight & Balance Analysis for (12) cond	50	23OCT09	06JAN10	84	26,701.96	
7690	Determine Shape of Main Ballast System	10	08DEC09	21DEC09	2	4,296.17	
5950	Prepare Schematic: Main Ballast System	5	10DEC09	16DEC09	50	2,247.39	
7700	Prepare Prel Design Documents: Main Ballast	10	22DEC09	06JAN10	2	4,012.56	
1700	Final Design: Main Ballast System	50	07JAN10	19MAR10	150	27,665.17	
3900	Procure & Fabricate: Main Ballast System	20	01JUL10	29JUL10	78	0.00	
3902	Fit New Main Ballast Tanks to Personnel Sphere	124	30JUL10	28JAN11	78	57,334.35	
A16 V	ariable Ballast System						
5990	Prepare Schematic: Variable Ballast System	5	17DEC09	23DEC09	50	2,225.16	
6010	Build/Test Prototype: Variable Ballast System	5	24DEC09	31DEC09	50	2,291.85	
6020	Revise Schematic: Variable Ballast System	5	04JAN10	08JAN10	50	2,314.08	
A18 F	ropulsion Control System						
6040	Prepare Schematic: Propulsion System	10	11JAN10	25JAN10	50	4,450.32	
6060	Revise Schematic: Propulsion System	10	26JAN10	08FEB10	50	9,115.24	
A20 N	Iain Hydraulic System						
6080	Prenare Schematic: Hydraulic System	5	09EEB10	16FEB10	50	3 671 51	
0000		5				0.071.01	
6090	Build/Test Prototype: Hydraulic System	5	17FEB10	23FEB10	50	3,671.51	

Activity	Activity	Orig	Early	Early	Total	Budgeted	2009				 20	10						20	11				
6150	Revise Schematic: Hydraulic System	Dur 5	24FEB10	02MAR10	Float 75	3,782.77	SON	D	JF		1 J	JA	S O	ND	J	FM	AN	<u>И</u> Ј	J	AS	0	D	JE
6152	Command & Control Integration: Hydraulic System	10	24FFB10	09MAB10	50	5 493 60										   		   			1		
0.02			2 20.0			0,100100		   	1						1							   	   
A24 L	ife Support Systems																						
6174	Cinal Davigny Life Sympost & Habitability	20	07 (41)10	1055B10	04	00 442 69				ų !	1									I I			
0174		30	0/JAN10	ISEDIO	94	20,443.00		<b> </b>     			Ì					I I					Ì		
6160	Identify Requirements: Life Support & Habitabil	10	10MAR10	23MAR10	50	7,796.34																	
6170	Prep EE Schematic: Life Support & Habitability	10	24MAR10	06APR10	50	7,965.61															1		
6172	Provided Design: Life Support & Habitability	30	07APR10	18MAY10	50	20,844.36			Ì	Ì						I I I		I I			i I		i I
4400	Procure & Fabricate: Life Support & Habitability	20	04OCT10	01NOV10	123	242,379.74			i	i			Ľ	ļ.		i I		i I			i		
4402	Fit New Life Support Equip into Mockup Birdcage	14	02NOV10	22NOV10	123	0.00			-	i						 		- 					
4404	Function Test New Life Support System in Mockup	4	23NOV10	29NOV10	123	0.00				i	Ì					i I		i I			i		i i
4406	Remove All Life Support & Send Vendor Cleaning	37	30NOV10	24JAN11	123	0.00			i	Ì	Ì			🗖		i I		i I			i		i I
7200	Install: Life Support & Habitability	16	12JUL11	02AUG11	6	0.00			i I I	Ì	i I I					i I I		i I I			i I I		1
A26 C	Compensation System										-											   	 
									Ì		1				I		I.			l I		1	1
6280	Identify Requirements: Compensation	10	10DEC09	23DEC09	50	0.00					ł					   					1		1
6290	Prepare Schematics: Compensation	10	24DEC09	08JAN10	50	0.00				   	I I I					   					1		
2300	Final Design: Compensation Systems	20	07JAN10	04FEB10	104	10,400.00			Ļ												1		
6370	Build Prototype: Compensation	10	11JAN10	25JAN10	50	0.00			ı.														-
6420	Test Prototype: Compensation	10	26JAN10	08FEB10	50	0.00			ė	1													1
4500	Procure & Fabricate: Compensation Systems	44	04OCT10	07DEC10	129	0.00					1		U L									   	
									-		1										-	   	
A28 S	ervice Releases								1											1			
Emerger 6445	ncy Kelease Prepare Schematic: Emergency Release	5	01OCT09	07OCT09	172	2.225.16			1		1					1				I.			
2495	Prel Design: Emerg Beleases(basket mann aux wt)	10	3000009	13NOV09	27	3 564 00				1													
2500	Einel Design: Emerg Peleosos/basket manp aux wt)	20	05550100	05MAR10	14	10 062 71				י י	Ì					I I I		I I I			1		
2500		20	USFEBIU	UDIMARIU	14	10,003.71															   		
2505	Final Design: Emerg Heleases(res buoy)	10	08MAR10	19MAR10	14	6,400.08					T T			     									
4700	Procure & Fabricate: Emergency Releases	70	04OCT10	14JAN11	103	15,217.73			1				Li.								1	1	
Service	Release	-							1							1				l l			
2395	Preliminary Design: Service Releases	20	01OCT09	29OCT09	27	8,910.00				1						   					   		
2400	Final Design: Service Releases	20	07JAN10	04FEB10	14	13,161.96		¦	Ļ	1						   		   			1		
6440	Prepare Schematic: Service Release	10	09FEB10	23FEB10	50	2,225.16				רי ו						   		   					

Activity	Activity	Orig	Early Start	Early Finish	Total Float	Budgeted Cost	20	009					20	10								20	11			
4600	Procure & Fabricate: Service Releases	70	04OCT10	14JAN11	103	8,936.41	50			JF	IVI			J	A						AIN	J		AS		J
A30 N	<b>Janipulators</b>								     											     					   	
								I I I																		
2600	Final Design: 4-wire Telemetry	30	24FEB10	06APR10	50	14,657.72		I I I			!															
A32 (	Dperational Equipment & Controls							i I I I					-						i t t					Ì		
6470	Refine HDD design & provide input to drawings	15	10DEC09	31DEC09	174	14,027.20		I I I																		
6480	Write HDD purchase sepc and obtain quotes	10	04JAN10	15JAN10	174	9,745.72		I I I																		
7240	Build HDD	10	19JAN10	01FEB10	174	6,777.47		i I I																		
7210	Write purchase spec & obtain quotes for handbox	10	20JAN10	02FEB10	165	9,745.72		i I I													i L L					
6510	Refine design for remainder of controls & indic	4	02FEB10	05FEB10	174	7,673.48		I I I									     		I I I	   	I I I			1		
6490	Refine handbox design & provide input to drawing	10	03FEB10	17FEB10	165	13,140.88		   		C	   			1	1					   	   					
7250	Integrate HDD	2	08FEB10	09FEB10	174	3,090.59		I I I		1																
7004	Test HDD	2	10FEB10	11FEB10	174	3,012.09		I I I		I																
7220	Build handbox	2	18FEB10	19FEB10	165	2,454.83				1			-													
7230	Integrate handbox	2	22FEB10	23FEB10	165	3,230.62		i I I		1	ļ				i				i T		i I I			i I		
4900	Test Handbox	2	24FEB10	25FEB10	165	2,872.06		i I I	   		ľ	1			I				   	1	   					
A34 S	cience Data System, Electrical		•	1							   										-					
6520	Prepare Schematic: Science Interface Systems	20	10DEC09	08JAN10	70	8,989.56		I I I	¦ 💼								     		l L L	   	I I I					
6530	Design Science Panel: Science Interface Systems	10	11JAN10	25JAN10	70	3,744.00																				
6540	Outside Bottle Schematic	10	26JAN10	08FEB10	70	4,628.16		L L L		Ļ																
6550	Prepare Bottle Design & Chassies	20	09FEB10	09MAR10	70	7,488.00		i I I		Ľ																
5100	Procure & Fabricate: Science Interface Systems	90	04OCT10	14FEB11	26	52,577.78		Ì I I							i I I	Lu Lu					Î I I			i I I		
A 34 S	cience Data Sys Imaging / Illumination							   	1 1 1		   						     	—	   	   	   			   	   	
Imaging	system														1				I I I		I I I			   		
4710	Begin Preliminary Design for Imaging	0	01OCT09		521	0.00		I I I							1				   		I I I					
4720	Prepare Imaging System Architecture	20	01OCT09	29OCT09	521	14,015.59																				
4722	Prepare Illumination System Architecture	20	30OCT09	30NOV09	521	7,177.37																				
4730	Begin Final Design Imaging/Illumination	0	10DEC09		106	0.00															I I I					
4780	Prepare Final Design: Science Utility Camera	90	10DEC09	20APR10	106	19,765.62		i I I			·   	Ì	-												-	
4800	Prepare Final Design: HDTV Camera System	90	10DEC09	20APR10	106	19,092.37		   			i									1   	   					

Activity	Activity	Orig	Early	Early	Total	Budgeted	2000			2010	0				201	1	
ID	Description	Dur	Start	Finish	Float	Cost	SON	DJ	FMA	MJJJ		O N D	JF	MA	MJ	JAS	JE
4840	Prepare Final Design: Camera Interface/Telemetry	90	10DEC09	20APR10	106	26,191.49	9										
4860	Prepare Final Design: Acquisition System	90	10DEC09	20APR10	106	19,663.95	5										
4880	Prepare Final Design: Internal Camera Interf/Tel	90	10DEC09	20APR10	106	18,584.76	6										
4910	Prepare Final Design: Internal Acquisition Syst	90	10DEC09	20APR10	106	21,786.68	B 1 1										
4920	Prepare Final Design: Control/Display/Monitoring	90	10DEC09	20APR10	106	24,687.25	5			1							
4940	Prepare Final Design: Science Image Data Distrib	90	10DEC09	20APR10	106	19,663.95	5										
4960	Prepare Final Design: Offload Data System	90	10DEC09	20APR10	106	20,409.40	D										
4980	Prepare Final Design: Alvin Data Duplication Sys	90	10DEC09	20APR10	106	19,060.38	B 1 1										
5005	Prepare Final Design: Science Data Processing	90	10DEC09	20APR10	106	19,663.95	5										
5140	Complete Final Imaging/Illumination Design	0		20APR10	106	0.00	D										
5095	Prepare Integration Plan	44	16SEP10	18NOV10	24	11,510.92	2										
4782	Prepare Final Design: Science Utility Camera	44	04OCT10	07DEC10	72	28,174.14	4										
4810	Procure/Fabricate: Primary Science Camera System	44	04OCT10	07DEC10	12	205,424.67	7										
4850	Procure/Fabricate: Exter Camera Interf/Telemetry	44	04OCT10	07DEC10	12	237,730.60	0										
4870	Procure/Fabricate: Internal Acquisition System	44	04OCT10	07DEC10	12	26,029.66	<b>6</b>										
4890	Procure/Fabricate: Internal Camera Interf/Telem	44	04OCT10	07DEC10	12	45,885.01	1										
4930	Procure/Fabricate: Control/Display/Monitoring	44	04OCT10	07DEC10	12	222,598.60	0										
4950	Procure/Fabricate: Science Image Data Distribut	44	04OCT10	07DEC10	12	0.00	0										
4970	Procure/Fabricate: Offload Data System	44	04OCT10	07DEC10	12	34,443.15	5										
4990	Procure/Fabricate: Alvin Data Duplication System	44	04OCT10	07DEC10	12	66,637.34	4										
5010	Procure/Fabricate: Science Data Processing Syst	44	04OCT10	07DEC10	12	108,793.93	3										
5012	Procure/Fabricate: Science Data Duplication Syst	44	04OCT10	07DEC10	12	16,701.14	4										
5105	Integrate Imaging System	20	08DEC10	06JAN11	12	21,761.05	5										
5120	Integrate Vehicle	20	07JAN11	04FEB11	12	0.00	0							 			
5130	Conduct Imaging System Calibration & Testing	20	07FEB11	07MAR11	12	12,102.49	9										
Illumina	tion																
5020	Prepare Final Design: Illumination Field	60	10DEC09	09MAR10	136	18,138.22	2										
5040	Prepare Final Design: Light Head	60	10DEC09	09MAR10	136	14,518.93	3										
5060	Prepare Final Design: Power & Modulation	60	10DEC09	09MAR10	136	25,129.35	5										
5080	Prepare Final Design: Lighting Control	60	10DEC09	09MAR10	136	18,665.97	7										
5030	Procure/Fabricate: Light Head	44	04OCT10	07DEC10	28	172,046.48	B										

Activity	Activity	Orig	Early	Early	Total	Budgeted	2	009				2010	)					2	011			
ID	Description	Dur	Start	Finish	Float	Cost	S O	N D	JF	М	AM	JJ	AS	3 O N	IDJ	JFI	AN	MJ	J	AS	O N	DJE
5050	Procure/Fabricate: Power Control & Modulation	44	04OCT10	07DEC10	28	127,565.67																
5090	Procure/Fabricate: Lighting Control	44	04OCT10	07DEC10	28	53,717.94																
5094	Intetrate Lighting System	44	08DEC10	10FEB11	28	23,083.77																
Telemet	rv								i	1	I I				i			i i	i i	i		
4760	Prepare Final Design: Telemetry	40	10DEC09	08FEB10	156	0.00																
4770	Procure/Fabricate: Telemetry	90	04OCT10	14FEB11	26	0.00					-											
A34 - S	Science Interface (Work Space)									   												
											1				1			1				
7325	Determine Requirements	10	01SEP09A	14OCT09	48	21,458.16				1 1 1	1				1					   		
7326	prepare PD inventor Model	60	01SEP09A	04NOV09	33	0.00	<b>i se s</b> i s			1 												
7327	Prepare PD studio Model	30	01SEP09A	30OCT09	36	0.00					I I I											
1055	Determine Final External Arrangements	40	07JAN10	05MAR10	84	52,323.00					-											
3105	Procure & Fabricate: External Arrangement	105	04OCT10	08MAR11	68	46,663.61					-											
A36 C	command, Control & Computing									   	i i							1				
Compute	er & Network Systems										1				1			1				
1735	Begin C&C Final Design	0	10DEC09		15	0.00				 										   		
1740	Identify/Design Interfaces; nav, sonar, comm, eq	26	10DEC09	19JAN10	15	10,954.08																
7460	Complete software spec/design real time controll	10	20JAN10	02FEB10	171	11,202.48																
7470	Complete software spec/design pilot GUI	10	20JAN10	02FEB10	171	11,202.48					-											
7480	Complete software spec/design navigation engine	10	20JAN10	02FEB10	171	43,539.48					i 1							i				
7590	Evaluate & specify computers for purchase	73	20JAN10	03MAY10	108	6,526.87					1											
7490	Purchase computer and network systems	20	04OCT10	01NOV10	2	102,814.00					   											
Handbo	X										1							1				
7550	Complete software spec/design other comp needs	10	20JAN10	02FEB10	103	5,601.24																
7560	move computer and network system to birdcage/sph	2	18FEB10	19FEB10	93	18,373.68																
7570	develop navigation simulators	10	18FEB10	03MAR10	85	8,606.88					-											
7580	produce beta version of Naveng	20	04MAR10	31MAR10	95	72,336.36					_											
7584	produce beta version of Nav GUI	30	04MAR10	14APR10	85	67,110.33																
7586	integrate & test new software systems hardware	20	15APR10	12MAY10	85	43,218.48																
HDD											I I							1				
7510	Complete software spec/design data system	10	20JAN10	02FEB10	93	7,075.58		     	<b> </b>				     									
7520	integrate and test computer & network system T&D	10	03FEB10	17FEB10	93	15,732.00					1											

Activity	Activity	Orig	Early	Early	Total	Budgeted	2009 2010 2011
ID	Description	Dur	Start	Finish	Float	Cost	S O N D J F M A M J J A S O N D J F M A M J J A S O N D J E
7530	develop submarine simulators	5	18FEB10	24FEB10	90	5,601.24	
7540	produce beta version of RTC	30	04MAR10	14APR10	85	59,446.20	
7582	produce beta version of GUI	30	04MAR10	14APR10	85	45,443.10	
Navigati	ion						
7630	commission version control platform	10	20JAN10	02FEB10	85	5,601.24	
7640	develop & test code for A/D, D/A, and DIO	10	03FEB10	17FEB10	85	7,452.50	
Pilot Sul	hmarine Control Proces	1			1 1		
7610	ovaluate approaches & aposity A/D_D/A and DIO	10	20 (ANI10	02EEB10	155	16 060 75	
7010		10	20JAN10	02FEB10	155	11,000,40	
/620	produce reference development platform	10	ZUJANTU	U2FEBIU	155	11,202.48	
5675	Develop System Command & Control Interfaces	10	01OCT09	15OCT09	198	0.00	
7495	Prepare C&C Preliminary Design	30	16OCT09	30NOV09	198	26,457.21	
7600	design network & evaluate hardware for network	6	20JAN10	27JAN10	159	10,130.76	
7650	write final software test plan	10	20JAN10	02FEB10	155	11,202.48	
7699	Complete Command & Control Schematics and Specs	5	13MAY10	19MAY10	85	0.00	
A 54 N	avigation Communication & Tracking						
	avigation, Communication & Tracking						
5172	Final Design: Navigation, Comm & Tracking	60	22MAR10	14JUN10	14	10,400.00	
5174	Procure & Fabricate: Navigtion, Comm & Tracking	90	04OCT10	14FEB11	34	0.00	
5176	Overhaul: Navigation, Comm & Tracking	90	15FEB11	22JUN11	34	0.00	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$
Constr	ruction						
Pre-Con	struction						
5230	Design Fixture for Personal Sphere	4	04OCT10	07OCT10	115	0.00	
0070	Begin Alvin Vehicle Construction (4500m)	0	24MAR11		0	0.00	
0195	Pre-Construction	15	24MAR11	13APR11	0	46,966.28	1   1   1   1   1   1   1   1   1   1
5200	Set Up High Bay	5	24MAR11	30MAR11	3	0.00	
5210	Load Test High Bay Crane	5	24MAR11	30MAR11	3	0.00	
5220	Set Up Outside Storage, Decking & Stairs	2	24MAR11	25MAR11	6	0.00	
5240	Fabricate Fixture for Personal Sphere	8	24MAR11	04APR11	3	0.00	】 ▌ : :   : :   : :   : :   : :   : : <b>□</b> : : <b>□</b> : :   :
5270	Fabricate VB Storage Sphere	2	24MAR11	25MAR11	10	0.00	
Vehicle '	Tear Down						
0196	Ship Demob & Submersible Disassembly	21	31MAR11	28APR11	22	97,758.28	
		1			1		

Li         Coli         C	Activity	Activity	Orig	Early	Early	Total	Budgeted	2009 2010 2011
S250       Official Submersitial       4       00APR11       3       0.00         S260       Texa Down Submersitial       4       00APR11       12APR11       0       0.00         S260       Store OLd VB Sphere       3       06APR11       12APR11       0       0.00         S260       Store OLd VB Sphere       3       06APR11       12APR11       1       0.00         S260       Store OLd VB Sphere       3       06APR11       12APR11       2       0.00         Maintenance       0       14APR11       14BAP11       0       0.00       1         Maintenance       0       14APR11       14BAP11       0       0.00       1         S250       Pedrobahment & Imtegration       25       14APR11       144       0       0.00         S250       Pedrobahment & Integration       0       14APR11       27APR11       32       0.00         S250       Pedrobahment & Builts Tarban       30       14APR11       27APR11       32       0.00         S251       Refurbah Russing Junction Bones       25       14APR11       12MAV11       3       0.00         S252       Refurbah Main Tabal       30       14APR11       12MAV11 </td <td>ID</td> <td>Description</td> <td>Dur</td> <td>Start</td> <td>Finish</td> <td>Float</td> <td>Cost</td> <td>S O N D J F M A M J J A S O N D J F M A M J J A S O N D J E</td>	ID	Description	Dur	Start	Finish	Float	Cost	S O N D J F M A M J J A S O N D J F M A M J J A S O N D J E
1280         Ter Lown Submersible         4         0AAPR11         13APR11         0         0.00           1280         Store Od VB Sphere         3         0AAPR11         12APR11         1         0.00           1530         Store Od VB Sphere         3         0AAPR11         12APR11         12         0.00         1           1531         Disassemble (3) Lead Acid Culls         6         21APR11         22APR11         22         0.00         1           1077         Returbatmental Integration         26         1AAPR11         7XPR14         0         0.000           1037         Returbatmental Integration         26         1AAPR11         7XPR14         14         0.000           1037         Returbatmental Integration         1         1AAPR11         7XPR14         14         0.000           1038         Returbath: Power Pressure Housing (Bottilo)         1         1AAPR11         7XPR11         15         0.000           1030         Returbat: Easting Junction Boxes         25         1AAPR11         7XPA11         13         0.000           1030         Returbat: Easting Variable Balaus Spheres         30         1AAPR11         2XPA11         13         0.000           103	5250	Offload Submersible & Complete High Bay Setup	3	31MAR11	04APR11	3	0.00	
Store Div Vi System         GAAPRII         12APRII         1         0.00           5280         Store Oid Vi System         3         GAAPRII         12APRII         1         0.00           5280         Store Oid Vi System         5         GAAPRII         12APRII         1         0.000           Ministemance         0         14APRII         12MAVII         0.000         0         0         0         0         0         0         0         0         0.000         0         0         0         0         0         0.000         0         0         0         0.000         0         0         0         0.000         0         0         0         0         0         0         0.000         0         0.000         0         0.000         0         0.000         0         0.000         0         0.000         0         0.000         0         0.000         0         0.000	5260	Tear Down Submersible	4	08APR11	13APR11	0	0.00	
Store CIQ Personel Sphere       3       08APR11       12APR11       1       0.00         6513       Disassemble (3) Lack Acid Calls       6       21APR11       28       0.000         6517       Disassemble (3) Lack Acid Calls       6       21APR11       128APR11       20       0.000         5300       Begin Maintenance       0       14APR11       19MAY11       0       729.854.07         5300       Begin Maintenance       0       14APR11       25MAY11       40       0.000         5322       Service Crossack: Mineral Components       0       14APR11       25MAY11       43       0.000         5330       Refurbish: Data Pressure Housing (Bottle)       10       14APR11       25MAY11       33       0.000         5330       Refurbish: Main Ballass Tanks       30       14APR11       25MAY11       33       0.000         5330       Refurbish: Mencury Trim System       30       14APR11       25MAY11       33       0.000         5340       Refurbish: Mencury Trim System       30       14APR11       25MAY11       33       0.000         5353       Refurbish: Mencury Trim System       30       14APR11       25MAY11       33       0.000         5354 </td <td>5280</td> <td>Store Old VB Sphere</td> <td>3</td> <td>08APR11</td> <td>12APR11</td> <td>1</td> <td>0.00</td> <td></td>	5280	Store Old VB Sphere	3	08APR11	12APR11	1	0.00	
6513       Disassemble (3) Laad Acid Collis       6       21 APR11       28       0.00       1       0.00       0       1       1       1       1       0.00       0	5290	Store Old Personnel Sphere	3	08APR11	12APR11	1	0.00	
Mainternace         University         Univer	6513	Disassemble (3) Lead Acid Cells	6	21APR11	28APR11	22	0.00	
1017       Refurbishment & Integration       26       14APR11       V       0       729,854.07       1       1       1       0 <t< td=""><td>Mainten</td><td>ance</td><td></td><td></td><td></td><td></td><td></td><td></td></t<>	Mainten	ance						
1900       Begin Maintenance       0       14APR11       25M AV11       143       0.000       14       143       0.000       14       143       0.000       14       143       0.000       14       143       0.000       14       143       0.000       14       143       0.000       14       143       0.000       14       143       0.000       14       143       0.000       14       143       0.000       14       143       0.000       14       143       0.000       14       143       0.000       14       143       0.000       14       143       0.000       14       144       0.000       144       144       0.000       144       144       0.000       144       144       0.000       144       144       0.000       144       144       0.000       144       144       0.000       144       144       0.000       144       144       0.000       144       144       143       0.000       144	0197	Refurbishment & Integration	26	14APR11	19MAY11	0	729,854.07	
5302       Service Crossdeck Internal Components       30       14APR11       25MAY11       143       0.00         5305       Refurbish: Poewr Pressure Housing (Bottle)       10       14APR11       27APR11       53       0.00         5315       Refurbish: Existing Uancilon Boxes       25       14APR11       27APR11       3       0.00         5326       Refurbish: Main Ballast Tanks       30       14APR11       25MAY11       38       0.00         5327       Refurbish: Main Ballast Tanks       30       14APR11       25MAY11       38       0.00         5335       Refurbish: Main Hydraulic System       30       14APR11       25MAY11       33       0.00         5336       Refurbish: Main Hydraulic System       30       14APR11       25MAY11       33       0.00         5347       Refurbish: Main Hydraulic System       30       14APR11       25MAY11       33       0.00         5348       Refurbish: Main Hydraulic System       30       14APR11       25MAY11       3       0.00         5355       Refurbish: Maney Maines       30       14APR11       25MAY11       3       0.00         5350       Sand Frame & Mold Components       10       14APR11       25MAY11       <	5300	Begin Maintenance	0	14APR11		0	0.00	
5305       Refurbish: Power Pressure Housing (Bottie)       10       14APR11       27APR11       53       0.00         5310       Refurbish: Existing Junction Boxes       25       14APR11       27APR11       53       0.00         5315       Refurbish: Existing Junction Boxes       25       14APR11       27APR11       33       0.00         5320       Refurbish: Existing Junction Boxes       30       14APR11       25MAY11       13       0.00         5323       Refurbish: Existing Variable Ballast Spheres       30       14APR11       25MAY11       33       0.00         5330       Refurbish: Mein Hydraulic System       30       14APR11       25MAY11       33       0.00         5340       Refurbish: Mercury Trim System       30       14APR11       25MAY11       33       0.00         5353       Refurbish: Mercury Trim System       30       14APR11       25MAY11       33       0.00         5354       Refurbish: Mercury Trim System       30       14APR11       25MAY11       33       0.00         5355       Refurbish: Regulators       30       14APR11       25MAY11       33       0.00         5360       Refurbish: Science Interface Systems       30       14APR11       2	5302	Service Crossdeck Internal Components	30	14APR11	25MAY11	143	0.00	
5310       Refurbish: Data Pressure Housing (Bottle)       10       14APR11       27APR11       53       0.00         5315       Refurbish: Skitsling Junction Boxes       25       14APR11       18MAY11       38       0.00         5320       Refurbish: Existing Junction Boxes       30       14APR11       25MAY11       13       0.00         5325       Refurbish: Existing Variable Ballast Spheres       30       14APR11       25MAY11       33       0.00         5336       Refurbish: Mark Hydnalle System       30       14APR11       25MAY11       33       0.00         5337       Refurbish: Mark Hydnalle System       30       14APR11       25MAY11       33       0.00         5340       Refurbish: Mercury Trim System       30       14APR11       25MAY11       3       0.00         5357       Refurbish: Mark Joulators       20       14APR11       25MAY11       3       0.00         5358       Refurbish: Sinde Hydraule System       30       14APR11       25MAY11       3       0.00         5359       Refurbish: Sinde Hydraule Systems       30       14APR11       25MAY11       33       0.00         5500       Refurbish: Frame & Mod Components       10       14APR11       25	5305	Refurbish: Power Pressure Housing (Bottle)	10	14APR11	27APR11	53	0.00	
5315       Refurbish: Existing Junction Boxes       25       14APR11       18MAY11       38       0.00         5320       Refurbish: Main Ballast Tarks       30       14APR11       25MAY11       13       0.00         5323       Refurbish: Existing Variable Ballast Spheres       30       14APR11       25MAY11       33       0.00         5333       Refurbish: Existing Variable Ballast Spheres       30       14APR11       25MAY11       33       0.00         5340       Refurbish: Main Hydraulic System       30       14APR11       25MAY11       33       0.00         5345       Refurbish: Maring Julators       30       14APR11       25MAY11       3       0.00         5356       Refurbish: Imaging Systems       30       14APR11       25MAY11       3       0.00         5356       Refurbish: Imaging Systems       30       14APR11       15MAY11       3       0.00         5356       Refurbish: Taging Systems       30       14APR11       25MAY11       3       0.00         5360       Send Frame & Mod Components       10       14APR11       25MAY11       3       0.00         5560       Send Frame & Modifications & Inspections       20       18APR11       1400.00       <	5310	Refurbish: Data Pressure Housing (Bottle)	10	14APR11	27APR11	53	0.00	
S200       Refurbish: Main Ballast Tanks       30       14APR11       25MAY11       13       0.00         5325       Refurbish: Existing Variable Ballast Spheres       30       14APR11       25MAY11       148       0.00         5330       Refurbish: Existing Variable Ballast Spheres       30       14APR11       25MAY11       33       0.00         5330       Refurbish: Mainpulator       30       14APR11       25MAY11       33       0.00         5336       Refurbish: Marcury Trim System       30       14APR11       25MAY11       3       0.00         5347       Refurbish: Maripulators       30       14APR11       25MAY11       3       0.00         5358       Refurbish: Manipulators       20       14APR11       25MAY11       3       0.00         5350       Refurbish: Science Interface Systems       30       14APR11       25MAY11       3       0.00         5350       Send Frame & Mod Components to Vendor       2       14APR11       25MAY11       3       0.00         5510       Refurbish: Frame & Structural Components       10       14APR11       27APR11       1       0.00         5510       Refurbish: Ballers & Refurn to WHOI       3       17MAY11       19MAY11	5315	Refurbish: Existing Junction Boxes	25	14APR11	18MAY11	38	0.00	
S225       Refurbish: Existing Variable Ballast Spheres       30       14APR11       25MAY11       148       0.00         5330       Refurbish: Existing Variable Ballast Spheres       30       14APR11       25MAY11       33       0.00         5335       Refurbish: Main Hydraulic System       30       14APR11       25MAY11       33       0.00         5346       Refurbish: Mercury Trim System       30       14APR11       25MAY11       13       0.00         5357       Refurbish: Lead Acid Battery Box       30       14APR11       25MAY11       3       0.00         5358       Refurbish: Laad Acid Battery Box       30       14APR11       25MAY11       3       0.00         5359       Refurbish: Imaging Systems       30       14APR11       25MAY11       33       0.00         5350       Refurbish: Science Interface Systems       30       14APR11       25MAY11       33       0.00         5510       Refurbish: Frame & Mod Components to Vendor       2       14APR11       15APR11       1       0.00         5520       Carry Out Frame Modifications & Return to WHOI       3       17MAY11       9       0.00         6515       Service Lead Acid Cells into Battery Box       42       010CT09	5320	Refurbish: Main Ballast Tanks	30	14APR11	25MAY11	13	0.00	
5330       Refurbish Propulsion System       30       14APR11       25MAY11       33       0.00         5335       Refurbish: Main Hydraulic System       30       14APR11       25MAY11       33       0.00         5340       Refurbish: Mercury Trim System       30       14APR11       25MAY11       13       0.00         5340       Refurbish: Mercury Trim System       30       14APR11       25MAY11       13       0.00         5355       Refurbish: Manipulators       20       14APR11       25MAY11       3       0.00         5356       Refurbish: Manipulators       30       14APR11       25MAY11       3       0.00         5356       Refurbish: Imaging Systems       30       14APR11       25MAY11       3       0.00         5360       Refurbish: Science Interface Systems       30       14APR11       25MAY11       33       0.00         5500       Send Frame & Mod Components to Vendor       2       14APR11       25APT11       1       0.00         5502       Carry Out Frame Modifications & Inspections       20       18APR11       13MAY11       1       0.00         5504       Accept Frame Modifications & Return to WHOI       3       17MAY11       19MAY11       0.	5325	Refurbish: Existing Variable Ballast Spheres	30	14APR11	25MAY11	148	0.00	
5335       Refurbish: Main Hydraulic System       30       14APR11       25MAY11       33       0.00         5340       Refurbish: Mercury Trim System       30       14APR11       25MAY11       13       0.00         5345       Refurbish: Manipulators       20       14APR11       25MAY11       3       0.00         5350       Refurbish: Manipulators       20       14APR11       25MAY11       3       0.00         5355       Refurbish: Manipulators       20       14APR11       25MAY11       3       0.00         5355       Refurbish: Science Interface Systems       30       14APR11       25MAY11       33       0.00         5500       Send Frame & Mod Components to Vendor       2       14APR11       15APR11       1       0.00         5501       Refurbish: Frame & Structural Components       10       14APR11       27APR11       16       0.00         5502       Carry Out Frame Modifications & Inspections       20       18APR11       29JUL11       0       0.00         6515       Service Lead Acid Cells into Battery Box       45       26MAY11       29JUL11       3       0.00         5900       Install: Existing Variable Ballast Spheres       20       010CCT09       290CT	5330	Refurbish Propulsion System	30	14APR11	25MAY11	33	0.00	
5340       Refurbish: Mercury Trim System       30       14APR11       25MAY11       13       0.00         5345       Refurbish: Lead Acid Battery Box       30       14APR11       25MAY11       3       0.00         5350       Refurbish: Manipulators       20       14APR11       11MAY11       3       0.00         5355       Refurbish: Imaging Systems       30       14APR11       25MAY11       33       0.00         5360       Refurbish: Science Interface Systems       30       14APR11       25MAY11       33       0.00         5360       Refurbish: Science Interface Systems       30       14APR11       15APR11       1       0.00         5500       Send Frame & Mod Components to Vendor       2       14APR11       15APR11       1       0.00         5510       Refurbish: Frame & Structural Components       10       14APR11       27APR11       16       0.00         5502       Carry Out Frame Modifications & Inspections       20       18APR11       13MAY11       0       0.00         6515       Service Lead Acid Cells into Battery Box       45       26MAY11       23       0.00         6500       Install: Data Pressure Housing (Bottle)       20       010CT09       29OCT09	5335	Refurbish: Main Hydraulic System	30	14APR11	25MAY11	33	0.00	
5345       Refurbish Lead Acid Battery Box       30       14APR11       25MAY11       3       0.00         5350       Refurbish: Manipulators       20       14APR11       11MAY11       3       0.00         5355       Refurbish: Imaging Systems       30       14APR11       25MAY11       33       0.00         5360       Refurbish: Science Interface Systems       30       14APR11       25MAY11       33       0.00         5360       Refurbish: Science Interface Systems       30       14APR11       25MAY11       33       0.00         5500       Send Frame & Mod Components to Vendor       2       14APR11       15APR11       1       0.00         5501       Refurbish: Frame & Structural Components       10       14APR11       27APR11       16       0.00         5502       Carry Out Frame Modifications & Inspections       20       18APR11       13MAY11       0.00         5504       Accept Frame Modifications & Return to WHOI       3       17MAY11       19MAY11       3       0.00         6515       Service Lead Acid Cells into Battery Box       45       26MAY11       25JUL11       3       0.00         5900       Install: Data Pressure Housing (Bottle)       20       20MAY11 <td< td=""><td>5340</td><td>Refurbish: Mercury Trim System</td><td>30</td><td>14APR11</td><td>25MAY11</td><td>13</td><td>0.00</td><td></td></td<>	5340	Refurbish: Mercury Trim System	30	14APR11	25MAY11	13	0.00	
5350       Refurbish: Manipulators       20       14APR11       11MAY11       3       0.00         5355       Refurbish: Imaging Systems       30       14APR11       25MAY11       33       0.00         5360       Refurbish: Science Interface Systems       30       14APR11       25MAY11       33       0.00         5360       Send Frame & Mod Components to Vendor       2       14APR11       15APR11       1       0.00         5510       Refurbish: Frame & Structural Components       10       14APR11       27APR11       16       0.00         5502       Carry Out Frame Modifications & Inspections       20       18APR11       13MAY11       0       0.00         5504       Accept Frame Modifications & Return to WHOI       3       17MAY11       19MAY11       0       0.00         6515       Service Lead Acid Cells into Battery Box       45       26MAY11       29JUL11       3       0.00         5711       Install: Existing Variable Ballast Spheres       20       010CT09       29OCT09       446       0.00       1         5800       Install: Data Pressure Housing (Bottle)       20       28APR11       25MAY11       53       0.00       1         5800       Install: Power Pressure Hous	5345	Refurbish Lead Acid Battery Box	30	14APR11	25MAY11	3	0.00	
5355       Refurbish: Imaging Systems       30       14APR11       25MAY11       33       0.00         5360       Refurbish: Science Interface Systems       30       14APR11       25MAY11       33       0.00         5500       Send Frame & Mod Components to Vendor       2       14APR11       15APR11       1       0.00         5510       Refurbish: Frame & Structural Components       10       14APR11       27APR11       16       0.00         5502       Carry Out Frame Modifications & Inspections       20       18APR11       13MAY11       1       0.00         5504       Accept Frame Modifications & Return to WHOI       3       17MAY11       19MAY11       0       0.00         6515       Service Lead Acid Cells into Battery Box       45       26MAY11       29JUL11       3       0.00         5711       Install: Data Pressure Housing (Bottle)       20       28APR11       25MAY11       53       0.00         5800       Install: Power Pressure Housing (Bottle)       20       04MAY11       01JUN11       49       0.00         7000       Install: Manipulators       20       12MAY11       03       0.00       Image: Construction       Image: Construction       Image: Construction       Image: Construction <td>5350</td> <td>Refurbish: Manipulators</td> <td>20</td> <td>14APR11</td> <td>11MAY11</td> <td>3</td> <td>0.00</td> <td></td>	5350	Refurbish: Manipulators	20	14APR11	11MAY11	3	0.00	
5360       Refurbish: Science Interface Systems       30       14APR11       25MAY11       33       0.00         5500       Send Frame & Mod Components to Vendor       2       14APR11       15APR11       1       0.00         5510       Refurbish: Frame & Structural Components       10       14APR11       27APR11       16       0.00         5502       Carry Out Frame Modifications & Inspections       20       18APR11       1       0.00         5504       Accept Frame Modifications & Return to WHOI       3       17MAY11       19MAY11       0       0.00         6515       Service Lead Acid Cells into Battery Box       45       26MAY11       29JUL11       3       0.00         5900       Install: Existing Variable Ballast Spheres       20       010CT09       29OCT09       446       0.00         5900       Install: Data Pressure Housing (Bottle)       20       28APR11       25MAY11       53       0.00         5800       Install: Power Pressure Housing (Bottle)       20       04MAY11       01JUN11       49       0.00       1         7000       Install: Manipulators       20       12MAY11       03       0.00       1       1	5355	Refurbish: Imaging Systems	30	14APR11	25MAY11	33	0.00	
5500       Send Frame & Mod Components to Vendor       2       14APR11       15APR11       1       0.00         5510       Refurbish: Frame & Structural Components       10       14APR11       27APR11       16       0.00         5502       Carry Out Frame Modifications & Inspections       20       18APR11       13MAY11       1       0.00         5504       Accept Frame Modifications & Return to WHOI       3       17MAY11       19MAY11       0       0.00         6515       Service Lead Acid Cells into Battery Box       45       26MAY11       29JUL11       3       0.00         Construction	5360	Refurbish: Science Interface Systems	30	14APR11	25MAY11	33	0.00	
5510       Refurbish: Frame & Structural Components       10       14APR11       27APR11       16       0.00         5502       Carry Out Frame Modificaitons & Inspections       20       18APR11       13MAY11       1       0.00         5504       Accept Frame Modificaitons & Return to WHOI       3       17MAY11       19MAY11       0       0.00         6515       Service Lead Acid Cells into Battery Box       45       26MAY11       29JUL11       3       0.00         Construction	5500	Send Frame & Mod Components to Vendor	2	14APR11	15APR11	1	0.00	
5502       Carry Out Frame Modifications & Inspections       20       18APR11       13MAY11       1       0.00         5504       Accept Frame Modifications & Return to WHOI       3       17MAY11       19MAY11       0       0.00         6515       Service Lead Acid Cells into Battery Box       45       26MAY11       29JUL11       3       0.00         6515       Service Lead Acid Cells into Battery Box       45       26MAY11       29JUL11       3       0.00         Construction         5711       Install: Existing Variable Ballast Spheres       20       010CT09       290CT09       446       0.00         5900       Install: Data Pressure Housing (Bottle)       20       28APR11       25MAY11       53       0.00         5800       Install: Power Pressure Housing (Bottle)       20       04MAY11       01JUN11       49       0.00         7000       Install: Manipulators       20       12MAY11       03       0.00       1       1       1       1       1       1	5510	Refurbish: Frame & Structural Components	10	14APR11	27APR11	16	0.00	
5504Accept Frame Modifications & Return to WHOI317MAY1119MAY1100.006515Service Lead Acid Cells into Battery Box4526MAY1129JUL1130.00Construction5711Install: Existing Variable Ballast Spheres20010CT09290CT094460.005900Install: Data Pressure Housing (Bottle)2028APR1125MAY11530.005800Install: Power Pressure Housing (Bottle)2004MAY1101JUN11490.007000Install: Manipulators2012MAY1109JUN1130.00	5502	Carry Out Frame Modificaitons & Inspections	20	18APR11	13MAY11	1	0.00	
6515Service Lead Acid Cells into Battery Box4526MAY1129JUL1130.00Construction5711Install: Existing Variable Ballast Spheres20010CT0929OCT094460.005900Install: Data Pressure Housing (Bottle)2028APR1125MAY11530.005800Install: Power Pressure Housing (Bottle)2004MAY1101JUN11490.007000Install: Manipulators2012MAY1109JUN1130.00	5504	Accept Frame Modifications & Return to WHOI	3	17MAY11	19MAY11	0	0.00	
Construction5711Install: Existing Variable Ballast Spheres20010CT09290CT094460.005900Install: Data Pressure Housing (Bottle)2028APR1125MAY11530.005800Install: Power Pressure Housing (Bottle)2004MAY1101JUN11490.007000Install: Manipulators2012MAY1109JUN1130.00	6515	Service Lead Acid Cells into Battery Box	45	26MAY11	29JUL11	3	0.00	
5711Install: Existing Variable Ballast Spheres2001OCT0929OCT094460.005900Install: Data Pressure Housing (Bottle)2028APR1125MAY11530.005800Install: Power Pressure Housing (Bottle)2004MAY1101JUN11490.007000Install: Manipulators2012MAY1109JUN1130.00	Constru	ction						
5900Install: Data Pressure Housing (Bottle)2028APR1125MAY11530.005800Install: Power Pressure Housing (Bottle)2004MAY1101JUN11490.007000Install: Manipulators2012MAY1109JUN1130.00	5711	Install: Existing Variable Ballast Spheres	20	01OCT09	29OCT09	446	0.00	
5800         Install: Power Pressure Housing (Bottle)         20         04MAY11         01JUN11         49         0.00           7000         Install: Manipulators         20         12MAY11         09JUN11         3         0.00         Image: Control of the second s	5900	Install: Data Pressure Housing (Bottle)	20	28APR11	25MAY11	53	0.00	
7000         Install: Manipulators         20         12MAY11         09JUN11         3         0.00	5800	Install: Power Pressure Housing (Bottle)	20	04MAY11	01JUN11	49	0.00	
	7000	Install: Manipulators	20	12MAY11	09JUN11	3	0.00	

Activity	Activity	Orig	Early	Early	Total	Budgeted -	2009			201	0					2011			
ID	Description	Dur	Start	Finish	Float	Cost	SONC	) J F I	A A	IJJ	J A S	6 O N	I D J	FM	AM	JJA	S	D N I	DJE
0198	Assembly	77	20MAY11	08SEP11	0	343,093.11													
5520	Begin to Reconstruct (milestone)	0	20MAY11		0	0.00							1						
5530	Install Frame Attachments - Tabs & Lugs	10	20MAY11	03JUN11	6	0.00									ļ				
5715	Install Crossdeck Internal Components in Birdcag	5	26MAY11	02JUN11	143	0.00													
6100	Install: Main Ballast Tanks	20	26MAY11	23JUN11	13	0.00													
6300	Install Propulsion System	20	26MAY11	23JUN11	33	0.00													
5540	Mount Sphere/Hull	2	06JUN11	07JUN11	6	0.00													
5550	Schedule Contingency (if sphere doesn't fit)	10	08JUN11	21JUN11	20	0.00													
7010	Install: Mercury Trim System	20	10JUN11	08JUL11	3	0.00													
7100	Transfer Mockup Command &Control Equip in Sphere	16	17JUN11	11JUL11	2	0.00													
5580	Test Fit Foam	5	22JUN11	28JUN11	20	0.00													
5590	Test Fit Main Ballast Tanks	5	22JUN11	28JUN11	20	0.00													
5600	Test Fit Sail & Bath Tub	5	22JUN11	28JUN11	20	0.00													
6105	Install: Skins	10	24JUN11	08JUL11	18	0.00													
6200	Install: New Variable Ballast Spheres	20	24JUN11	22JUL11	13	0.00													
5605	Fit Up Skins	10	29JUN11	13JUL11	20	0.00													
5610	Install Syntactic Foam	10	29JUN11	13JUL11	20	0.00											1		
6000	Install: Junction Boxes	20	06JUL11	02AUG11	6	0.00													
6107	Install: Fairings	5	11JUL11	15JUL11	18	0.00													
6109	Install: Sail	5	11JUL11	15JUL11	18	0.00													
7020	Install: Main Hydraulic System	20	11JUL11	05AUG11	3	0.00													
7300	Install: Imaging Systems	20	12JUL11	08AUG11	2	0.00													
7400	Install: Science Interface Systems	20	12JUL11	08AUG11	2	0.00													
6525	Assemble Lead Acid Batteries Into Alvin	5	01AUG11	05AUG11	3	0.00													
0202	Hangar Test and Ship Mobilization	44	11AUG11	130CT11	20	95,598.28													
7500	Complete Testing NEW 4500m Alvin Vehicle Systems	20	11AUG11	08SEP11	0	0.00													
Sea Tr	ials																		
0201	Dockside Testing and Sea Trials	43	09SEP11	09NOV11	1	245,519.48													
0340	Commission 4500m Alvin Vehicle	44	09SEP11	10NOV11	0	119,638.22													
0350	Deliver 4500m Alvin Vehicle	0		10NOV11	0	0.00													

#### **3.3 Critical Path Activities**

The critical path activities go through construction of the personnel sphere (Figure 3). This ongoing effort by SwRI is being managed with a subcontractor-provided monthly milestone schedule. Construction of the personnel sphere will be updated in accordance with that schedule so that any impact to the project schedule can be readily seen. SwRI and WHOI have implemented aggressive oversight of this project. A SwRI representative is on-site at their subcontractors, there are weekly telephone conferences on progress, monthly written status reports, site visits, and quality control checks being conducted to ensure that sphere construction and delivery schedule are met.



Figure 3. Critical Path Activities

# 4.0 Cost Estimate

# 4.1 Cost Summary for Preferred A-4500 HOV Design

A cost summary for the preferred A-4500 HOV design is shown in Table 2. The cost estimate is summarized by work package and was used to prepare the base estimate for the preferred A-4500 HOV design. The costs are priced using 2009 labor rates and quotes. Annual escalation factors have *not* been applied to the figures in this Table.

Project	Work		Project					Imaging /	Command		09/30/09		Cost to	
Number	Package		Management	E	lectrical	N	lechanical	Illumination	& Control	Construction	Actuals	(	Complete	Total
Historical Co	sts													
83340900		Contract Management	\$ 604,061								\$ 604,061			\$ 604,061
83340901		WHOI Management	\$ 747,183								\$ 747,183			\$ 747,183
83340902		WHOI Effort	\$ 309,786								\$ 309,786			\$ 309,786
83340903		RHOC Costs	\$ 27,804								\$ 27,804			\$ 27,804
83340905		Vehicle Preliminary Design	\$ 5,188,707								\$ 5,188,707			\$ 5,188,707
83340906		Main Battery Development	\$ 150,684								\$ 150,684			\$ 150,684
83340907		Syntactic Foam Certification	\$ 4,511								\$ 4,511			\$ 4,511
		Miscellaneous Actual Costs	\$ 39,062								\$ 39,062			\$ 39,062
Project Mana	agement													
		Project Management												
83340911	A99	Project Management	\$ 1,840,384								\$ 910,768	\$	1,840,384	\$ 2,751,152
	A99	PM Plans	\$ 212,884								\$ -	\$	212,884	\$ 212,884
83340940	A99	Preliminary Design Report	\$ 126,956								\$ 52,222	\$	126,956	\$ 179,178
	A99	Final Design Report	\$ 126,956								\$ -	\$	126,956	\$ 126,956
Certification/	/Classifica	tion												
83340945	A99	ABS Classifiction	\$ 607,120								\$ 41,705	\$	607,120	\$ 648,825
Vehicle Fabri	cation													
83340913	A00	General Information/Sys Eng		\$	177,886						\$ 172,846	\$	177,886	\$ 350,732
83340904	A02	Sphere & Attachments				\$	3,099,477				\$ 6,762,041	\$	3,099,477	\$ 9,861,518
83340917	A02-03	Penetrators				\$	315,954				\$ 25,655	\$	315,954	\$ 341,609
83340916	A02-06,07	Internal Arrangement		\$	116,425	\$	251,350				\$ 152,909	\$	367,776	\$ 520,685
83340918	A04	Frame & Structural Components				\$	155,261				\$ 31,714	\$	155,261	\$ 186,975
83340919	A06	Fixed Buoyancy Assemblies				\$	3,212,967				\$ 32,847	\$	3,212,967	\$ 3,245,814
83340920	A08	Skins, Fairings and Sail				\$	154,142				\$ 446	\$	154,142	\$ 154,588
83340921	A10	Main Battery Systems				\$	33,161				\$ 157,630	\$	33,161	\$ 190,791
83340922	A12-03	Power Bottle		\$	151,774	\$	68,253				\$ 27,564	\$	220,027	\$ 247,591
83340923	A12-03	Data Bottle		\$	108,932	\$	86,810				\$ 343	\$	195,742	\$ 196,085
83340924	A12-01	Junction Boxes		\$	36,266	\$	53,427				\$ 115	\$	89,694	\$ 89,809
83340925	A14	Main Ballast System		\$	2,225	\$	116,848				\$ -	\$	119,073	\$ 119,073
83340926	A16	Variable Ballast System		\$	6,675						\$ 49,652	\$	6,675	\$ 56,327
83340927	A18	Propulsion System		\$	13,301						\$ 39,232	\$	13,301	\$ 52,533
83340928	A20	Main Hydraulic System		\$	16,512						\$ 18,382	\$	16,512	\$ 34,894
83340929	A22	Mercury Trim System		\$	2,225						\$ -	\$	2,225	\$ 2,225
83340930	A24	Life Support & Habitability		\$	288,736						\$ 2,286	\$	288,736	\$ 291,022
83340931	A26	Compensation Systems				\$	9,000				\$ -	\$	9,000	\$ 9,000
83340932	A28	Service Releases		\$	2,225	\$	30,506				\$ -	\$	32,731	\$ 32,731
83340933	A28	Emergency Releases		\$	2,225	\$	34,427				\$ -	\$	36,652	\$ 36,652

Project Number	Work Package		Project Management	Electrical	Mechanical	Imaging / Illumination	Command & Control	Construction	09/30/09 Actuals		Cost to Complete		Total
83340934	A30	Manipulators		\$ 14,351					\$ 265	\$	14,351	\$	14,616
83340935	A32	Operational Equipment					\$ 79,180		\$ -	\$	79,180	\$	79,180
83340936	A34	Imaging & Illumination				\$ 1,629,324			\$ 20,425	\$	1,629,324	\$	1,649,749
83340937	A34	Science Interface Systems		\$ 74,151	\$ 117,052				\$ -	\$	191,203	\$	191,203
83340938	A36	Command & Control					\$ 598,004		\$ 15,597	\$	598,004	\$	613,601
Support Equi	ipment												
83340939	A50	General Support							\$ -	\$	-	\$	-
83340939	A52	Launch and Recovery System			\$ 104,620				\$ -	\$	104,620	\$	104,620
Construction	& Test												
		Preconstruction & Disassembly											
83340960		Preconstruction						\$ 37,940	\$ -	\$	37,940	\$	37,940
83340960		Disassembly						\$ 89,532	\$ -	\$	89,532	\$	89,532
83340960		Integration						\$ 628,261	\$ -	\$	628,261	\$	628,261
		Integration and Test											
83340970		Assembly						\$ 270,149	\$ -	\$	270,149	\$	270,149
83340970		Hangar Test & Ship Mob						\$ 87,532	\$ -	\$	87,532	\$	87,532
83340970		Dockside Test & Sea Trials						\$ 155,932	\$ -	\$	155,932	\$	155,932
83340970		Sea Trials - Shoreside Labor						\$ 113,121	\$ -	\$	113,121	\$	113,121
			\$ 9,986,097	\$ 1,013,909	\$ 7,843,256	\$ 1,629,324	\$ 677,184	\$ 1,382,467	\$ 15,586,441	\$	15,460,439	\$	31,046,880
									Does not in	clude	e escalation or	con	tingency
										+		<u> </u>	
										+		<u> </u>	

A detailed cost estimating worksheet was created for each work package. These detailed estimating worksheets can be found in Appendix A. The summary figures were reviewed in a Project Management Team and lead engineers meeting to be sure that all major scope was included in the pricing. The detailed cost estimates have also undergone a second level review within the last month to refine the current figures.

Once the preferred A-4500 HOV design was selected, the costs were loaded into the schedule and escalated according to Table 3.

Table 5. Escalation Factors									
<b>Fiscal Year</b>	<u>2010</u>	<u>2011</u>	<u>2012</u>						
LABOR & Non-Labor									
%	4.0	4.0	4.0						
Cum Effect	1.0400	1.0816	1.1249						

Table 3. Escalation Factors

Contingency was added to these figures in accordance with the Risk Summary Table in the *A*-4500 HOV Risk Management Plan. The project estimated costs are shown in Table 4.

#### Table 4. A-4500 HOV Project Estimated Costs

#### PREFERRED A-4500 HOV DESIGN – ESTIMATE

Base Cost	\$31,046,880
w/Escalation	\$31,722,894
Contingency	\$ 3,452,000
Total Cost Estimate .	\$35,174,894

#### FUNDING

NSF Project	.\$2	22,910,005
WHOI	.\$	5,000,000
Ship Modifications	.\$	200,000
Total Funding Available	.\$2	28,110,005

Funding Variance ......\$ 7,064,889

# 4.2 Cost Estimating Worksheets (see Appendix A)

"Bottom Up" cost estimating worksheets were prepared for each work package. The sheet includes a narrative, list of scheduled activities, labor estimates, personnel and other expenses needed to execute the particular work package. Cost estimates were prepared with 2009 rates. Escalation has not been applied within these worksheets.

All labor was estimated by the technical lead responsible for the work package. Pricing for expenses are either engineers estimates, vendor quotes and/or historically based. Each item is identified as such so that the team can assess the confidence level of the quotation. As the design matures, these sheets will become working documents to refine the cost estimating figures.

The current cost estimate was loaded into the schedule and escalated. The preliminary cash flow shown below is based on that effort.

### 4.3 Estimated Cash Flow

The data developed in the estimating sheets were then loaded into the schedule and escalated. The cash flow shows anticipated expenditures if the project proceeds on schedule (Figure 4). If activities slip into outer years, escalation will start to impact the costs.



Figure 4. Preliminary Cash Flow Analysis

# 5.0 Staffing Plan

## **5.1 Total Staffing**

The staffing chart (Figure 5) shows the level of full time personnel needed to execute this project. On average ~12 people will be needed. As part of the second level cost estimate review, the team will review and revise the sequence of activities to level the resources shown below. Where staffing peaks remain, the project team will be supplemented by additional resources. WHOI has a number of employees and graduate students to draw from within their resource pool. Consultant services may also be used to supplement the team for specific activities when needed.



Figure 5. Staffing Chart for the A-4500 HOV Project

#### **5.2 Detailed Staffing**

In addition to the overall project staffing, individual staffing plans were created so that the Project Management Team could identify peak periods for key personnel. An effort will be made to level peak period by staggering non-critical activities, re-distributing work

assignments within the department, extending the workweek to include weekends, and/or bringing on additional people.



Figure 6. Example of Individual Staffing Plans

The example shown in Figure 6 demonstrates how the individual staffing plans will be used. Some work activities assigned to the  $1^{st}$  employee will be reassigned to the  $2^{nd}$  employee for the months of August and then again in December, January and February. The team will review opportunities to accelerate some of the work planned for December into the late fall months. Example individual staffing charts are provided in Figures 7-11.


A-4500-HOV Project Integrated Master Schedule

JUL

DEC

0000000

OCT

MAY

2011

1

0

SEP

2009

FEB

2010

Full

0

SEP

2009

Months

FEB

2010

JUL

DEC

MAY

2011

OCT

Mont**3**4

JUL

DEC

MAY

2011

OCT

Full

0

SEP

2009

FEB

2010



SEP

2009

FEB

2010

Months

JUL

DEC

MAY

2011

OCT

SEP

2009

FEB

2010

Months

Full Time Employees



JUL

DEC

MAY

2011

OCT

Employees

Time

Full

Jonathan Howland



William Lange



Technical Lead



Months



MAr4500 HOV Project Integrated Master Schedule

## Months





Time Employees

Time Employees

Time Employees Full

Months

Months

Months

37





0

JUL SEP FEB 2009 2010

Months

DEC

MAY

2011

OCT



Months



Months

Full

38

## 6.0 Scheduled Values for Earned Value Management System

The scheduled value assigned to each activity is shown in Table 6. Activities that do not have a scheduled value have been filtered out of this table. The activities listed are horizontally traceable to the cost estimating worksheets. These values are the basis for earned value within the WBS

Activity ID	Ac Desc	tivity ription	Sche Va	eduled alue	
Project Manage	ement				
+ Historical Info	rmation				
			15,	586,441.16	
Project Manager	nent				
0099	Prepare Preliminary Design			126,955.88	
0107	Project Management during	Preliminary Design		140,427.92	
0237	Project Management Final P	lans		212,884.04	
0110	Project Management during	Final Design		670,238.72	
1998	Prepare Final Design			132,032.52	
0160	Project Management during	Procure & Fabrication		693,407.26	
0190	Project Management during	Construction		412,126.92	
0192	Project Management during	Sea Trials		18,147.40	
Classification/C	ertification				
0115	ABS Certification during Pro	eliminary Design		28,800.00	
0120	ABS Certification during Fit	nal Design		218,157.04	
0170	ABS Certification during Pr	ocure & Fabrication	:	224,781.73	
0200	ABS Certification during Co	onstruction		167,874.84	
Vehicle A-4500					
A00 General Inf	ormation				
5682	Design Monitoring Alarm Ir	terface to Battery Sys		8,874.36	
5690	Build/Test EE Prototype: Co	ommand Structure		22,345.88	
5693	Build/Test EE Prototype: Co	ontrols		45,744.64	
5695	Build/Test EE Prototype: Pr	opulsion		20,628.16	
5698	Develop Hydraulic Control	Architecture		48,007.44	
5735	Complete Electrical Schema	tics and Specs		46,744.42	
A01 Sphere and	Attachments				
7270	Determine External Tabs an	d Lug Placement		22,688.64	
7320	Determine Internal Arranger	nents		112,686.16	
7330	Buildup Internal Sphere Mo	ckup		62,794.19	
7280	Prepare Prel Design Docume	ents: Sphere & Attach		12,793.80	
Start Date 015 Finish Date 280 Data Date 05NOV09 (D Primavera Systems, II	EP65 EG1 02:11	AL28 Woods Hole Oceanographic Insti 6500m HOV Project Section 6.1 Scheduled Value	Sheet 1 of 8 Itution		

## Table 6. Scheduled Value for Each Activity

**Appendix A – Cost Estimating Worksheets** 

Project	Work		Project					Imaging /	Command		09/30/09	Cost to	
Number	Package		Management	E	lectrical	N	<b>Aechanical</b>	Illumination	& Control	Construction	Actuals	Complete	Total
Historical Co	sts												
83340900		Contract Management	\$ 604,061								\$ 604,061		\$ 604,061
83340901		WHOI Management	\$ 747,183								\$ 747,183		\$ 747,183
83340902		WHOI Effort	\$ 309,786								\$ 309,786		\$ 309,786
83340903		RHOC Costs	\$ 27,804								\$ 27,804		\$ 27,804
83340905		Vehicle Preliminary Design	\$ 5,188,707								\$ 5,188,707		\$ 5,188,707
83340906		Main Battery Development	\$ 150,684								\$ 150,684		\$ 150,684
83340907		Syntactic Foam Certification	\$ 4,511								\$ 4,511		\$ 4,511
		Miscellaneous Actual Costs	\$ 39,062								\$ 39,062		\$ 39,062
Project Mana	agement												
		Project Management											
83340911	A99	Project Management	\$ 1,840,384								\$ 910,768	\$ 1,840,384	\$ 2,751,152
	A99	PM Plans	\$ 212,884								\$ -	\$ 212,884	\$ 212,884
83340940	A99	Preliminary Design Report	\$ 126,956								\$ 52,222	\$ 126,956	\$ 179,178
	A99	Final Design Report	\$ 126,956								\$ -	\$ 126,956	\$ 126,956
Certification/	/Classifica	tion											
83340945	A99	ABS Classifiction	\$ 607,120								\$ 41,705	\$ 607,120	\$ 648,825
Vehicle Fabri	cation												
83340913	A00	General Information/Sys Eng		\$	177,886						\$ 172,846	\$ 177,886	\$ 350,732
83340904	A02	Sphere & Attachments				\$	3,099,477				\$ 6,762,041	\$ 3,099,477	\$ 9,861,518
83340917	A02-03	Penetrators				\$	315,954				\$ 25,655	\$ 315,954	\$ 341,609
83340916	A02-06,07	Internal Arrangement		\$	116,425	\$	251,350				\$ 152,909	\$ 367,776	\$ 520,685
83340918	A04	Frame & Structural Components				\$	155,261				\$ 31,714	\$ 155,261	\$ 186,975
83340919	A06	Fixed Buoyancy Assemblies				\$	3,212,967				\$ 32,847	\$ 3,212,967	\$ 3,245,814
83340920	A08	Skins, Fairings and Sail				\$	154,142				\$ 446	\$ 154,142	\$ 154,588
83340921	A10	Main Battery Systems				\$	33,161				\$ 157,630	\$ 33,161	\$ 190,791
83340922	A12-03	Power Bottle		\$	151,774	\$	68,253				\$ 27,564	\$ 220,027	\$ 247,591
83340923	A12-03	Data Bottle		\$	108,932	\$	86,810				\$ 343	\$ 195,742	\$ 196,085
83340924	A12-01	Junction Boxes		\$	36,266	\$	53,427				\$ 115	\$ 89,694	\$ 89,809
83340925	A14	Main Ballast System		\$	2,225	\$	116,848				\$ -	\$ 119,073	\$ 119,073
83340926	A16	Variable Ballast System		\$	6,675						\$ 49,652	\$ 6,675	\$ 56,327
83340927	A18	Propulsion System		\$	13,301						\$ 39,232	\$ 13,301	\$ 52,533
83340928	A20	Main Hydraulic System		\$	16,512						\$ 18,382	\$ 16,512	\$ 34,894
83340929	A22	Mercury Trim System		\$	2,225						\$ -	\$ 2,225	\$ 2,225
83340930	A24	Life Support & Habitability		\$	288,736						\$ 2,286	\$ 288,736	\$ 291,022
83340931	A26	Compensation Systems				\$	9,000				\$ -	\$ 9,000	\$ 9,000
83340932	A28	Service Releases		\$	2,225	\$	30,506				\$ -	\$ 32,731	\$ 32,731
83340933	A28	Emergency Releases		\$	2,225	\$	34,427				\$ -	\$ 36,652	\$ 36,652

Project Number	Work Package		Project Management	Electrical	м	lechanical	Imaging / Illumination	Command & Control	Co	nstruction	09/30/09 Actuals		Cost to Complete		Total
83340934	A30	Manipulators		\$ 14,351	-						\$ 265	\$	14,351	\$	14,616
83340935	A32	Operational Equipment						\$ 79,180			\$ -	\$	79,180	\$	79,180
83340936	A34	Imaging & Illumination					\$ 1,629,324				\$ 20,425	\$	1,629,324	\$	1,649,749
83340937	A34	Science Interface Systems		\$ 74,151	\$	117,052					\$ -	\$	191,203	\$	191,203
83340938	A36	Command & Control						\$ 598,004			\$ 15,597	\$	598,004	\$	613,601
Support Equi	ipment														
83340939	A50	General Support									\$ -	\$	-	\$	-
83340939	A52	Launch and Recovery System			\$	104,620					\$ -	\$	104,620	\$	104,620
Construction	& Test														
		Preconstruction & Disassembly													
83340960		Preconstruction							\$	37,940	\$ -	\$	37,940	\$	37,940
83340960		Disassembly							\$	89,532	\$ -	\$	89,532	\$	89,532
83340960		Integration							\$	628,261	\$ -	\$	628,261	\$	628,261
		Integration and Test													
83340970		Assembly							\$	270,149	\$ -	\$	270,149	\$	270,149
83340970		Hangar Test & Ship Mob							\$	87,532	\$ 	\$	87,532	\$	87,532
83340970		Dockside Test & Sea Trials							\$	155,932	\$ -	\$	155,932	\$	155,932
83340970		Sea Trials - Shoreside Labor							\$	113,121	\$ -	\$	113,121	\$	113,121
			\$ 9,986,097	\$ 1,013,909	\$	7,843,256	\$ 1,629,324	\$ 677,184	\$	1,382,467	\$ 15,586,441	\$	15,460,439	\$	31,046,880
											Does not in	clud	e escalation or	r con	tingency
												-			
					-							-			
					-										
			l	1											

Description	: This work	nackage includes all work required to	generate a	dminister an	d impleme	nt project contr	ისნი	nctions and repo	orting tasks in	ncluding risk mitigation sched
budgeting, e Execution F and attend r	earned value Plan, Configuroiect meet	management and reporting for the du uration Management Plan, Risk Mana	ration of the gement Plan	project. Th , Quality As	is includes surance Pla	work required an, etc. This wo	to m	aintain (but not ackage also incl	develop and ludes all effor	write) project documents i.e.: rts required to plan organize, a
Basis of 1	Estimate	ings mendaning an regularity scheduled		*assumes 1	/2 time					
Activity	Project		LOE Driving	Most Likely						
ID	Phase	Description	Duration	(Days)						Comments
0107	PD	Project Management during Preliminary Design	8	40						10/01/09 through 11/30/09
0110	FD	Project Management	35.4	177						12/01/09 through 08/12/10
0160	FAB	Project Management	35.8	179						08/13/10 through 05/02/11
0190	OV	Project Management	20	100						05/03/11 through 09/22/11
	ST	Project Management	0	0						PM and assistant PM for 2 m
				0						
		Subtotal:	99.2							
Object Code	Type of Etimate	Item	Man Wks	Qty	Unit	Unit Rate		Cost		Pricing Assumption
labor	EE	Project Manager	99.2	3633.3	HR	\$ 150.00	\$	544,995.00		full time 8 hrs per day each a mths for sea trials
labor	EE	Susan Humphris	99.2	892.8	HR					assume 2 hrs per day each Ac
labor	EE	Anthony P. Tarantino	99.2	3633.426	HR					full time 8 hrs per day each a mths for sea trials
labor	EE	Richard S. Chandler	99.2	1785.6	HR					assume 4 hrs per day each Ac
labor	EE	K. Faith Hampshire	99.2	1785.6	HR					assume 4 hrs per day each Ac
labor	EE	Barrie B. Walden	99.2	892.8	HR					assume 2 hrs per day each Ac
labor	EE	Tech Lead	99.2	446.4	HR					assume 1 hr per week for 5 pe attend team meetings
		Subtotal Labor:		13,070			\$	1,733,326.91		
Expenses: M Software, R	Aeals, Trave epair & Ma	Domestic/International, Equipment, intenance, Communication.	Supplies, St	ockroom Suj	pplies, Out	side Services, 0	Cons	ulting Services,	Shipping & I	Postage, Subcontracts, Compu
travel - dom	EE	ARHOC meetings in DC		12	trip(s)	\$ 1,500.00	\$	18,000.00		(2) people quarterly for 2 years
travel - dom	EE	DeSSC meeting in San Francisco		4	trip(s)	\$ 1,500.00	\$	6,000.00		(2) people quarterly for 2 yes
comm	EE	teleconferences		2	year(s)	\$ 1,000.00	\$	2,000.00		
outside sv	EE	RHOC		1	LS	\$ 81,057.00	\$	81,057.00		see attached
							\$	-		
		C-14-4-1 E		10			\$	-		
		Subtotal Expense:		19			\$	107,057.00		
				and Dah		Total:	<b>&gt;</b>	1,840,383.91	Other attend	loss one servered under the t

B B	C	D	E	F	G	Н		J	R R
2 Project	: <u>New Alv</u> in	Design and Fab (83340908)	Work Package:	022-02	Project M	anagement Plans	s (Option A,B,D)	Technical Lead:	Susan Humphries
Descripti Execution Environm	on: This work Plan, Vehicle ental Health a	package includes activities to prepar Design Plan, Project Management F nd Safety Pan, and Transition to Ope	e and revie Plan, Risk M rations Plar	w project Ianagem 1.	t managem ent Plan, C	ent plans. Activ Contingency Man	vities include the dra agement Plan, Acq	aft and fina uisition Pl	al for (9) PM plans for the Project an, Quality Control/Assurance Plan,
6 Basis of	f Estimate			*assume	es 1/2 time	1			
Activity	Project			Most Likely					
7 <b>ID</b>	Phase	Description	Man Wks	(Days)					Comments
<sup>8</sup> 0236	PD	Prepare Draft Plans	0	0					includes: PEP, Vehicle Design, PMP, risk management plan, contingency plan, acquisition plan, QC/QA Plan, H&S plan, transition plan - COMPLETE
9 0237	PD	Prepare Final Plans	7	70					includes: PEP, Vehicle Design, PMP, risk management plan, contingency plan, acquisition plan, QC/QA Plan, H&S plan, transition plan
10				0					
12		Subtotal:	7						
Object	Type of Etimate	Item	Man Wks	Otv	Unit	Unit Rate	Cost		Pricing Assumptions
14 0000	Dimute		intuit vviks	213	Cint		Cost		
15 labor	EE	Tech Lead	4	144	HR				
16 labor	EE	Susan Humphris	2	72	HR				
17 labor	EE	Barrie B. Walden	1	36	HR				
18				0	HR				
19				0	HR				
Expenses: 21 Computer	: Meals, Trave Software, Rej	Subtotal Labor: l Domestic/International, Equipment pair & Maintenance, Communication	, Supplies, S	252 Stockroom	m Supplies	s, Outside Servic	<b>\$ 39,884.04</b> es, Consulting Serv	ices, Shipj	ping & Postage, Subcontracts,
consulting	g VO	John Leadmon		1	LS	\$ 91.000.00	\$ 91,000.00		for 10/01/09-02/28/10
consulting 23 SV	g VQ	Scheduling Solutions		1	LS	\$ 82,000.00	\$ 82,000.00		for 10/01/09-12/09/09
24							\$ -		
25							\$ -		
26 27		Subtotal Expense:		2			\$ 173,000.00		
28						Total:	\$ 212,884.04		
Notes:									

	В	С	D	E	F	G	Н		1	J	K
2	Project:	New Alvin	: Design and Fab (83340908)	Work Package:	002-03 Pro	eliminary De	sign Repo	rt (Opt	ion A,B,D)	Technical Lead	Susan Humphries
	Description: of presentation	This work pons, dry run s	backage is to prepare and review doct dessions and revisions with the interna-	uments prese al and extern	entations an nal advisory	d data for the boards.	e Prelimin	ary De	sign Review.	Activities in	clude engineering reviews, preparation
4											
6	Basis of E	stimate			*assumes 1	/2 time					
7	Activity ID	Project Phase	Description	Man Wks	Most Likely (Days)						Comments
8	0561	PD	Engineering Review	0.1	1						
9	0571	PD	Engineering Review Report	0.5	5						
10	0103	PD	Presentation preparation	1	10						
11	0104, 0108, 0122	PD	RR Dry Run sessions	0.6	6						(3) Team, internal & readiness review
12	0132	PD	PDR Presentation preparation	1	10						
13	0133, 0136	PD	PDR Dry Run sessions	0.6	6						
14					0						
15					0						
10			Subtotal	3.8							
17	Obiect	Type of	Subtotal	5.0			Unit				
19	Code	Etimate	Item	Man Wks	Qty	Unit	Rate		Cost		Pricing Assumptions
20	labor	EE	Susan Humphris	3.8	136.8	HR					
21	labor	EE	Richard S. Chandler	3.8	136.8	HR					
22	labor	EE	Barrie B. Walden	3.8	136.8	HR					
23	labor	EE	Jonathan C. Howland	3.8	136.8	HR					
24	labor	EE	Lane J. Abrams	3.8	136.8	HR					
25	labor	EE	Donald B. Peters	3.8	136.8	HR					
26					0	HR					
27					0	HR					
28	Evnoncos: M	aala Traval I	Subtotal Labor:	Sumplies Ste	821	mias Outsi	da Camiaa	\$	126,955.87	. Shinning	r Dogtogo Subcontracto Computer
29	Software, Re	pair & Maint	tenance, Communication.	supplies, sto	ickiooni Suj	ppnes, Outsi	ue service	s, con	suiting Service	s, snipping	& Postage, Subcontracts, Computer
30								\$	-		
31								\$	-		
31								¢	_		
32			Subtotal Expense		0			» Տ	 _		
34					-						
35							Total:	\$	126,955.87		
	Notes: Tear Assumes tec	n participant hnical plans,	ts include: Susan, Barrie, Anthony , specs, drawings are paid for unde	, Don, Jon, r each disap	and Lane. dine's preli	Participation minary desi	on by And gn activit	y and ies.	Pat is covered	l under thei	r respective operations budgets.
		- /			-	-					
37											

Project	New Alvin	: Design and Fab (83340908)	Package:	002-04	Final Desig	gn Report (0	Option A,B,D)	Lead:	Susan Humphries
Description	This work p	ackage is to prepare and review docu	ments prese	ntations	and data for	r the Final 1	Design Review.	Activities in	clude engineering reviews, preparation
of presentati	ons, dry run s	sessions and revisions with the interna	and exterr	al advis	ory boards.		0		0 0 /11
Basis of F	Stimate			*00001000	1/2 time				
Da515 01 1	stimate			Most	es 1/2 time				
Activity ID	Project Phase	Description	Man Wks	Likely (Days)					Comments
Activity ID	Thase	Description	Mail WKS	(Days)					Comments
0561	FD	Engineering Review	0.1	1					
0571	FD	Engineering Review Report	0.5	5					
0371		Engineering Review Report	0.5	5					
0103	FD	Presentation preparation	1	10					
0104, 0108, 0122	FD	RR Dry Run sessions	0.6	6					(3) Team internal & readiness review
0122	12		0.0	Ū					
0132	FD	PDR Presentation preparation	1	10					
0133, 0136	FD	PDR Dry Run sessions	0.6	6					
				-					
				0					
				0					
		Subtotal:	3.8						
Object	Type of					Unit			
Code	Etimate	Item	Man Wks	Qty	Unit	Rate	Cost		Pricing Assumptions
labor	FF	Susan Humphris	3.8	136.8	HR				
14001	LL	Susan Humphilis	5.0	150.0	III				
labor	EE	Richard S. Chandler	3.8	136.8	HR				
				126.0					
labor	FF	Darria D. Waldan	38	146 8	HR				
labor	EE	Barrie B. Walden	3.8	136.8	HR				
labor labor	EE EE	Barrie B. Walden Jonathan C. Howland	3.8 3.8	136.8	HR HR				
labor labor	EE	Barrie B. Walden Jonathan C. Howland	3.8	136.8	HR				
labor labor labor	EE EE EE	Barrie B. Walden Jonathan C. Howland Lane J. Abrams	3.8 3.8 3.8	136.8 136.8 136.8	HR HR HR				
labor labor labor labor	EE EE EE	Barrie B. Walden Jonathan C. Howland Lane J. Abrams Donald B. Peters	3.8 3.8 3.8 3.8	136.8 136.8 136.8	HR HR HR				
labor labor labor labor	EE EE EE EE	Barrie B. Walden Jonathan C. Howland Lane J. Abrams Donald B. Peters	3.8 3.8 3.8 3.8 3.8	136.8 136.8 136.8	HR HR HR HR				
labor labor labor labor	EE EE EE EE	Barrie B. Walden Jonathan C. Howland Lane J. Abrams Donald B. Peters	3.8 3.8 3.8 3.8	136.8 136.8 136.8 136.8 0	HR HR HR HR HR				
labor labor labor labor	EE EE EE EE	Barrie B. Walden Jonathan C. Howland Lane J. Abrams Donald B. Peters	3.8 3.8 3.8 3.8	136.8 136.8 136.8 136.8 0 0	HR HR HR HR HR				
labor labor labor labor	EE EE EE EE	Barrie B. Walden Jonathan C. Howland Lane J. Abrams Donald B. Peters Subtotal Labor:	3.8 3.8 3.8 3.8	136.8 136.8 136.8 136.8 0 0 821	HR HR HR HR HR HR		\$ 126,955.87		
labor labor labor labor Expenses: M	EE EE EE EE feals, Travel J	Barrie B. Walden Jonathan C. Howland Lane J. Abrams Donald B. Peters Subtotal Labor: Domestic/International, Equipment, S	3.8 3.8 3.8 3.8 3.8	136.8 136.8 136.8 136.8 0 0 <b>821</b> ckroom	HR HR HR HR HR Supplies, O	Putside Serv	\$ 126,955.87 rices, Consulting	g Services, Sh	ipping & Postage, Subcontracts,
labor labor labor labor Expenses: M Computer S	EE EE EE EE Ieals, Travel 1	Barrie B. Walden Jonathan C. Howland Lane J. Abrams Donald B. Peters Subtotal Labor: Domestic/International, Equipment, S ir & Maintenance, Communication.	3.8 3.8 3.8 3.8 .upplies, Sto	136.8 136.8 136.8 136.8 0 0 821 ckroom	HR HR HR HR HR Supplies, O	Putside Serv	\$ 126,955.87 rices, Consulting	g Services, Sh	ipping & Postage, Subcontracts,
labor labor labor Expenses: N Computer S	EE EE EE EE feals, Travel 1 oftware, Repa	Barrie B. Walden Jonathan C. Howland Lane J. Abrams Donald B. Peters Subtotal Labor: Domestic/International, Equipment, S ir & Maintenance, Communication.	3.8 3.8 3.8 3.8 3.8 upplies, Sto	136.8 136.8 136.8 0 0 821 ckroom	HR HR HR HR HR Supplies, O	utside Serv	\$ <b>126,955.87</b> rices, Consulting	g Services, Sh	ipping & Postage, Subcontracts,
labor labor labor labor Expenses: M Computer S	EE EE EE feals, Travel 1 oftware, Repa	Barrie B. Walden Jonathan C. Howland Lane J. Abrams Donald B. Peters Subtotal Labor: Domestic/International, Equipment, S ir & Maintenance, Communication.	3.8 3.8 3.8 3.8 upplies, Sto	136.8 136.8 136.8 0 0 0 821 ckroom	HR HR HR HR HR Supplies, O	Putside Serv	\$ 126,955.87 vices, Consulting \$ -	g Services, Sł	ipping & Postage, Subcontracts,
labor labor labor labor Expenses: N Computer S	EE EE EE Ieals, Travel I oftware, Repa	Barrie B. Walden Jonathan C. Howland Lane J. Abrams Donald B. Peters Subtotal Labor: Domestic/International, Equipment, S ir & Maintenance, Communication.	3.8 3.8 3.8 3.8 upplies, Sto	136.8 136.8 136.8 0 0 821 ckroom	HR HR HR HR HR Supplies, O	Putside Serv	\$ 126,955.87 ices, Consulting \$ - \$ -	g Services, Sł	ipping & Postage, Subcontracts,
labor labor labor Expenses: N Computer S	EE EE EE Ieals, Travel 1 oftware, Repa	Barrie B. Walden Jonathan C. Howland Lane J. Abrams Donald B. Peters Subtotal Labor: Domestic/International, Equipment, S ir & Maintenance, Communication.	3.8 3.8 3.8 3.8 3.8	136.8 136.8 136.8 136.8 0 0 821 cckroom	HR HR HR HR HR Supplies, O	Dutside Serv	\$ 126,955.87 rices, Consulting \$ - \$ - \$ - \$ -	g Services, Sh	ipping & Postage, Subcontracts,
labor labor labor Expenses: N Computer S	EE EE EE EE feals, Travel 1 oftware, Repa	Barrie B. Walden Jonathan C. Howland Lane J. Abrams Donald B. Peters Subtotal Labor: Domestic/International, Equipment, S ir & Maintenance, Communication. Subtotal Expense:	3.8 3.8 3.8 3.8 upplies, Sto	136.8 136.8 136.8 0 0 821 ckroom	HR HR HR HR HR Supplies, O	Dutside Serv	\$ 126,955.87 rices, Consulting \$ - \$ - \$ - \$ - \$ - \$ -	g Services, Sh	ipping & Postage, Subcontracts,
labor labor labor Expenses: M Computer S	EE EE EE feals, Travel 1 oftware, Repa	Barrie B. Walden Jonathan C. Howland Lane J. Abrams Donald B. Peters  Subtotal Labor: Domestic/International, Equipment, S ir & Maintenance, Communication.  Subtotal Expense:	3.8 3.8 3.8 3.8 upplies, Sto	136.8 136.8 136.8 136.8 0 0 821 ckroom	HR HR HR HR HR Supplies, O	Putside Serv	\$ 126,955.87 rices, Consulting \$ - \$ - \$ - \$ - \$ - \$ -	g Services, Sh	ipping & Postage, Subcontracts,
labor labor labor labor Expenses: M Computer S	EE EE EE Ieals, Travel 1 oftware, Repa	Barrie B. Walden Jonathan C. Howland Lane J. Abrams Donald B. Peters  Subtotal Labor: Domestic/International, Equipment, S ir & Maintenance, Communication.  Subtotal Expense:	3.8 3.8 3.8 3.8 upplies, Sto	136.8 136.8 136.8 0 0 821 ckroom	HR HR HR HR Supplies, O	Putside Serv	\$ 126,955.87 rices, Consulting \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ -	g Services, Sh	ipping & Postage, Subcontracts,

2	Project:	New Alvin:	Design and Fab (83340908)	Work Package:	003 AB	S Certifica	tion (Option A,B	,D)	Technical Lead:	Anthony P. Tarantino	
Do pr su	escription oject. Thi bmissions	n: This work is includes me s. This task in	package includes all work required to etings with ABS and effort required to neludes any billing by ABS engineering	o support ve to generate a ng and surve	hicle clas all reports eying grou	sification of and informulation of a single statements of a single statement of a single statement of a single single statement of a	during the prelimi nation required b y WHOI labor re	nary design, fina y the ABS Class quired to Classif	al design, pro dification Plan y the vehicle.	curement & overhaul phases of the including all drafts and final	
в	asis of 1	Estimate			*assume	s 1/2 time					-
A	ctivity ID	Project Phase	Description	Man Wks	Most Likely (Days)					Comments	
01	25	PD	Draft/Final ABS Certification Plan		40					ABS Approval needed by: 1 May 2010	A,]
01	40	FD	Draft/Final Existing Equip Group		40					ABS Approval needed by: 1 Sep 10	
90	00	FD	Draft/Final General Group		40					ABS Approval needed by: 1 Sep 10	
90	40	FD	Draft/Final Mech Equip Group		40					ABS Approval needed by: 1 March 10	
90	80	FD	Draft/Final Pressure Vessel Group, Power Bottle		40					ABS Approval needed by: 1 Sep 10	
?		FD	Draft/Final Pressure Vessel Group, Data Bottle		40					ABS Approval needed by: 1 Sep 10	
?		FD	Draft/Final Pressure Vessel Group, Motor Control Bottle		40					ABS Approval needed by: 1 Sep 10	
?		FD	Draft/Final Pressure Vessel Group, Implodable Volumes		40					ABS Approval needed by: 1 Sep 10	
91	20	FD	Draft/Final Ballast Group, Variable Ballast System		40					ABS Approval needed by: 1 March 10	
91	20	FD	Draft/Final Ballast Group, Main Balast System		40					ABS Approval needed by: 1 March 10	
91	20	FD	Draft/Final Ballast Group, Syntactic Foam		40					ABS Approval needed by: 1 March 10	
91	60	FD	Draft/Final Elec Installation Group		40					ABS Approval needed by: 1 March 10	
92	00	FD	Draft/Final Emergency Sys Group		40					ABS Approval needed by: 1 Sep 10	-
93	20	FD	Draft/Final Life Support Group		40					ABS Approval needed by: 1 Sep 10	_
93	60	FD	Group		40					ABS Approval needed by: 1 Sep 10	-
94	00	FD	Draft/Final Manuals Group		120					ABS Approval needed by: 1 Sep 10	
					0						-
			Subtotal:	0							
(	Object Code	Type of Etimate	Item	Man Wks	Qty	Unit	Unit Rate	Cost		Pricing Assumptions	]
lal	oor	EE	Systems Engineer	446.4	3571.2	HR	\$ 100.00	\$ 357,120.00		8 hr/day	
					0	HR		s -			
Еx	penses: N	Meals, Travel	Subtotal Labor: Domestic/International, Equipment, S	Supplies, St	3,571 ockroom	Supplies, (	Dutside Services,	\$ 357,120.00 Consulting Serv	rices, Shippin	g & Postage, Subcontracts, Computer	
Sc	ftware, R	Repair & Maii	ntenance, Communication.					-			+
ts	heontrac	EE	ABS Certification Agency		1	LS	\$ 200,000.00	\$ 200,000.00		from LM estimate	+
ts	ocontrac	EE	Gloston		1	LS	\$ 50,000.00	\$ 50,000.00		engineer	4
			Subtotal Expense:		2			\$ 250,000.00			4
							Total:	\$ 607,120.00			
N	otes: Co	mpiling data	, writing report, submitting it and 1	esolving is	sues (sub	mittal pro	cess with ABS).				1

-	В	С	D	E	F	G	Н		I	J Tochnic-1	К	L
2	Project:	New Alvin:	Design and Fab (83340908)	Package:	A00 Gene	ral Info/Sy	stem Engineer	ing(O	ption B)	Lead:	Lane J. Abrams	_
4	Description: The covers design a and low power connector list a required to gen test all component	This work pac and build of th distribution s and vehicle wi herate ABS sup- nents of functi	kage includes all electrical engineeri e pilots joystick, control hardware, s ystem with circuit protection analysi ring schematic and design of ground pport documentation to be included i onal system and spares.	ng, planning submarine s is and comp d and leak d in ABS class	g, prototypi pecific cont onent selec etection sys sification su	ng and doc trols and ar tion. This stems, eme abmission.	with the second	quirec analys ll effc plan a ude ar	to generate a to sis required to de orts required to r and junction box ny procurement	op level elect evelop a syst naintain inst allocation. costs and fal	rical system design. This WP effort em architecture including data, high rument list, I/O list, wire list, cable and The work package includes work prication effort required to build and	
6	Basis of Est	timate			*assumes	1/2 time						-
7	Activity ID	Project Phase	Description	LOE Driving Duration	Duration (Days)						Comments	
8	5670	PD	Develop Prelim Elec Architecture	0	0						Minor feature changes. (COMPLETE)	А
9	5670	PD	Develop Prelim Elec Architecture	0	50						Minor feature changes. (COMPLETE)	B, C, D
10	5697	PD	Propulsion Control Architecture	0	10						COMPLETE	B, C, D
11	5730	PD	Complete Elec Architecture	0	1						COMPLETE	B, C, D
12	5682	FD	Monitoring Alarm Interface	0.5	5							B, C, D
13	5690	FD	Prototype Command Structure	4	40						Smooth interface development	B, C, D
14	5693	FD	Prototype Controls	4	40						Smooth interface development	B, C, D
15	5695	FD	Prototype Propulsion	1	10						In-shop. 1 week remaining effort	B, C, D
16	5698	FD	Hydraulic control Architecture	4	40							B, C, D
17	5735	FD	Complete Schematics & Specs	9	90							А
18	7285	FD	Weight & Balance	0	0							А
19 20					0							+
21			Subtotal:	22.5								
23	Object Code	Type of Etimate	Item	Man Wks	Qty	Unit	Unit Rate		Cost		Pricing Assumptions	]
24	labor	EE	Lane J. Abrams	23.6	849.6	HR					~ *	
25	labor	EE	Tom Lanagan	3	108	HR				5693		
26	labor	EE	Joshua A Eaton	2	72	HR				5682		1
27	labor	EE	Donald B Peters	5	180	HR				7285		+
					0	HR				,		1
28			Subtotal Labor:		1.210	IIK		\$	150.837.55			-
30	Expenses: Mea Software, Repa	uls, Travel Do air & Mainten	mestic/International, Equipment, Sup ance, Communication.	oplies, Stock	croom Supp	lies, Outsi	de Services, C	onsult	ing Services, Sh	iipping & Po	stage, Subcontracts, Computer	
31	Supplies	EE	Misc. Prototyping Bits		2	EA	\$ 2,000.00	\$	4,000.00	5693		В
32	Supplies	HD	Misc. Prototyping Bits		0	EA	\$ 5,000.00	\$	-	5690	(2) at \$5,000 - already purchased	В
33	Subcontracts	EE	Louis Whitcomb	160		HR	\$ 144.05	\$	23,048.00	5697	Subcontractor @ 4 man wks	В
34	Repair	EE	Pressure Tests		0	ea	\$ 1,200.00	\$	-			А
35								\$	-			
36 37			Subtotal Expense:	160	2			\$	27,048.00			+
38 58							Total	: \$	177,885.55			
[	Notes:											
40												
<u> </u>												

	В	C	D	E	F	G	Н	I	J	К	L
2	Project:	New Alvin:	Design and Fab (83340908)	Work Package:	A02 Sp	here & Att	achment (Options	A,B,D)	Technic	Donald B. Peters	_
4	Description: T integration requ SwRI sphere co	his work pack uired to genera osts and all out	age includes all engineering, planning ate an interface document indicating s tside services required to support the	g, prototypin ize and plac project.	ng and do ement of	cumentatio	on required to supp ags and hull to frar	port the SwRI sphere ne attachment point	e fabricati s on the p	on process including all interface and ersonnel sphere. This budget includes	
5	Basis of Est	imate			*assume	es 1/2 time					1
		Project			Most Likely						]
7	Activity ID	Phase	Description	Man Wks	(Days)					Comments	
8	7270	PD	Determine External Tabs & Lug Placement	4	40						A,B,D
9	7280	PD	Documentation	1	10					assume work for PDR is complete	A,B,D
10	7290	PD	Compile Mech PDR Documents Prepare Final Design	1	10						A,B,D
11	1002	FD	Documentation	1	20						A,B,D
12	5410	FAB	Construct Sphere	0	316						A,B,D
13	5447	FAB	Procure Attachments for Sphere	1	10						A,B,D
14	5440	FAB	Install Penetrator and Test Sphere	1	84						A,B,D
15	5470	FAB	Complete & Deliver Hull	0	54						A,B,D
16 17					0						
18			Subtotal:	9							
20	Object Code	Type of Etimate	Item	Man Wks	Qty	Unit	Unit Rate	Cost	ACTY ID	Pricing Assumptions	
21	labor	EE	Donald B. Peters	9	324	HR					-
22	labor	EE	Megan M. Carroll	3	108	HR			7280, 1002	2  wk = 80/1  wk = 40	
23					0	HR					
24					0	HR					
25					0	HR					
26					0	HR					
27			Subtotal Labor:		432			\$ 63,414.36			1
28	Expenses: Mea Repair & Main	ls, Travel Dor tenance, Com	nestic/International, Equipment, Supp munication.	olies, Stockr	oom Sup	plies, Outs	ide Services, Cons	sulting Services, Shi	pping & F	ostage, Subcontracts, Computer Software,	
29	Subcontracts	HD	SwRI		0	EA	\$ 6,762,041.21	\$ -		\$6,672,041 actual cost as of 09/30/09	_
30	Subcontracts	VQ	SwRI		1	EA	\$ 1,536,958.79	\$ 1,536,958.79		Balance of current contract	-
31	Subcontracts	EE	SwRI		1	EA	\$ 1,287,779.00	\$ 1,287,779.00		Vendor Provided Estimate	-
32	Subcontracts	HD	Perot Systems		0	LS	\$ 567,527.00	\$ -		\$567,527 actual cost as of 09/30/09	-
33	Subcontracts	VQ	Perot Systems		1	LS		\$ -			
34	Subcontracts	EE	Perot Systems		1	LS	\$ 198,874.76	\$ 198,874.76		Vendor Provided Estimate	-
35	Subcontracts	VQ	Control Solution: Ed Slate		1	EA	\$ 9,450.00	\$ 9,450.00			-
36	travel -dom	EE	Trip to Hydro Test Facility		1	EA	\$ 3,000.00	\$ 3,000.00		San Antonio, TX	
37					-			\$ -			-
38 39			Subtotal Expense:		6			\$ 3,036,062.55			+
40							Total:	\$ 3,099,476.91			<u> </u>
l	Notes:										
42											

H	В	С	D	E	F	G		Н		I	J	К	L
2	Project:	New Alvin	: Design and Fab (83340908)	Work Package:	A02-03	Penetrator	s (Opti	ion B and D)			Technical Lead:	Barrie B. Walden	_
	Description production	on: This work units. The W	package includes all engineering, pla /P included vendor site visits, procure	nning, and d ement of ver	ocument idor quot	ation requirations and	red to selecti	develop a pu on of a penet	rcha	ase specification or vendor. Thi	n and define a s WP include	a final test procedure for verification of s procurement of prototype copper and	
4	fiber penet	rators and pro	oduction units and effort to complete	final testing	to be per	formed by	WHO	ĺ.					
6	Basis of	Estimate			*assume	es 1/2 time							1
	Activity	Project			Most Likelv								
7	ID	Phase	Description	Man Wks	(Days)							Comments	1
8	1090	FD	Prepare Final Design and Specs	4.9	49							Includes ABS Comments	A,B,D
9	1160	FAB	Issue Purchase Order	1	10								A,B,D
10	1170	FAB	Vendor Evaluate Penetrators	0	20								A,B,D
11	1180	FAB	Vendor Manufacture Penetrator	0	88								A,B,D
12		FAB	Testing NRE	1	10								_
13		FAB	Testing Fiber	0.5	5								
14		FAB	Testing Copper	1.5	15								
15					0								
16													1
17			Subtotal:	8.9							0		 T
19	Object Code	Type of Etimate	Item	Man Wks	Qty	Unit	U	nit Rate		Cost	Apply to ACTY ID	Pricing Assumptions	ļ
20	labor	EE	Barrie B. Walden	3	108	HR							
21	labor	EE	Lane J. Abrams	1.4	50.4	HR					1090, NRE		
22	labor	EE	Joshua A. Eaton	4.5	162	HR					Fiber, Copper		
					0				¢				İ
23					0	HR			\$	-			1
24					0	HR			\$	-			-
25					0	HR			\$	-			
26	F		Subtotal Labor:	G L' G	320	0 1		<u> </u>	\$	41,267.27	G1 · · · 0		-
27	Expenses: Software, 1	Repair & Mai	ntenance, Communication.	Supplies, St	ockroom	Supplies,	Outsid	e Services, C	ons	ulting Services	, Shipping &	Postage, Subcontracts, Computer	
28	supplies	VQ	copper base, 1st article		1	EA	\$	16,887.00	\$	16,887.00		Kemlon	А
29	supplies	VQ	fiber base, 1st article		1	EA	\$	23,236.00	\$	23,236.00		Lancer	A
30	supplies	VQ	copper base		18	EA	\$	8,231.95	\$	148,175.10		Kemlon assumes (14) with (4) spare	B,D
31	supplies	VQ	fiber base		5	EA	\$	12,600.00	\$	63,000.00		Lancer (2) installed with (3) spare	B,D
32	supplies	EE	end caps		23	EA	\$	500.00	\$	11,500.00			B,D
33	supplies	VQ	SwRi		1	LS	\$	11,889.00	\$	11,889.00		Penetrator Housing Structural Analysis	B,D
34 35			Subtotal Expense:		49				\$	274,687.10			-
36								Total:	\$	315,954.37			
31	Notes:								_				1
1													
38													

Descriptio	n: This wo	rk package includes all engineering, p	lanning, pro	totyping	and docum	entation required	to design an erg	onomically c	orrect internal arrangement. This
includes al of a master mounting s birdcage ar	I LM contra r equipment studs that are nd internal a	ct services and any WHOI costs requ list (MEL), switch list and panel list a e needed to attach internal structure. ' rrangement components and spares.	ired to gener and all effort This will inc	rate intern s needed lude all V	nal mock-u l to generat WHOI proc	ps of sphere inter- e an interface doc surement costs and	nal hardware and ument for SwRI d fabrication effo	d components indicating the ort required to	s. Also included are WHOI maintenance e placement of personnel sphere o build and test the mock-up and actual
Basis of	Estimate		1	*assume	es 1/2 time		1		1
Activity	Project			Most Likely					
ID	Phase	Description	Man Wks	(Days)					Comments
7320	PD	Evaluate LM CAD Designs	5	50					Work with LM expert to incorporate initial designs, provide feedback and make changes based on feedback
7220	DD	Constant Mark on Comparis	14	140					Construct initial mockup layout design and modify based on LM and science
7330	PD	Construct Mock-up Components	14	140					user input to final configuration
1050	FD		5	30					Progues final internal arrangement
3100	FAB	Procure Internal Arrangement	1	10					material and provide construction oversight
3100	FΔB	Fabricate Internal Arrangement	6	60					Fabricate final 6500m hull internal
5100	TAD	rabileate internal Arrangement	0	0					
		Subtotal	29						
Object Code	Type of Etimate	Item	25 Man Wks	Otv	Unit	Unit Rate	Cost	Apply to	Pricing Assumptions
Cour	Etimate	ittiii	Ivian vv Ko	20	Cint	Cint Rate	Cust	ACTTID	
labor	EE	Barrie B. Walden	2	72	HR				Technical Lead WHOI mockup modeling in
									a subservation south TM see along heads
labor	EE	Griffith Outlaw	6	216	HR				conjunction with LM, mockup build assistance
labor	EE	Griffith Outlaw	6	216	HR				conjunction with LM, mockup build assistance Primary interaction with LM erronomics expert initial mockup build
labor labor	EE	Griffith Outlaw J. Pat Hickey	6 8	216 288	HR HR				conjunction with LM, mockup build assistance Primary interaction with LM ergonomics expert, initial mockup build
labor labor labor	EE EE EE	Griffith Outlaw J. Pat Hickey Rodney M. Catanach	6 8 3	216 288 108	HR HR HR				conjunction with LM, mockup build assistance Primary interaction with LM ergonomics expert, initial mockup build Construction lead for 6500M hull build Structural evaluation of internal tab
labor labor labor labor	EE EE EE	Griffith Outlaw J. Pat Hickey Rodney M. Catanach Donald B. Peters	6 8 3 2	216 288 108 72	HR HR HR				conjunction with LM, mockup build assistance Primary interaction with LM ergonomics expert, initial mockup build Construction lead for 6500M hull build Structural evaluation of internal tab locations working in conjunction with SWRI
labor labor labor labor labor	EE EE EE EE	Griffith Outlaw J. Pat Hickey Rodney M. Catanach Donald B. Peters ALOPS	6 8 3 2 5	216 288 108 72 180	HR HR HR HR				conjunction with LM, mockup build assistance Primary interaction with LM ergonomics expert, initial mockup build Construction lead for 6500M hull build Structural evaluation of internal tab locations working in conjunction with SWRI Construction lead for 6500M hull build
labor labor labor labor Expenses: Software	EE EE EE EE Meals, Trav Repair & M	Griffith Outlaw J. Pat Hickey Rodney M. Catanach Donald B. Peters ALOPS Subtotal Labor: el Domestic/International, Equipment aintenance. Communication	6 8 3 2 5 5	216 288 108 72 180 <b>936</b> Stockroom	HR HR HR HR m Supplies	, Outside Services	\$ 119,136.24 s, Consulting Ser	vices, Shippi	conjunction with LM, mockup build assistance Primary interaction with LM ergonomics expert, initial mockup build Construction lead for 6500M hull build Structural evaluation of internal tab locations working in conjunction with SWRI Construction lead for 6500M hull build ing & Postage, Subcontracts, Computer
labor labor labor labor Expenses: Software, I Supplies	EE EE EE EE Meals, Trav Repair & M	Griffith Outlaw J. Pat Hickey Rodney M. Catanach Donald B. Peters ALOPS Subtotal Labor: rel Domestic/International, Equipment aintenance, Communication. Internal parts - design & fabrication	6 8 3 2 5 ;, Supplies, S	216 288 108 72 180 <b>936</b> Stockroot	HR HR HR HR m Supplies	Outside Services	\$ 119,136.24 , Consulting Set \$ -	vices, Shippi	conjunction with LM, mockup build assistance Primary interaction with LM ergonomics expert, initial mockup build Construction lead for 6500M hull build Structural evaluation of internal tab locations working in conjunction with SWRI Construction lead for 6500M hull build ing & Postage, Subcontracts, Computer Lockheed Martin design \$181,315 (PO# D100126-0001 00122-001)
labor labor labor labor Expenses: Software, I Supplies	EE EE EE EE Meals, Trav Repair & M	Griffith Outlaw J. Pat Hickey Rodney M. Catanach Donald B. Peters ALOPS Subtotal Labor: rel Domestic/International, Equipment aintenance, Communication. Internal parts - design & fabrication	6 8 3 2 5 5 5 5 5	216 288 108 72 180 936 Stockroon	HR HR HR HR MR LS	. 0utside Services	\$ 119,136.24 5, Consulting Set 5	vices, Shippi	conjunction with LM, mockup build assistance Primary interaction with LM ergonomics expert, initial mockup build Construction lead for 6500M hull build Structural evaluation of internal tab locations working in conjunction with SWRI Construction lead for 6500M hull build ing & Postage, Subcontracts, Computer Lockheed Martin design \$181,315 (PO# D100126-0001 00122-001) Remainder of Lockheed Martin design
labor labor labor labor Expenses: Software, I Supplies Supplies repair	EE EE EE EE Meals, Traw Repair & M HD VQ EE	Griffith Outlaw J. Pat Hickey Rodney M. Catanach Donald B. Peters ALOPS Subtotal Labor: rel Domestic/International, Equipment aintenance, Communication. Internal parts - design & fabrication Internal parts - design & fabrication WHOI machine shop	6 8 3 2 5 ;, Supplies, S	216 288 108 72 180 <b>936</b> Stockroon 0 1 240	HR HR HR HR MR LS LS hrs	0utside Services \$ 14,090.00 \$ 107,014.00 \$ 55.00	\$ 119,136.24 s, Consulting Set \$ - \$ 107,014.00 \$ 13,200.00	vices, Shippi	conjunction with LM, mockup build assistance Primary interaction with LM ergonomics expert, initial mockup build Construction lead for 6500M hull build Structural evaluation of internal tab locations working in conjunction with SWRI Construction lead for 6500M hull build ing & Postage, Subcontracts, Computer Lockheed Martin design \$181,315 (PO# D100126-0001 00122-001) Remainder of Lockheed Martin design \$181,315
labor labor labor labor labor Expenses: Software, I Supplies Supplies repair Supplies	EE EE EE EE Meals, Trav Repair & M HD VQ EE EE	Griffith Outlaw J. Pat Hickey Rodney M. Catanach Donald B. Peters ALOPS Subtotal Labor: rel Domestic/International, Equipment aintenance, Communication. Internal parts - design & fabrication Internal parts - design & fabrication WHOI machine shop materials	6 8 3 2 5 , Supplies, S	216 288 108 72 180 936 Stockroon 0 1 240 1	HR HR HR HR MR HR LS LS LS hrs ea	Coutside Services \$ 14,090.00 \$ 107,014.00 \$ 55.00 \$ 10.000 00	\$ 119,136.24 , Consulting Set \$ - \$ 107,014.00 \$ 13,200.00 \$ 10,000 00	vices, Shippi	conjunction with LM, mockup build assistance Primary interaction with LM ergonomics expert, initial mockup build Construction lead for 6500M hull build Structural evaluation of internal tab locations working in conjunction with SWRI Construction lead for 6500M hull build ing & Postage, Subcontracts, Computer Lockheed Martin design \$181,315 (PO# D100126-0001 00122-001) Remainder of Lockheed Martin design \$181,315 aluminum, angles, plastic cushions
labor labor labor labor labor Expenses: Software, l Supplies repair Supplies	EE EE EE Meals, Trav Repair & M HD VQ EE EE	Griffith Outlaw J. Pat Hickey Rodney M. Catanach Donald B. Peters ALOPS Subtotal Labor: rel Domestic/International, Equipment aintenance, Communication. Internal parts - design & fabrication Internal parts - design & fabrication WHOI machine shop materials	6 8 3 2 5 5 5 5 5 5 5 5	216 288 108 72 180 <b>936</b> Stockroot 0 1 240 1	HR HR HR HR m Supplies LS LS hrs ea	Outside Services           \$ 14,090.00           \$ 107,014.00           \$ 55.00           \$ 10,000.00	\$ 119,136.24 5, Consulting Ser \$ \$ 107,014.00 \$ 13,200.00 \$ 10,000.00	rvices, Shippi	conjunction with LM, mockup build assistance Primary interaction with LM ergonomics expert, initial mockup build Construction lead for 6500M hull build Structural evaluation of internal tab locations working in conjunction with SWRI Construction lead for 6500M hull build ing & Postage, Subcontracts, Computer Lockheed Martin design \$181,315 (PO# D100126-0001 00122-001) Remainder of Lockheed Martin design \$181,315 aluminum, angles, plastic, cushions
labor labor labor labor labor Expenses: Software, 1 Supplies Supplies repair Supplies stockroom	EE EE EE Meals, Trav Repair & M HD VQ EE EE EE	Griffith Outlaw J. Pat Hickey Rodney M. Catanach Donald B. Peters ALOPS Subtotal Labor: rel Domestic/International, Equipment aintenance, Communication. Internal parts - design & fabrication Internal parts - design & fabrication WHOI machine shop materials stock room	6 8 3 2 5 5 5 5 5 5	216 288 108 72 180 <b>936</b> Stockroon 0 1 240 1 1	HR HR HR HR m Supplies LS LS hrs ea ea	Outside Services \$ 14,090.00 \$ 107,014.00 \$ 55.00 \$ 10,000.00 \$ 2,000.00	\$ 119,136.24 , Consulting Set \$ - \$ 107,014.00 \$ 13,200.00 \$ 10,000.00 \$ 2,000.00	vices, Shippi	conjunction with LM, mockup build assistance Primary interaction with LM ergonomics expert, initial mockup build Construction lead for 6500M hull build Structural evaluation of internal tab locations working in conjunction with SWRI Construction lead for 6500M hull build ing & Postage, Subcontracts, Computer Lockheed Martin design \$181,315 (PO# D100126-0001 00122-001) Remainder of Lockheed Martin design \$181,315 aluminum, angles, plastic, cushions
labor labor labor labor labor Expenses: Software, 1 Supplies Supplies repair Supplies stockroom	EE EE EE Meals, Trav Repair & M HD VQ EE EE EE EE	Griffith Outlaw J. Pat Hickey Rodney M. Catanach Donald B. Peters ALOPS Subtotal Labor: rel Domestic/International, Equipment aintenance, Communication. Internal parts - design & fabrication Internal parts - design & fabrication WHOI machine shop materials stock room	6 8 3 2 5 5 4, Supplies, S	216 288 108 72 180 <b>936</b> Stockroot 0 1 240 1 1	HR HR HR HR m Supplies LS LS hrs ea ea	Outside Services           \$ 14,090.00           \$ 107,014.00           \$ 55.00           \$ 10,000.00           \$ 2,000.00	\$ 119,136.24 5, Consulting Ser \$ - \$ 107,014.00 \$ 13,200.00 \$ 10,000.00 \$ 2,000.00 \$ -	rvices, Shippi	conjunction with LM, mockup build assistance Primary interaction with LM ergonomics expert, initial mockup build Construction lead for 6500M hull build Structural evaluation of internal tab locations working in conjunction with SWRI Construction lead for 6500M hull build ing & Postage, Subcontracts, Computer Lockheed Martin design \$181,315 (PO# D100126-0001 00122-001) Remainder of Lockheed Martin design \$181,315 aluminum, angles, plastic, cushions
labor labor labor labor labor Expenses: Software, 1 Supplies Supplies supplies stockroom	EE EE EE EE Meals, Trav Repair & M HD VQ EE EE EE EE	Griffith Outlaw J. Pat Hickey Rodney M. Catanach Donald B. Peters ALOPS Subtotal Labor: el Domestic/International, Equipment aintenance, Communication. Internal parts - design & fabrication Internal parts - design & fabrication WHOI machine shop materials stock room Subtotal Evnesed	6 8 3 2 5 5 5 5 5 5	216 288 108 72 180 936 Stockroon 0 1 240 1 1 240 1 240	HR HR HR HR MR HR HR LS LS LS hrs ea ea	Outside Services         \$ 14,090.00         \$ 107,014.00         \$ 55.00         \$ 10,000.00         \$ 2,000.00	\$ 119,136.24 5, Consulting Set \$ - \$ 107,014.00 \$ 13,200.00 \$ 10,000.00 \$ 2,000.00 \$ - \$ - \$ 132,214.00	vices, Shippi	conjunction with LM, mockup build assistance Primary interaction with LM ergonomics expert, initial mockup build Construction lead for 6500M hull build Structural evaluation of internal tab locations working in conjunction with SWRI Construction lead for 6500M hull build ing & Postage, Subcontracts, Computer Lockheed Martin design \$181,315 (PO# D100126-0001 00122-001) Remainder of Lockheed Martin design \$181,315 aluminum, angles, plastic, cushions
labor labor labor labor labor Expenses: Software, 1 Supplies Supplies supplies stockroom	EE EE EE EE EE Heals, Trav Repair & M HD VQ EE EE EE EE	Griffith Outlaw J. Pat Hickey Rodney M. Catanach Donald B. Peters ALOPS Subtotal Labor: rel Domestic/International, Equipment aintenance, Communication. Internal parts - design & fabrication Internal parts - design & fabrication WHOI machine shop materials stock room Subtotal Expense:	6 8 3 2 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	216 288 108 72 180 936 Stockroon 0 1 240 1 1 240 1 1 243	HR HR HR HR MR HR HR LS LS LS hrs ea ea	Outside Services         \$ 14,090.00         \$ 107,014.00         \$ 55.00         \$ 10,000.00         \$ 2,000.00	\$ 119,136.24 5, Consulting Ser \$ - \$ 107,014.00 \$ 13,200.00 \$ 10,000.00 \$ 2,000.00 \$ - \$ - \$ 132,214.00	vices, Shippi	conjunction with LM, mockup build assistance Primary interaction with LM ergonomics expert, initial mockup build Construction lead for 6500M hull build Structural evaluation of internal tab locations working in conjunction with SWRI Construction lead for 6500M hull build ing & Postage, Subcontracts, Computer Lockheed Martin design \$181,315 (PO# D100126-0001 00122-001) Remainder of Lockheed Martin design \$181,315 aluminum, angles, plastic, cushions

	В	С	D	E	F	G	н	1	J	К	L
2	Project:	New Alvin	: Design and Fab (83340908)	Work Package:	A02-06E	Internal A	rrangements (Op	otion B,D)	Technical Lead:	Lane J. Abrams	_
4	Description This will in	n: This work nclude all WH	package includes all engineering, plan IOI procurement costs and fabrication	nning, protot effort requir	typing and red to build	documenta d and test c	ation required to components and	design internal p spares.	panels, peneti	rator enclosures and wiring harness.	]
5	Basis of	Estimate			*assumes	1/2 time					_
7	Activity ID	Project Phase	Description	LOE Driving Duration	Most Likely (Days)					Comments	
8	1057	FD	Prepare Panel Schematic	4	40						A,B,D
9	1058	FD	Design Panels	4	40						A,B,D
10	1059	FD	Design Penetrator Enclosure	1	10						A,B,D
11	0162	FAB	Procure/Fabricate Wire Harness	3	30						A,B,D
12					0						_
14			Subtotal:	12							1
15	Object Code	Type of Etimate	Item	Man Wks	Qty	Unit	Unit Rate	Cost	Apply to ACTY ID	Pricing Assumptions	]
17	labor	EE	Lane J. Abrams	4	144	HR					
18	labor	EE	Mechanical Engineer	4	144	HR				estimate 6 panels @ 3 days each	]
19	labor	EE	Mechanical Engineer	1	36	HR					_
20	labor	EE	Electrical Engineer	3	108	HR					_
21					0	HR					
22			Subtotal Labor:		432			\$ 46,925.28			
23	Expenses: Software, 1	Meals, Travel Repair & Mai	l Domestic/International, Equipment, antenance, Communication.	Supplies, Sto	ockroom S	upplies, O	utside Services,	Consulting Serv	ices, Shipping	g & Postage, Subcontracts, Computer	
24	equip	EE	Panels		6	EA	\$ 500.00	\$ 3,000.00			
25	equip	EE	Penetrator Enclosures		2	EA	\$ 1,000.00	\$ 2,000.00			
26	Supplies	EE	Wires & Connection		1	EA	\$ 2,000.00	\$ 2,000.00			
27	Supplies	EE	Power Supply		25	EA	\$ 2,500.00	\$ 62,500.00			B,D
28								\$ -			
29 30			Subtotal Expense:	0	34			\$ 69,500.00			_
31							Total:	\$ 116,425.28			
Ē	Notes:										7
33											

	C	D	E	F	G	Н	1	J	К	L
2 Project:	New Alvin	: Design and Fab (83340908)	Work Package:	A04 Fra	me & Stru	acture (Options A	A,B,D)	Technical Lead:	Donald B. Peters	_
Description: and design of rules and guid vendor quotat	This work pa new structure elines. All de ions required	ckage includes all engineering, planni required to attach the new personnel stail design, external services, fabricat to identify and select a fabrication and	ng, prototyp sphere and ion cost and d weld shop	bing and d all subsys l unit test are inclu	documenta stems. The ing is inclu ded in this	tion required to e work package i uded. Vendor sit s WP.	design the vehic ncludes structur te visits, develop	ele frame inclu al analysis an oment of purc	ading modifications to the existing frame d verification of compliance with ABS hase specifications and procurement of	,
Basis of Es	timate			*assume	es 1/2 time					-
Activity ID	Project Phase	Description	Man Wks	Most Likely (Days)					Comments	]
3 7340	PD	Prepare Design & Calculations for Frame Mods	1	10						A,B,I
7350	PD	Prepare Preliminary Design Documentation	1	10					assume work for PDR is complete	A,B,I
0310	FD	Prepare Final Design Documentation	2	20						A,B,I
1 0320	FAB	Procure Frame & Components	1	10						A,B,I
2 5500	OV	Inspect, Modify and Weld Frame	0	10						A,B,I
3				0						-
4				0						-
5				0						-
7		Subtotal:	5							
9 Object Code	Type of Etimate	Item	Man Wks	Qty	Unit	Unit Rate	Cost	Apply to ACTY ID	Pricing Assumptions	
₀ labor	EE	Donald B. Peters	5	180	HR					
1					HR					_
2				0	HR					
3 Expenses: Me	als, Travel Do	Subtotal Labor: omestic/International, Equipment, Sup	plies, Stock	180 troom Su	pplies, Ou	tside Services, C	<b>\$ 28,360.80</b> Consulting Service	ces, Shipping	& Postage, Subcontracts, Computer	-
4 Software, Rep	air & Mainte	nance, Communication.								-
5 subcontracts	VQ	frame modifications		1	EA	\$ 116,000.00	\$ 116,000.00		TiFab - material & fabrication	A,B,I
subcontracts	VQ	fabrication plan		1	EA	\$ 4,000.00	\$ 4,000.00		TiFab - if ABS requires	A,B,I
					ΕA	\$ 2,500,00	\$ 2,500,00			A.B.I
7 supplies	EE	misc mounting brackets		1	LA	\$ 2,000.00				T ´ ´
7 supplies 8 repair	EE EE	misc mounting brackets WHOI machine shop		80	hrs	\$ 55.00	\$ 4,400.00			A,B,I
7 supplies 8 repair 9	EE	misc mounting brackets WHOI machine shop Subtotal Expanse:		80	hrs	\$ 55.00	\$ 4,400.00 \$ - \$ 126,900.00			A,B,I
7 supplies 8 repair 9	EE	misc mounting brackets WHOI machine shop Subtotal Expense:		1 80 83	hrs	\$ 55.00	\$ 4,400.00 \$ - \$ 126,900.00			A,B,I
7 supplies 8 repair 9 0 1 1 2 2 3 Notes: TiFal	EE EE	misc mounting brackets WHOI machine shop Subtotal Expense:	y fahricati	1 80 83	hrs K). fabric	\$ 55.00	\$ 4,400.00 \$ - \$ 126,900.00 \$ 155,260.80 D if ABS require			A,B,I
7 supplies 8 repair 9 0 1 2 7 Notes: TiFah	EE EE - based on j	misc mounting brackets WHOI machine shop Subtotal Expense: preliminary design only. material &	k fabricatio	1 80 83 on (\$116	hrs K), fabric	\$ 55.00 Total:	\$ 4,400.00 \$ - \$ 126,900.00 \$ 155,260.80 .) if ABS require	res.		A,B,I

-	В	С	D	E	F	G	Н	I	J	к	L
2	Project:	New Alvin:	Design and Fab (83340908)	Work Package:	A06 Fixed	l Buoyancy	Assemblies (Optic	on B)	Technical Lead:	Barrie B. Walden	_
4	Description: T minimum foam determined as w This will includ	This work pac a density requi well as identif de any procure	kage includes all engineering, plannin irements, foam qualification test proc ication of shaping facility. The work ment costs and fabrication effort req	ng, and docu edures and a package inc uired to buil	mentation accurate est ludes work d and test a	required to imates of c required t all compon	develop a syntactic juantity needed. Fo o generate ABS sup ents of functional sy	e foam purchase pam block size, port documenta ystem and spare	specification shape, placem ation to be inc s.	. This includes efforts to determine tent and attachment method should be luded in ABS classification submission.	
6	Basis of Est	timate	1	1	*assumes	1/2 time	1			1	7
7	Activity ID	Project Phase	Description	Man Wks	Most Likely (Days)					Comments	
8		FAB	Pressure Test Sample	3	30						_
9	1190	FD	Prepare Purchase & Test Spec	2	20					spread over 2 months	
10	1220	FD	Mod & Submit Foam Spec	4	40					includes respond to ABS and WHOI/ABS resolve Issues	
11	7360	PD	Determine Shape and Location of Fo	4	40						_
12	7370	PD	Calculate adjustable fixed ballast we	- 1	10						_
13	7380	PD	Prepare Preliminary Design	1	10						_
14	1100	FD	Prepare Final Design	2	20						
15	1260	FAB	Procure Syntactic Foam Vendor	1	10						-
16	1270	FAB	Vendor Qualify Foam	0	55					2 1/2 months qualification testing	-
17	1280	FAB	Vendor Manufacture Foam	0	250					12 months delivery (380 ft3)	_
18	1290	FAB	Vendor Shape Foam	0	250					12 months delivery (380 ft3)	_
19 20		FAB	Vehicle Foam Production Test	5	50						-
21			Subtotal:	23							
22	Object Code	Type of Etimate	Item	Man Wks	Qty	Unit	Unit Rate	Cost	Apply to ACTY ID	Pricing Assumptions	]
24	labor	EE	Barrie B. Walden	5	180	HR					
25	labor	EE	Donald B. Peters	4	144	HR			7360,7370, 7380,1240	40 hrs per acty	
26	labor	EE	Megan M. Carroll	6	216	HR			7380,1100	20 hrs - 80 hrs	
27	labor	EE	Griner	8	288	HR				pressure testing effort	
28					0	HR					
29	EMar	la Traval Dar	Subtotal Labor:	23	828	line Outsid	- Semiere Consult	\$ 109,679	inning & Dag	tere Scherntrete Committee Software	
30	Repair & Main	itenance, Com	munication.	piles, stocki	ooni Suppi	lies, Outsia	le Services, Consum	ing services, si	npping & Fos		_
31	supplies	VQ	Foam for 6500m - Forebody		200	ft3	\$ 8,156	\$ 1,631,220	1280		В
32	supplies	VQ	Foam for 6500m - Midbody		103	ft3	\$ 8,156	<u>\$ 840</u> ,078	1280		в
33	supplies	VQ	Foam for 6500m - Tail Block		64	ft3	\$ 8,156	\$ 521,990	1280		в
34	supplies	EE	1st Article Qualification Testing		1	LS	\$ 100,000	\$ 100,000			A,B,D
35	supplies	EE	pressure tests		50	EA	\$ 200	\$ 10,000			A,B,D
36 37			Subtotal Expense:		418			\$ 3,103,288			-
38							Total:	\$ 3,212,967			
	Notos: 35lb fo	oam, manufa	ctured and shaped. Assumes 1/2 p	urchased fo	am is was	ted. Bond	ed & shaping is =	1.5x installed			1
	Notes. 5510 10	,	F								
	100cs. 5510 10	·····, ·····									

-	В	С	D	E	F	G	Н	I	J	К	L
2	Project:	New	Alvin: Design and Fab (83340908)	Work Package:	A08 Sk	ins, Fairing	s and Sail (Opti	on B)	Technical Lead:	Rodney M. Catanach	_
4	Descriptio are include fabrication	n: This d in thi costs, i	work package includes all engineering, pl s WP including vendor site visits, develop unit testing and WHOI rework is included.	anning, and nent of purc	documer hase spe	ntation requestions	ired to develop and procuremer	skin, bathtub an at of vendor quo	d sail designs tations. All d	<ul> <li>Efforts to select a fabrication shop lesign, external labor and services,</li> </ul>	
5	Basis of	Estin	nate		*assum	es 1/2 time					
0	Dubis of	Proje			Most						
7	Activity ID	ct Phase	Description	Man Wks	Likely (Days)					Comments	
8	7390	PD	Determine Shape of Skins, Fairings & Sails	3	30						A,B,D
9	7660	PD	Prepare Preliminary Design Documentation	1	10						A,B,D
10	1200	FD	Prepare Final Design Documentation	4	40						A,B,D
11	3400	FAB	Procure	1	10						A,B,D
12		FAB	Fabricate	0	60						A,B,D
13		ov	Assemble and Fit-up Skins, sail & bathtub	4	40						A,B,D
14					0						4
16			Subtotal:	13							1
18	Object Code	of Etima	Item	Man Wks	Qty	Unit	Unit Rate	Cost	Apply to ACTY ID	Pricing Assumptions	1
19	labor	EE	Rodney M. Catanach	10	360	HR					A,B,D
20	labor	EE	Donald B. Peters	3	108	HR			7390		
21					0	HR					
21					0	HR					-
23			Subtotal Labor:		468			\$ 57,142,08			
20	Expenses:	Meals,	Travel Domestic/International, Equipment	, Supplies, S	tockrooi	m Supplies	, Outside Servic	es, Consulting S	ervices, Ship	ping & Postage, Subcontracts, Computer	r
24	Software, l	Repair a	& Maintenance, Communication.			1					_
25	Supplies	EE	materials & manufacture: sail		1	ea	\$ 33,000.00	\$ 33,000.00		Green VE based on current sail Oct 14, 2009	A,B,D
26	Supplies	EE	materials & manufacture: bath tub		1	ea	\$ 8,000.00	\$ 8,000.00		assumes simple configuration	A,B,D
27	Supplies	EE	materials & manufacture: skins		0	ea	\$ 8,000.00	\$ -		2 skin pieces includes molds at \$8k each, fabrication, and painting. Assumes (2) transition skins and all foam forward fairings. Aft stays the same.	А
28	Supplies	EE	materials & manufacture: skins		7	ea	\$ 8,000.00	\$ 56,000.00		7 skin pieces includes molds at \$8k each, fabrication, and painting. Mid body foam will be replaced. Aft stays the same. Includes (1) for the rescue buoy.	в
29	Supplies	EE	materials & manufacture: skins		0	ea	\$ 8,000.00	\$ -		20 skin pieces includes molds at \$8k each, fabrication, and painting. Mid body foam will be replaced. Lower aft skins change.	D
30								\$ -		-	1
31 32			Subtotal Expense:		9			\$ 97,000.00			
33							Total:	\$ 154,142.08			
F	Notes: Po	tential	vendors include NE boatworks, Greene	Marine. A	ssumes	aft skins r	emain the same	e. Current Alvi	n has appro	ximately 24 skins in total.	]
l											
35											1

В	С	D	E Work	F	G	Н	I	J	К	L
2 Project	New Alvin	: Design and Fab (83340908)	Package:	A10 - Lea	d Acid Bat	teries (Optio	on A, B)	Lead:	Joshua A. Eaton	
Activities	on: This work include the pr	c package includes all electrical engine ocurement of replacement cells.	eering, plann	iing, protot	typing and o	documentati	on required to c	ross deck the	existing lead acid main battery design.	
6 Basis of	Estimate			*assumes	1/2 time					
7 Activity 1D	Project Phase	Description	Man Wks	Most Likely (Days)					Comments	
8 6485	FAB	Procure New Battery Cells	0.1	1						A,E
9 6487	FAB	Fab & Deliver Battery Cells	0	30						A,E
10				0						
11				0						
12				0						
13		Subtotal	0.1							
15 Object 16 Code	Type of Etimate	Item	Man Wks	Otv	Unit	Unit Rate	Cost	Apply to ACTY ID	Pricing Assumptions	Ī
lahan	EE	Diskard C. Chandler	0.1	26	UD				o and Kitter	
17 10001	EE	Richard S. Chandler	0.1	3.0	пк					
18				0	HK					_
19				0	HR					_
20				0	HR					_
21				0	HR					_
22		Subtotal Labor:		0 4	HR		\$ 361 30			_
Expenses: 24 Software,	Meals, Trave Repair & Mai	Domestic/International, Equipment, intenance, Communication.	Supplies, St	ockroom S	Supplies, Ou	itside Servic	es, Consulting S	Services, Ship	pping & Postage, Subcontracts, Computer	1
25 supplies	HD	Battery Cells		200	EA	\$ 164.00	\$ 32,800.00		replacement for 3 batteries and 20 spares	A,E
26							\$ -		price based on most recent purchase 01/09	
27							s -		· ·	
28 29		Subtotal Expense:		200			\$ 32,800.00			
30						Total:	\$ 33,161.30			
Notes:										٦
32										

Project:	New Alvin	· Design and Fab (83340908)	Package:	A12-01	Junction F	Boxes (Option B	(D)	Lead:	Donald B Peters
Trojeci.			- I uchuge:	112-01	, ,	Joxes (Option B	,D)		
Description junction bo	n: This work	a package includes all engineering, pla k includes any procurement costs and	nning, proto fabrication	otyping an effort rea	d docume	entation required	to generate nev mechanical box	mechanical es covers an	designs for four (4) new electrical d gaskets only Electrical stuffing tubes
and internal	l hardware w	ill be covered by the electrical effort.	luonounon	enoning	uneu to o			es, eo (eis ui	
Basis of [	Estimate			*assume	s 1/2 time	1			
Activity	Ducient			Most					
ID	Project	Description	Man Wks	(Davs)					Comments
	1 mase	Description		(Duj5)					
									location, wire count (need vehicle
1595	PD	Determine jbox requirements	1	10					wiring plan from Lane and jbox layout)
1505	DD	Prepare Preliminary Design	1	10					
1595	PD	Documentation Property Final Design	1	10					
1600	FD	Documentation	4	40					
3800	FAB	Procure, Fabricate & Oversite	2	20					2 week spread over 60 days
				0					
				0					
				•					
		Subtotal:	8						
Object Code	Type of Etimate	Item	Mon Wke	Otv	Unit	Unit Pote	Cost	Apply to	Pricing Assumptions
Coue	Etimate	Item	Iviali VVKS	Qıy	Unit	Unit Kate	Cost	ACTTID	Theng Assumptions
labor	EE	Chris Lumping	6	216	HR				
labor	EE	Megan M. Carroll	2	72	HR			7285, 7690	oversight
				0	HR				
				0					
				0	HK				
Expanses: N	Maala Trova	Subtotal Labor:	Supplies St	288	Supplies	Outsida Sarviaa	\$ 29,627.28	ruioos Shinn	ing & Postago Subsontrasts Computer
Software, F	Repair & Mai	ntenance. Communication.	supplies, su	OCKIOOIII	Supplies,	Outside Service	s, consulting se	ivices, shipp	nig & Fostage, Subcontracts, Computer
,									
Supplies	EE	all stock & supplies		1	EA	\$ 15,000.00	\$ 15,000.00		
repair	EE	WHOI machine shop		160	hrs	\$ 55.00	\$ 8,800.00		
							\$ -		
							¢		
		C 14 4 17		10			5 - 6		
		Subtotal Expense:		161			\$ 23,800.00		
						Total:	\$ 53,427.28		
Notes: NO	T REQUIR	ED for Base Configuration.							

assemblies required to	for reused an assemble full	d new external electrical junction box ly functional units and spares.	es. This wil	l include a	ny procure	ment costs and	fabrication effor	t required to	build and test the necessary component
Basis of	Estimate			*assumes	1/2 time				
Activity ID	Project Phase	Description	LOE Driving Duration	Most Likely (Days)					Comments
1595	FD	New Desion for Penetration Configuration	1	10					
1600	FD	New Box Design	2	20					
3800	FAB	Build Box	4	40					prior to Alvin construction
				0					
				0					
				0					
		Subtotal:	7						
Object Code	Type of Etimate	Item	Man Wks	Qty	Unit	Unit Rate	Cost	Apply to ACTY ID	Pricing Assumptions
labor	EE	Mechanical Engineer	2	72	HR				
abor	EE	Electrical Engineer	2	72	HR				
labor	EE	Lane J. Abrams	1	36	HR				
labor	EE	Mechanical Engineer	2	72	HR				
				0	HR				
				0	HR				
Expenses: 1	Meals, Trave	Subtotal Labor: Domestic/International, Equipment, S	Supplies, Sto	252 ockroom Su	applies, Ou	itside Services,	\$ 26,266.32 Consulting Serv	rices, Shippin	g & Postage, Subcontracts, Computer
Software, I	Repair & Mai	ntenance, Communication.							
Supplies	EE	Fabrication		2	EA	\$ 5,000.00	\$ 10,000.00		
							\$ -		
							\$ -		
		Subtotal Expense:		2			\$ 10,000.00		
						Total:	\$ 36,266.32		

	В	C	D	E	F	G	Н	I	J	К	L
Р	roiect:	New Alvin	· Design and Fab (83340908)	Work Package:	A12-03	Power Bott	tle (Ontion B D)		Technical Lead:	Donald B Peters	
Des desi subr	criptio gn and mission	<b>on:</b> This work thermal analy a. All detail de	package includes all engineering, pla visis is included. The work package in esign, external labor and services, fab	anning, proto acludes struc prication cost	typing an tural ana s and un	nd documer lysis and ge it testing is	ntation required t eneration of ABS included.	to design the pov 8 support docum	wer pressure entation to be	vessels. Component layout, chassis e included in ABS classification	
Ba	sis of	Estimate			*assume	es 1/2 time					_
					Most						1
Ac	tivity	Project	Description	Mon Wha	Likely					Commente	
-	ID	rnase	Description	Mail WKS	(Days)					Comments	-
767	0	PD	Specs	1	10						B,D
768	0	PD	Documentation	2	20					assume work for PDR is complete	
/000	0	10	Prepare Final Design Analysis and	2	20					includes thermal and FE analysis as	
140	0	FD	Documentation	2	20					required.	_
586	0	FD	Design Chassis	2	20						
360	0	FAB	Procure	1	60						_
		OV	Assemble (2) Power Bottles	0	10					1 per week (2) bottles	
											1
					0						4
					0						
					0						
			Subtotal:	8							
01 C	bject Code	Type of Etimate	Item	Man Wks	Qty	Unit	Unit Rate	Cost	Apply to ACTY ID	Pricing Assumptions	
labo	or	EE	Megan M. Carroll	8	288	HR				possibly McDonald effort	
					0	HR					
					0	HR					
			Subtotal Labor:		288			\$ 32.973.12			
Exp Soft	enses: 1 tware, I	Meals, Travel Repair & Mai	Domestic/International, Equipment, Intenance, Communication.	Supplies, Sto	ockroom	Supplies, C	Dutside Services,	, Consulting Ser	vices, Shippi	ng & Postage, Subcontracts, Computer	
Sup	plies	EE	materials & manufacture							vessels, welding, end caps,	
Sup	plies	EE	titanium (2) @ 288		576	lbs	\$ 30.00	\$ 17 280.00		includes end cap stock	
- "T'								,			1
Sup	plies	EE	treepaning & machining	5	2	housings	\$ 4,000.00	\$ 8,000.00			4
repa	air	EE	WHOI machine shop		160	hrs	\$ 55.00	\$ 8,800.00			
Sup	plies	EE	pressure test (shop & labor)		1	test	\$ 1,200.00	\$ 1,200.00			
	_							\$ -			
			Subtotal Expense:		739			\$ 35,280.00			
				1				*			
							Total:	\$ 68,253.12			
Not	P2. 36.	sumes no con	nera vessels. See hill's estimate				Total:	\$ 68,253.12			ì
Note	es: ass	sumes no can	nera vessels. See bill's estimate.				Total:	\$ 68,253.12			]
Note	es: ass	sumes no can	nera vessels. See bill's estimate.				Total:	\$ 68,253.12		<u></u>	

	В	С	D	E	F	G		Н		I	J	К	L
2	Project:	New Alvin:	Design and Fab (83340908)	Work Package:	A12-03	Power Bot	ttle (0	Option B,D)			Technical Lead:	Lane J. Abrams	_
4	Descriptio prototypes all compor	on: This work for validating nents of three f	package includes all engineering, pla designs and development of test proc functional systems and spares.	nning, and c edures for t	locument functiona	tation requi l units. Th	ired t is wi	o develop a o ll include any	deta y pr	iled power b ocurement co	ottle schemat	ic. This WP includes procurement of cation effort required to build and test	
5 6	Basis of	Estimate			*assume	es 1/2 time							_
7	Activity ID	Project Phase	Description	LOE Driving Duration	Most Likely (Days)							Comments	
8	5770	FD	Identify Requirements	1	10								B,D
9	5780	FD	Prototype Selected Components	3	30								B,D
10	5790	FD	Develop Prel Schematic	2	20								B,D
11	5850	FD	Purchase Components	1	10								B,D
12	5865	FD	Revise Schematic	1	10								B,D
13	5772	FD	Design Lanecon Software	1	10								B,D
14	5305	OV	Assemble and Test	2	20							(2) bottles 1 per week	B,D
15 16					0								B,D
17			Subtotal:	11									
10	Object	Type of									Apply to		7
19	Code	Etimate	Item	Man Wks	Qty	Unit	1	Unit Rate		Cost	ACTY ID	Pricing Assumptions	_
20	labor	EE	Lane J. Abrams	7	252	HR							
21	labor	EE	Hugh Popenoe	2	72	HR					5780	40 hrs for 3wks = 120 hrs	
22	labor	FF	Jonathan C. Howland	1	36	HR					5780	40 hrs for $3wks = 120$ hrs	
22	hibbi	LL	Johanan C. Howand		50	IIIC					5766	10 113 101 5 0 120 113	_
23			Subtotal Labor:		0	HR			¢	43 433 64			_
24	Expenses:	Meals, Travel	Domestic/International, Equipment, S	Supplies, St	ockroom	Supplies,	Outsi	de Services,	Coi	sulting Serv	ices, Shippin	g & Postage, Subcontracts, Computer	_
25	Sumalias		Prototorio Commonorato		1	EA	¢	4 000 00	¢	4 000 00			_
26	Supplies	FF	Power Supply		8	EA	ۍ د	200.00	э ¢	1 600 00			BD
28	Supplies	EE	Power Supply		8	EA	\$	90.00	\$	720.00			BD
	a r	EE.			0		¢.	200.00		1 (00.00			Increment
29	Supplies	EE	Power Supply		8	EA	\$	200.00	\$	1,600.00			Increment
30	Supplies	EE	Power Supply		8	EA	\$	90.00	\$	720.00			from B to D
31	Supplies	EE	Contractor		30	EA	\$	160.00	\$	4,800.00		GX12TAA Price.pdf	B,D
32	Supplies	СР	SSR Relay		80	EA	\$	100.00	\$	8,000.00		S60DC40 Price.pdf	B,D
33	Supplies	EE	Network		3	EA	\$	1,500.00	\$	4,500.00			B,D
34	Supplies	EE	F IDEF Serial		5	EA	\$ ¢	2,000,00	\$ ¢	4,800.00			
35	Supplies	CP	BS485 Convert		12	EA	\$	2,000.00	\$	900.00		485PBTR Price ndf	BD
30							Ψ -	, 5.00	φ.	200.00		Chassis components but not their	
37	Supplies	EE	Other		1	EA	\$	3,000.00	\$	3,000.00		design	B,D
38	Supplies	EE	Lanecon		10	EA	\$	1,000.00	\$	1,000.00	5772	After EDP	B,D
39	Supplies	CP	Lanecon Fiber Equipment		10	EA	\$	35,000,00	\$ ¢	35,000,00	5772	Aller FDK	B,D
40	Supplies	Cr	rioer Equipitient		1	EA	3	33,000.00	\$	55,000.00		5-spheet, 2 tester, 2-v FL	-
41	supplies	EE	Penetrators NRE		1	EA	\$	1,700.00	\$	1,700.00			_
42	supplies	EE	Penetrators		4	EA	\$	3,000.00	\$	12,000.00			_
43	supplies	EE	Blindmate Tools		4	EA	\$	500.00	\$	2,000.00			
44									\$	-			_
45 46			Subtotal Expense:		189				\$	108,340.00			_
47								Total:	\$	151,773.64			
-+/	1	1	1	t	l	I	1	- oul.	μψ.			I	

Basis of	Estimate			*assum	es 1/2 time					
Activity ID	Project Phase	Description	Man Wks	Most Likely (Days)				Hrs per Key Emp	Comments	
1500	FD	Prepare Final Design	3	30				108	assume work for PDR is complete. Includes thermo and FE analysis as needed	
5930	FD	Design Chassis	2	20				72		
3700	FAB	Procure, Fabricate and Oversight	1	10				36		
5310	OV	Fabricate (2) Data Bottles	0	10				0	1 bottle per week	
				0				0		_
				0				0		
		Subtotal:	6					216		
Object Code	Type of Etimate	Item	Man Wks	Qty	Unit	Unit Rate	Cost	Apply to ACTY ID	Pricing Assumptions	
labor	EE	Megan M. Carroll	6	216	HR				possibly McDonald Effort	
				0	HR					
				0	HR					
Expenses: Computer	Meals, Trave Software, Rej	Subtotal Labor: Domestic/International, Equipment, pair & Maintenance, Communication	Supplies, S	216 tockroo	m Supplies,	, Outside Ser	\$ 24,729.84 vices, Consulting	Services, Sh	ipping & Postage, Subcontracts,	
Supplies	EE	materials & manufacture							vessels, welding, end caps,	
Supplies	EE	titanium (2) @ 558		1116	lbs	\$ 30.0	\$ 33,480.00		includes end cap stock	
Supplies	EE	treepaning & machining		2	housings	\$ 6,000.0	) \$ 12,000.00			
repair	EE	WHOI machine shop		200	hrs	\$ 55.0	) \$ 11,000.00		housing and end caps	
repair	EE	WHOI machine shop		80	hrs	\$ 55.0	) \$ 4,400.00		chassie components	
repair	EE	pressure test (shop & labor)		1	test	\$ 1,200.0	) \$ 1,200.00			
							\$ -			
		Subtotal Expense:		1399			\$ 62,080.00			
						Tata	1. \$ \$2 \$00 \$4			

Party of Advisory Decision of Advisory Decision of California Decision of Advisory Decision of California Decision of Advisory Decision of California Decision decision decision decision decision decision d	В	С	D	E	F	G	Н		I	J	К	L
Operational constraints         Distribution of a production of an an an an an an an an an an an an an	Project:	New Alvin	: Design and Fab (83340908)	Work Package:	A12-03	Electrical	Data Bottle (O	ption	B)	Technical Lead:	Lane J. Abrams	=
Interview         Interview	Descriptio prototypes all compon	n: This work for validating tents of three	package includes all engineering, play designs and development of test proc functional systems and spares.	nning, and o edures for a	locumen functiona	tation requ al units. Th	ired to develop his will include	a de any p	tailed data bo procurement c	ttle schematic osts and fabr	. This WP includes procurement of ication effort required to build and test	
Anthe         Project         Description         Description <thdescription< th=""> <thdescr< td=""><td>Basis of</td><td>Estimate</td><td></td><td></td><td>*assum</td><td>es 1/2 time</td><td></td><td>1</td><td></td><td></td><td></td><td>]</td></thdescr<></thdescription<>	Basis of	Estimate			*assum	es 1/2 time		1				]
Addity         Project Description         Derive Point         Description         Derive Point         Description         Derive Point         Point         Comments         ED           SP0         P.90         Matrix Regularization         3         30         -				LOE	Most							
SYN       10       doutly Requirements       1       10 <th< td=""><td>Activity ID</td><td>Project Phase</td><td>Description</td><td>Driving Duration</td><td>Likely (Days)</td><td></td><td></td><td></td><td></td><td></td><td>Comments</td><td></td></th<>	Activity ID	Project Phase	Description	Driving Duration	Likely (Days)						Comments	
S880     FD     Protrige Sciencel Components     3     70	5870	FD	Identify Requirements	1	10							B,D
S800     FD     Develop Prel Schematic     2     20 </td <td>5880</td> <td>FD</td> <td>Prototype Selected Components</td> <td>3</td> <td>30</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>B,D</td>	5880	FD	Prototype Selected Components	3	30							B,D
920     10     Purchase Components     1     10     Image: Second Schematic     1     1     10     Image: Second Schematic     1     1     Image: Second Schematic     1     1     Image: Second Schematic     1     1     1     Image: Second Schematic     1	5890	FD	Develop Prel Schematic	2	20							B,D
9935     FD     Revise Schematic     1     10     10     10     10     10     10     100     1	5920	FD	Purchase Components	1	10							B,D
FAB       Assemble/Test       1       10       Image: Construction of the state o	5935	FD	Revise Schematic	1	10							B,D
Image: series:     Image: series		FAB	Assemble/Test	1	10							B,D
Image: series     State     J </td <td></td> <td></td> <td></td> <td></td> <td>0</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>					0							
Object Code         Type of Etimate         Item         Man Wks         Oy         Unit         Unit Rate         Cost         Apply to ACTY ID         Pricing Assumptions           labor         EE         Lane J. Abrams         6         216         HR                   Apply to          Pricing Assumptions           labor         EE         Donald B. Peters         2         72         HR          5880         required for heat transfer issues           labor         IE         Jonathan C. Howland         1         36         HR          3880			Subtotal:	9								
abor       EE       Lane J. Abranes       6       216       HR       Image: Construct on the structure on th	Object Code	Type of Etimate	Item	Man Wks	Qty	Unit	Unit Rate		Cost	Apply to ACTY ID	Pricing Assumptions	
laborEEDonald B. Peters272HRImage: State of the sta	labor	EE	Lane J. Abrams	6	216	HR						
labor       EE       Jonathan C. Howland       1       36       HR       S880       S880         Loo       A	labor	EE	Donald B. Peters	2	72	HR				5880	required for heat transfer issues	_
Image: Problem in the second secon	labor	EE	Jonathan C. Howland	1	36	HR				5880		
Image: Notes: Notes: Notes: Notes: Notes: Note: N					0	HR						
Software, Repair & Maintenanec, Communication.         I         EA         \$ 4,000.00         \$ 4,000.00         B,D           supplies         EE         Poototype components         1         EA         \$ 90.00         \$ 4,000.00         B,D           supplies         EE         Power Supply         40         EA         \$ 90.00         \$ 3,600.00         B,D           supplies         EE         Power Supply         10         EA         \$ 90.00         \$ 3,600.00         B,D           supplies         EE         Power Supply         0         EA         \$ 90.00         \$ -         Incrementfrom B to Incrementfrom B to Supplies           supplies         EE         Power Supply         0         EA         \$ 1,600.00         \$ 4,500.00         Incrementfrom B to B to Supplies           Supplies         EE         Network         3         EA         \$ 1,600.00         \$ 4,800.00         Incrementfrom B to B to Supplies           Supplies         EE         Strial         6         EA         \$ 2,000.00         \$ 4,800.00         B,D           supplies         EE         Strial         6         EA         \$ 2,000.00         \$ 3,100.00         S 3,100.00         S 3,100.00           supplies	Expenses:	Meals, Travel	Subtotal Labor: Domestic/International, Equipment, S	Supplies, St	324 ockroom	Supplies,	Outside Servic	\$ es, Co	43,432.20 onsulting Serv	vices, Shippin	g & Postage, Subcontracts, Computer	_
supplies       EE       Prototype components       1       EA       \$ 4,000.00       \$ 4,000.00       B,D         supplies       EE       Power Supply       40       EA       \$ 90.00       \$ 3,600.00       B,D         supplies       EE       Power Supply       10       EA       \$ 90.00       \$ 2,000.00       B,D         supplies       EE       Power Supply       0       EA       \$ 90.00       \$ 2,000.00       Increment from B to Increment fr	Software, I	Repair & Mai	ntenance, Communication.									-
supples       EE       Power Supply       40       EA       S       90.00       S       3,600.00       B,D         supples       EE       Power Supply       10       EA       S       200.00       S       2,000.00       B,D         supples       EE       Power Supply       0       EA       S       200.00       S	supplies	EE	Prototype components		1	EA	\$ 4,000.00	\$	4,000.00			B,D
suppliesEEPower Supply10EAS $200.00$ S $2,000.00$ B,DsuppliesEEPower Supply0EAS $90.00$ S-Increment from B tosuppliesEEPower Supply0EAS $200.00$ S-Increment from B tosuppliesEENetwork3EAS $1,500.00$ S $4,500.00$ B,DsuppliesEEFiber3EAS $1,600.00$ S $4,800.00$ B,DsuppliesEEFiber3EAS $2,000.00$ S $4,800.00$ B,DsuppliesEEFiber3EAS $2,000.00$ S $4,800.00$ B,DsuppliesEESerial6EAS $2,000.00$ S $12,000.00$ B,DsuppliesEEOther1EAS $3,100.00$ S $3,100.00$ B,DsuppliesEELancon10EAS $3,000.00$ after FDRB,DsuppliesEEBindmale Tools6EAS $3,000.00$ S $3,000.00$ after FDRIncrement from B tosuppliesEEBindmale Tools1EAS $5,00.00$ S $3,000.00$ Increment from B tosuppliesEEBindmale Tools1EAS $5,00.00$ S $3,000.00$ Increment from B tosuppliesEEBindmale Tools1EA	supplies	EE	Power Supply		40	EA	\$ 90.00	\$	3,600.00			B,D
suppliesEEPower Supply0EA\$ 90.00\$-from B to Increment from B to Increment from B to Increment from B to B	supplies	EE	Power Supply		10	EA	\$ 200.00	\$	2,000.00			B,D Increment
Supplies       EE       Power Supply       0       EA       \$ 200.00       \$ -       from B to         supplies       EE       Network       3       EA       \$ 1,500.00       \$ 4,500.00       Addition       BD         supplies       EE       Fiber       3       EA       \$ 1,600.00       \$ 4,800.00       Addition       BD         supplies       EE       Fiber       3       EA       \$ 1,600.00       \$ 4,800.00       Addition       BD         supplies       EE       Serial       6       EA       \$ 2,000.00       \$ 12,000.00       Addition       BD         supplies       EE       Other       1       EA       \$ 3,100.00       \$ 3,100.00       Addition       BD         supplies       EE       Denormal       10       EA       \$ 3,000.00       \$ 10,000.00       After FDR       B,D         supplies       EE       Penetraters       6       EA       \$ 3,000.00       \$ 10,000.00       After FDR       B,D         supplies       EE       Bindmale Tools       1       EA       \$ 500.00       \$ 3,000.00       After FDR       Addition         supplies       EE       Bindmale Tools       1       EA	supplies	EE	Power Supply		0	EA	\$ 90.00	\$	-			from B to Increment
supplies       EE       Fiber       3       EA       \$ 1,0000       \$ 4,0000       B,D         supplies       EE       Fiber       3       EA       \$ 1,600.00       \$ 4,800.00       B,D         supplies       EE       Serial       6       EA       \$ 2,000.00       \$ 12,000.00       B,D         supplies       EE       Serial       6       EA       \$ 2,000.00       \$ 12,000.00       B,D         supplies       EE       Other       1       EA       \$ 3,100.00       \$ 3,100.00       B,D         supplies       EE       Lancon       10       EA       \$ 1,000.00       \$ 3,100.00       after FDR       B,D         supplies       EE       Penetraters       6       EA       \$ 3,000.00       \$ 18,000.00       after FDR       B,D         supplies       EE       Bindmale Tools       6       EA       \$ 500.00       \$ 3,000.00       Image: Second	supplies	EE	Power Supply		0	EA EA	\$ 200.00 \$ 1.500.00	\$ \$	- 4 500 00			from B to
Supplies       EE       Strial       6       EA       \$ 1,000,00       \$ 4,800,00       B,D         supplies       EE       Strial       6       EA       \$ 2,000,00       \$ 12,000,00       B,D         supplies       EE       Other       1       EA       \$ 3,100,00       \$ 3,100,00       B,D         supplies       EE       Other       1       EA       \$ 3,100,00       \$ 3,100,00       B,D         supplies       EE       Lancon       10       EA       \$ 1,000,00       \$ 10,000,00       after FDR       B,D         supplies       EE       Penetraters       6       EA       \$ 3,000,00       \$ 10,000,00       after FDR       B,D         supplies       EE       Penetraters       6       EA       \$ 3,000,00       \$ 18,000,00       after FDR       B,D         supplies       EE       Blindmale Tools       6       EA       \$ 500,00       \$ 3,000,00       after FDR       B,D         supplies       EE       Blindmale Tools       1       EA       \$ 500,00       \$ 500,00       after FDR       B,D         supplies       EE       Blindmale Tools       1       EA       \$ 500,00       \$ 500,00       after FD	supplies	FE	Fiber		2	EA	\$ 1,500.00	ф S	4 800 00			B.D.
supplies       EE       Other       1       EA       \$ 2,000.00       \$ 12,000.00       B,D         supplies       EE       Other       1       EA       \$ 3,100.00       \$ 3,100.00       B,D         supplies       EE       Lancon       10       EA       \$ 1,000.00       \$ 3,100.00       after FDR       B,D         supplies       EE       Penetraters       6       EA       \$ 1,000.00       \$ 10,000.00       after FDR       B,D         supplies       EE       Penetraters       6       EA       \$ 1,000.00       \$ 10,000.00       after FDR       B,D         supplies       EE       Blindmale Tools       6       EA       \$ 3,000.00       \$ 3,000.00       after FDR       B,D         supplies       EE       Blindmale Tools       1       EA       \$ 500.00       \$ 3,000.00       after FDR       B,D         supplies       EE       Blindmale Tools       1       EA       \$ 500.00       \$ 500.00       after FDR       B,D         supplies       EE       Blindmale Tools       1       EA       \$ 500.00       \$ 500.00       after FDR       B,D         and the fourther tools       B       F       S       S	supplies	EE	Serial		5	EA	\$ 2,000.00	ۍ د	12 000 00			BD
Supplies         EE         Outer         I         EA         \$ 3,100.00         \$ 3,100.00         after FDR         B,D           supplies         EE         Lancon         10         EA         \$ 1,000.00         \$ 10,000.00         after FDR         B,D           supplies         EE         Penetraters         6         EA         \$ 3,000.00         \$ 10,000.00         after FDR         B,D           supplies         EE         Penetraters         6         EA         \$ 3,000.00         \$ 18,000.00         after FDR         B,D           supplies         EE         Blindmale Tools         6         EA         \$ 500.00         \$ 3,000.00         after FDR         B,D           supplies         EE         Blindmale Tools         6         EA         \$ 500.00         \$ 3,000.00         after FDR         B,D           supplies         EE         Blindmale Tools         1         EA         \$ 500.00         \$ 500.00         after FDR         after FDR         B,D           supplies         EE         Blindmale Tools         1         EA         \$ 500.00         \$ 500.00         after FDR         after FDR         after FDR         after FDR         after FDR         after FDR         after FD	supplies	EE	Other		1	EA	\$ 2,000.00	ۍ د	3 100 00			B.D
Supplies       EE       Lancon       10       EA       \$ 1,000.00       \$ 10,000.00       atter FDK       B,D         supplies       EE       Penetraters       6       EA       \$ 3,000.00       \$ 18,000.00       atter FDK       B,D         supplies       EE       Blindmale Tools       6       EA       \$ 3,000.00       \$ 3,000.00       atter FDK       B,D         supplies       EE       Blindmale Tools       6       EA       \$ 500.00       \$ 3,000.00       atter FDK       B,D         supplies       EE       Blindmale Tools       6       EA       \$ 500.00       \$ 3,000.00       atter FDK       B,D         supplies       EE       Blindmale Tools       1       EA       \$ 500.00       \$ 500.00       atter FDK       B,D         supplies       EE       Blindmale Tools       1       EA       \$ 500.00       \$ 500.00       atter FDK       B,D         autor field       I       EA       \$ 500.00       \$ 500.00       Image: FDK       Im	supplies	EE			1	EA	\$ 1,000,00	3 6	10,000,00		after EDB	<u>в,</u> р
Supplies         EE         Penetraters         6         EA         \$ 3,000.00         \$ 18,000.00           supplies         EE         Blindmale Tools         6         EA         \$ 500.00         \$ 3,000.00           supplies         EE         Blindmale Tools         6         EA         \$ 500.00         \$ 3,000.00           supplies         EE         Blindmale Tools         1         EA         \$ 500.00         \$ 3,000.00           supplies         EE         Blindmale Tools         1         EA         \$ 500.00         \$ 500.00           supplies         EE         Blindmale Tools         1         EA         \$ 500.00         \$ 500.00           supplies         EE         Blindmale Tools         1         EA         \$ 500.00         \$ 500.00           supplies         EE         Blindmale Tools         1         EA         \$ 500.00         \$ 500.00           supplies         EE         Subtotal Expense:         87         E         \$ 65,500.00         E	supplies	EE			10	EA	\$ 1,000.00	3 e	18,000.00		and FDK	<u>в,</u> D
Supplies         EE         Blindmale Tools         6         EA         \$ 500.00         \$ 3,000.00           supplies         EE         Blindmale Tools         1         EA         \$ 500.00         \$ 500.00           supplies         EE         Blindmale Tools         1         EA         \$ 500.00         \$ 500.00           supplies         EE         Blindmale Tools         1         EA         \$ 500.00         \$ 500.00           supplies         EE         Blindmale Tools         1         EA         \$ 500.00         \$ 500.00           supplies         EE         Blindmale Tools         1         EA         \$ 500.00         \$ 500.00           supplies         EE         Blindmale Tools         87         \$ 65,500.00         \$ 65,500.00	supplies	EE	Plindende Tech		6	EA	\$ 3,000.00	\$	18,000.00			1
Supplies         EE         Blindmale Fools         I         EA         \$ 500.00         \$ 500.00           Image: Supplies         Image: Supplies <td>supplies</td> <td>EE</td> <td></td> <td></td> <td>6</td> <td>EA</td> <td>\$ 500.00</td> <td>\$</td> <td>3,000.00</td> <td></td> <td></td> <td>-</td>	supplies	EE			6	EA	\$ 500.00	\$	3,000.00			-
Subtotal Expense:         87         \$ 65,500.00	supplies	EE	Blindmale Tools		1	EA	\$ 500.00	\$	500.00	<u> </u>		-
			Subtotal Expense:		87			\$ \$	- 65,500.00			
								¢	100 022 20			-

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2 Project	New Alvin	: Design and Fab (83340908)	Work Package:	A14 - M	1ain Ballas	t System (Optio	n A,	B)	Technical Lead:	Rodney M. Catanach	_
Description the buoyar includes A componer	on: This work ncy requirement ABS support do nts of the system	package includes all engineering plat nts of the vehicle and the design of ne ocumentation to be included in ABS of m.	nning, proto w soft balla lassification	typing ar st tanks. 1 submiss	nd docume This WP v sion. This v	ntation required vill also include vill include any	to d any proc	esign the main effort require urement costs	n ballast syste d to modify h and fabricati	m. This includes a study to determine ard and soft piping. The work package on effort required to build and test all	
Basis of	f Estimate			*assume	es 1/2 time						4
Activity 7 ID	Project Phase	Description	Man Wks	Most Likely (Days)						Comments	]
7295	ND	Prepare Weight & Balance	5	50							
8 7285	PD	Determine Overall Requirements &	5	50							A,B.D
9 7690	PD	Specs Prepare Preliminary Design	1	10							A,B.D
10 7700	PD	Documentation	1	10							A,B.D
11 1700	FD	Documentation	5	50						1 week for Don	A,B.D
12 3900	FAB	Procure & Oversee Fabrication	1	10							A,B.D
13 3900	FAB	Fabricate	0	66							_
14 5590	OV	Fit Main Ballast	2	20						assume fit check and TE work	A,B.D
15											_
16		C-14-4-1	15								-
17	Type of	Subtotal:	15						A I 4 .		
Uniect									A DDIV TO		
19 Code	Etimate	Item	Man Wks	Qty	Unit	Unit Rate		Cost	Apply to ACTY ID	Pricing Assumptions	4
19 Code	EE	Item Rodney M. Catanach	Man Wks	<b>Qty</b> 504	Unit HR	Unit Rate		Cost	ACTY ID	Pricing Assumptions	
20 labor 21 labor	EE EE	Item Rodney M. Catanach Donald B. Peters	<b>Man Wks</b> 14 1	<b>Qty</b> 504 36	Unit HR HR	Unit Rate		Cost	Apply to ACTY ID 7285, 7690	Pricing Assumptions	_
20 labor 21 labor 22	EE EE	Item Rodney M. Catanach Donald B. Peters	Man Wks 14 1	Qty 504 36 0	Unit HR HR	Unit Rate		Cost	Apply to ACTY ID 7285, 7690	Pricing Assumptions	
20 labor 21 labor 22 22 23	Etimate EE EE	Item Rodney M. Catanach Donald B. Peters	Man Wks 14 1	Qty 504 36 0	Unit HR HR HR	Unit Rate		Cost	Apply to ACTY ID 7285, 7690	Pricing Assumptions	
Object           19         Code           20         labor           21         labor           22         23           23         24	EE EE	Item Rodney M. Catanach Donald B. Peters Subtotal Labor:	Man Wks 14 1	Qty           504           36           0           0           540	Unit HR HR HR HR	Unit Rate	\$	Cost	Apply to ACTY ID 7285, 7690	Pricing Assumptions	
20 Jabor 21 Jabor 22 Jabor 23 Jabor 24 Expenses: 25 Software,	EE EE Meals, Travel	Item Rodney M. Catanach Donald B. Peters Subtotal Labor: Domestic/International, Equipment, ntenance, Communication.	Man Wks 14 1 Supplies, St	Qty           504           36           0           0           0           540	Unit HR HR HR Supplies,	Unit Rate	\$ s, Co	Cost 61,848.00 onsulting Serv	Apply to ACTY ID 7285, 7690 vices, Shippin	Pricing Assumptions	
20 Jabor 21 Jabor 22 Jabor 23 Jabor 24 Jabor 25 Software,	EE EE Meals, Travel Repair & Mai	Item Rodney M. Catanach Donald B. Peters Subtotal Labor: Domestic/International, Equipment, ntenance, Communication.	Man Wks 14 1 Supplies, St	Qty 504 36 0 0 540 ockroom	Unit HR HR HR Supplies,	Unit Rate	\$ s, Co	Cost 61,848.00 onsulting Serv	Apply to ACTY ID 7285, 7690	Pricing Assumptions Pricing Assumptions g & Postage, Subcontracts, Computer Green Marine quoted (4) Tanks for 37k completed at same time as sail	
20 Jabor 21 Jabor 22 Jabor 23 Jabor 23 Software, 25 Software, 26 Supplies	EE EE Meals, Travel Repair & Mai	Item Rodney M. Catanach Donald B. Peters Subtotal Labor: Domestic/International, Equipment, ntenance, Communication. fiberglass tanks	Man Wks 14 1 Supplies, St	Qty 504 36 0 0 540 000ckroom	Unit HR HR HR Supplies,	Unit Rate	\$ \$	Cost 61,848.00 onsulting Serv 37,000.00	Apply to ACTY ID 7285, 7690	Pricing Assumptions Pricing Assumptions g & Postage, Subcontracts, Computer Green Marine quoted (4) Tanks for 37k completed at same time as sail (3mon) VE 14 Oct 09	A,B,D
20 Jabor 21 Jabor 22 Jabor 23 Jabor 24 Jabor 25 Software, 26 Supplies 27 Supplies	EE EE Meals, Travel Repair & Mai	Item Rodney M. Catanach Donald B. Peters Subtotal Labor: Domestic/International, Equipment, ntenance, Communication. fiberglass tanks fiberglass tanks	Man Wks 14 1 Supplies, St	Qty           504           36           0           0           540           ockroom           1	Unit HR HR HR Supplies, lot ea	Unit Rate	\$ \$ \$ \$	Cost 61,848.00 onsulting Serv 37,000.00 18,000.00	Apply to ACTY ID 7285, 7690	Pricing Assumptions Pricing Assumptions g & Postage, Subcontracts, Computer Green Marine quoted (4) Tanks for 37k completed at same time as sail (3mon) VE 14 Oct 09 aft tank	A,B,D A,B,D
20 Jabor 21 Jabor 22 Jabor 23 Jabor 24 Jabor 25 Software, 26 Supplies 27 Supplies 28 Japplies	EE EE Meals, Travel Repair & Mai EE EE	Item         Rodney M. Catanach         Donald B. Peters         Subtotal Labor:         Domestic/International, Equipment, ntenance, Communication.         fiberglass tanks         fiberglass tanks	Man Wks 14 1 Supplies, St	Qty 504 36 0 0 540 0 0 ckroom	Unit HR HR HR Supplies,	Unit Rate	\$ \$ \$ \$ \$ \$	Cost 61,848.00 onsulting Serv 37,000.00 18,000.00	Apply to ACTY ID 7285, 7690 //ices, Shippin	Pricing Assumptions Pricing Assumptions g & Postage, Subcontracts, Computer Green Marine quoted (4) Tanks for 37k completed at same time as sail (3mon) VE 14 Oct 09 aft tank	A,B,D A,B,D
20 Jabor 21 Jabor 22 Jabor 23 Jabor 24 Jabor 25 Software, 26 Supplies 27 Supplies 28 Japplies 29 Japplies 29 Japplies 20 Jabor 20 Jabor 20 Jabor 20 Jabor 21 Jabor 22 Jabor 23 Japplies 24 Japplies 25 Japplies 28 Japplies 29 Japplies 29 Japplies 20 Jabor 20 Jabor 20 Jabor 21 Jabor 22 Japplies 23 Japplies 24 Japplies 25 Japplies 26 Japplies 27 Japplies 28 Japplies 29 Japplies 29 Japplies 29 Japplies 20 Japplie	EE EE Meals, Travel Repair & Mai EE EE	Item         Rodney M. Catanach         Donald B. Peters         Subtotal Labor:         Domestic/International, Equipment, ntenance, Communication.         fiberglass tanks         fiberglass tanks         fiberglass tanks	Man Wks 14 1 Supplies, St	Qty 504 36 0 0 540 0 0 ckroom 1 1	Unit HR HR HR Supplies, lot ea	Unit Rate	\$ \$ \$ \$ \$ \$ \$	Cost 61,848.00 onsulting Serv 37,000.00 18,000.00 - 55,000.00	Apply to ACTY ID 7285, 7690	Pricing Assumptions Pricing Assumptions g & Postage, Subcontracts, Computer Green Marine quoted (4) Tanks for 37k completed at same time as sail (3mon) VE 14 Oct 09 aft tank	A,B,D A,B,D
20 Jabor 20 Jabor 21 Jabor 22 Jabor 23 Jabor 24 Jabor 25 Software, 26 Supplies 27 Supplies 28 Jabor 29 Jabor 29 Jabor 20 Jab	EE EE Meals, Travel Repair & Mai EE EE	Item         Rodney M. Catanach         Donald B. Peters         Subtotal Labor:         I Domestic/International, Equipment, ntenance, Communication.         fiberglass tanks         fiberglass tanks         Subtotal Expense:	Man Wks 14 1 Supplies, St	Qty           504           36           0           0           504	Unit HR HR HR Supplies, lot ea	Unit Rate	\$ \$ \$ \$ \$ \$ \$ \$	Cost 61,848.00 onsulting Serv 37,000.00 18,000.00 - 55,000.00 116,848.00	Apply to ACTY ID 7285, 7690	Pricing Assumptions  g & Postage, Subcontracts, Computer  Green Marine quoted (4) Tanks for 37k completed at same time as sail (3mon) VE 14 Oct 09 aft tank	A,B,D A,B,D
Object       19     Code       20     labor       21     labor       22     Iabor       23     Iabor       24     Iabor       25     Software,       26     Supplies       27     Supplies       28     Iabor       29     Iabor       30     Iabor       31     Iabor       31     Iabor	Etimate EE EE Meals, Travel Repair & Mai EE EE	Item         Rodney M. Catanach         Donald B. Peters         Subtotal Labor:         Domestic/International, Equipment, ntenance, Communication.         fiberglass tanks         fiberglass tanks         Subtotal Expense:	Man Wks 14 1 Supplies, St	Qty 504 36 0 0 540 0 0 ckroom	Unit HR HR HR Supplies,	Unit Rate	\$ \$ \$ \$ \$ \$ \$	Cost 61,848.00 onsulting Serv 37,000.00 18,000.00 - 555,000.00 116,848.00	Apply to ACTY ID 7285, 7690 //ices, Shippin	Pricing Assumptions Pricing Assumptions g & Postage, Subcontracts, Computer Green Marine quoted (4) Tanks for 37k completed at same time as sail (3mon) VE 14 Oct 09 aft tank	A,B,D A,B,D
20 Jabor 21 Jabor 22 Jabor 23 Jabor 24 Jabor 25 Software, 26 Supplies 27 Supplies 28 Japplies 29 Japplies 29 Japplies 20 Jabor 20 Jabo	EE EE Meals, Travel Repair & Mai EE EE	Item         Rodney M. Catanach         Donald B. Peters         Subtotal Labor:         Domestic/International, Equipment, ntenance, Communication.         fiberglass tanks         fiberglass tanks         Subtotal Expense:	Man Wks 14 1 Supplies, St	Qty           504           36           0           0           504	Unit HR HR HR Supplies, lot ea	Unit Rate	\$ \$ \$ \$ \$ \$ \$ \$	Cost 61,848.00 onsulting Serv 37,000.00 18,000.00 - 55,000.00 116,848.00	Apply to ACTY ID 7285, 7690	Pricing Assumptions Pricing Assumptions g & Postage, Subcontracts, Computer Green Marine quoted (4) Tanks for 37k completed at same time as sail (3mon) VE 14 Oct 09 aft tank	A,B,D A,B,D

	-		Work					Technical	•
Project	New Alvin	: Design and Fab (83340908)	Package:	A14 Ma	in Ballast S	Systems (Op	otion B,D)	Lead:	Lane J. Abrams
Descriptie	on: This worl	c package includes all electrical engine	ering planni	ng, proto	typing and	documenta	tion required to	cross deck th	e Alvin Main Ballast system and desig
the electri	cal interface s	chematic and electronics. The work pa	ickage inclu	des work	required t	o generate	ABS support do	cumentation	to be included in ABS classification
submissio	n. This will in	clude any procurement costs and fabric	ation effort	required	to build ar	id test all co	omponents of fu	nctional syste	em and spares.
Racic of	Estimate			*	- 1/2 time				
Da515 01	Estimate		LOF	*assume	es 1/2 time				
Activity	Project		Driving	Likely				Hrs per	
D	Phase	Description	Duration	(Days)				Key Emp	Comments
								10	
5950	FD	Prepare Schematic - Main Ballast	0.5	5				18	
				0				0	
				0				0	
				0				0	
				0				0	
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		-	-					Ŭ	
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				0				0	
		-							
		Subtotal:	0.5					18	
Object	Type of					Unit		Apply to	
Code	Etimate		Man Wks	Otv	Unit	Rate	Cost	ACTY ID	Pricing Assumptions
Coue	Lumate	Item		~~~			0050		0 I
bor	Etimate	Item	0.5	10	IID		0050		
abor	EE	Lane J. Abrams	0.5	18	HR				
abor	EE	Lane J. Abrams	0.5	18 0	HR HR				
abor	EE	Lane J. Abrams	0.5	18 0	HR HR				
abor	EE	Lane J. Abrams	0.5	18 0 0	HR HR HR				
labor	EE	Lane J. Abrams	0.5	18 0 0	HR HR HR				
	EE	Lane J. Abrams	0.5	18 0 0	HR HR HR HR		¢ 2.225.16		
Labor Expenses:	EE Meals, Trave	Lane J. Abrams           Subtotal Labor:           1	0.5	18 0 0 0 18 ckroom	HR HR HR HR Supplies, C	Dutside Serv	\$ 2,225.16 ices, Consulting	s Services, Sh	ipping & Postage, Subcontracts,
abor	EE EE Meals, Trave Software, Re	Item Lane J. Abrams Subtotal Labor: Domestic/International, Equipment, S pair & Maintenance, Communication.	0.5	18 0 0 0 18 ckroom	HR HR HR Supplies, C	Dutside Serv	\$ 2,225.16 ices, Consulting	g Services, Sh	ipping & Postage, Subcontracts,
abor Expenses: Computer	EE EE Meals, Trave Software, Re	Lane J. Abrams Lane J. Abrams Subtotal Labor: Domestic/International, Equipment, S pair & Maintenance, Communication.	0.5	18 0 0 0 18 ckroom	HR HR HR Supplies, C	Dutside Serv	\$ 2,225.16 ices, Consulting	g Services, Sh	ipping & Postage, Subcontracts,
Expenses: Computer	EE EE Meals, Trave Software, Re	Lane J. Abrams Lane J. Abrams Subtotal Labor: Domestic/International, Equipment, S pair & Maintenance, Communication.	0.5	18 0 0 18 0 18 0 ckroom	HR HR HR Supplies, C	Dutside Serv	\$ 2,225.16 ices, Consulting \$ -	g Services, Sh	ipping & Postage, Subcontracts,
Labor Expenses: Computer	EEE Meals, Trave Software, Re	Lane J. Abrams Lane J. Abrams Subtotal Labor: Domestic/International, Equipment, S pair & Maintenance, Communication.	0.5	18 0 0 18 vckroom	HR HR HR Supplies, C	Dutside Serv	\$ 2,225.16 ices, Consulting \$ - \$ -	g Services, Sh	ipping & Postage, Subcontracts,
Expenses: Computer	EE EE Meals, Trave Software, Re	Item         Lane J. Abrams         Subtotal Labor:         1 Domestic/International, Equipment, Spair & Maintenance, Communication.         Subtotal Expense:	0.5	18 0 0 18 ckroom	HR HR HR Supplies, C	Dutside Serv	\$ 2,225.16 ices, Consulting \$ - \$ - \$ -	g Services, Sh	ipping & Postage, Subcontracts,
Expenses: Computer	EE EE Meals, Trave Software, Re	Item         Lane J. Abrams         Subtotal Labor:         Domestic/International, Equipment, Spair & Maintenance, Communication.         Subtotal Expense:	0.5	18 0 0 0 18 ckroom 2	HR HR HR Supplies, C	Dutside Serv	\$ 2,225.16 ices, Consulting \$ - \$ - \$ -	3 Services, Sh	ipping & Postage, Subcontracts,
Expenses: Computer	EE EE Meals, Trave Software, Re	Item         Lane J. Abrams         Subtotal Labor:         1 Domestic/International, Equipment, Spair & Maintenance, Communication.         pair & Maintenance, Communication.         Subtotal Expense:	0.5	18 0 0 0 18 ckroom	HR HR HR Supplies, C	Dutside Serv	\$ 2,225.16 ices, Consulting \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ - \$ -	g Services, Sh	ipping & Postage, Subcontracts,

Vert         Technical Package: A16 Variable Ballast Systems (Options B,D)         Technical Lead: Lane I. Abrams           Description: This work package includes all engineering planning, prototyping and documentation required to cross deck the Alvin VB system and construct the electrical included in ABS classification submission. This winches and electronics. The work package includes work required to generate ABS support documentation to be included in ABS classification submission. This winches and electronics. The work package includes work required to generate ABS support documentation to be included in ABS classification submission. This winches and electronics. The work package includes work required to generate ABS support documentation to be included in ABS classification submission. This winches and electronics. The work package includes work required to generate ABS support documentation to be included in ABS classification submission. This winches and electronics. The work package includes work required to generate ABS support documentation to be included in ABS classification submission. This winches and electronics. The work package includes work required to generate ABS support documentation to be included in ABS classification submission. This winches and electronics. The work package includes work required to generate ABS support documentation to be included in ABS classification submission. This work package includes and test all components of functional system and spaces.           a basis of Extince at a component cost and fabrication effort required to particle at a component cost and fabrication effort required to generate ABS support documentation required to particle at a component cost and fabrication effort required to a component cost and fabrication effort required to a component cost and fabrication effort required to a component cost and fabrication effort at component cost and fabricatio	
Description:         This work package includes all engineering planning, prototyping and documentation required to cross deck the Alvin VB system and construct the electrical interface schematic and electronics. The work package includes work required to generate ABS support documentation to be included in ABS classification submission. This vinclude any procurement costs and fabrication effort required to build and test all components of functional system and spares.           4         *assumes 1/2 time           4         *assumes 1/2 time           5         Project         Description         Dirking         Lkey Duration         Comments           5         Sp90         FD         Prepare Schematic - Variable Ballast         0.5         5         Comments           10         Project         Prototype - Variable Ballast         0.5         5         Comments           10         FD         Prototype - Variable Ballast         0.5         5         Comments           10         Prototype - Variable Ballast         0.5         5         Comments           10         Prototype - Variable Ballast         0.5         5         Comments           10         O         O         O         O         O           11         O         O         O         O         O         O           12         O         O	] B,D 
Basis of Estimate         *assumes 1/2 time           Activity ID         Project Phase         Description         Most Duration (Days)         Most Likely (Days)         Most Li	B,C
Activity ID         Project Phase         Description         LOE Driving Uays         Most Likely Uays         Image         Image         Comments           5         5900         FD         Prepare Schematic - Variable Ballast         0.5         5         Image	B,C 
a       5990       FD       Prepare Schematic - Variable Ballast $0.5$ $5$ $a$ $a$ $a$ $a$ $a$ $6010$ FD       Prototype - Variable Ballast $0.5$ $5$ $a$ $a$ $a$ $a$ $b$ $a$ $b$ $a$ $b$	B,I 
$\circ$ 6010FDPrototype - Variable Ballast0.55 $\circ$ 6020FDRevise Schematic - Variable Ballast0.55 $\circ$ <td< td=""><td>_</td></td<>	_
10       6020       FD       Revise Schematic - Variable Ballast $0.5$ $5$ $  -$ 11 $  0$ $   -$ 12 $  0$ $   -$ 12 $  0$ $   -$ 13 $  0$ $   -$ 14 $  0$ $   -$ 14 $  0$ $    -$ 14 $  0$ $                                   -$	_
11         0            12         0        0           13         0             14         0             14          0             15         0              16                 17                 19       Object       Type of Etimate       Item       Man Wks       Qty       Unit       Rate       Cost       Apply to       Pricing Assumptions         20       labor       EE       Lane J. Abrams       15       54       HR            21         0       HR	_
$\frac{12}{13}$ $\frac{13}{13}$ $\frac{14}{14}$ $14$	_
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	1
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	-
Distribution     Image: Constraint of the second seco	
Virtual     Subtotal:     1.5     Image: Constraint of the state	-
Object     Type of Code     Type of Etimate     Type of Item     Man Wks     Oty     Unit     Rate     Cost     ACTY ID     Pricing Assumptions       20     labor     EE     Lane J. Abrams     1.5     54     HR	
20         labor         EE         Lane J. Abrams         1.5         54         HR	4
21 0 HR	_
	_
22 0 HR 0 HR	-
23 0 HR 0 HR 24 24 Subtotal Labor: 54 \$ 6.675.48	-
Expenses: Meals, Travel Domestic/International, Equipment, Supplies, Stockroom Supplies, Outside Services, Consulting Services, Shipping & Postage, Subcontracts, Compute 25 Software, Repair & Maintenance, Communication.	
27 \$ -	
28         Subtotal Expense:         0         \$ -           29         -         -         -         -	
30 Total: \$ 6,675.48	-
inoles:	
32	

	В	С	D	E	F	G	Н	1	J	К	L
2	Project:	New Alvin	: Design and Fab (83340908)	Work Package:	A16 Va	riable Ball	ast System (O	ption B)	Technical Lead:	Donald B. Peters	
4	Descriptio to accomm This will in engineering work packa fabrication	n: This work nodate the new nclude any pr g planning, pr age includes v effort require	c package includes all engineering pla v sphere design. The work package is ocurement costs and fabrication effor rototyping and documentation require work required to generate ABS suppo ed to build and test all components of	nning, prot ncludes wor t required to d to make a rt documen functional	otyping a rk require o build a uny high tation to system a	and docum ed to gener nd test all pressure pi be include nd spares.	entation requi rate ABS supp components o ping modifica d in ABS clas	red to make any ort documentati f functional syst ttions to the VB sification submi	high pressure on to be inclu em and spare system to acc ssion. This w	e piping modifications to the VB system ded in ABS classification submission. sThis work package includes all ommodate the new sphere design. The rill include any procurement costs and	
0	Docia of	Ectimate			*	1/2.4					•
6	Dasis of	Estimate			*assume Most	es 1/2 time					T
7	Activity ID	Project Phase	Description	Man Wks	Likely (Days)					Comments	
8		PD	prepare modified piping diagram	1	10						в
9		FD	Prepare Final Design	1	10						+
10		FAB	Procure	1	30						-
11					0						-
12					0						+
13					0						+
14					0						+
15 16					0						
17			Subtotal:	3							
19	Object Code	Type of Etimate	Item	Man Wks	Qty	Unit	Unit Rate	Cost	Apply to ACTY ID	Pricing Assumptions	
20	labor	EE	Philip E. Forte	3	108	HR					-
21					0	HR					
22					0	HR					ļ
23			Subtotal Labor:		108			\$ 11,201.76			
24	Expenses: Computer	Meals, Trave Software, Rej	l Domestic/International, Equipment, pair & Maintenance, Communication	Supplies, S	Stockroor	n Supplies	, Outside Serv	vices, Consulting	g Services, Sh	ipping & Postage, Subcontracts,	-
25	Supplies	EE	piping & fittings		1	EA	\$ 3,000.00	\$ 3,000.00			-
26								\$ -			-
27								\$ -			+
28			C14-4-1 F		1			\$ -			-
29 30			Subtotal Expense:		1			ə <u>ə</u> ,000.00			1
31							Total:	\$ 14,201.76			
	Notes:										
33											

-	В	С	D	E	F	G	Н	I	J	К	
2	Project:	New Alvin	: Design and Fab (83340908)	Package:	A16 Va	riable Balla	ast System (Opti	on B,D)	Lead:	Donald B. Peters	_
1 5 2	Descriptio ystem. The new sphe	n: This work ne work packa eres. Replace	c package includes all engineering plat age includes work required to generat ment of VB Hydraulic system is not in	nning, proto e ABS supp ncluded in tl	typing an ort docur ne scope	d documer nentation to of this task	ntation required t o be included in	o design and integr ABS classification	rate new Vari submission.	able Ballast Spheres into the existing This will include procurement costs for	]
。 6 ]	Basis of	Estimate			*assume	es 1/2 time					4
7	Activity ID	Project Phase	Description	Man Wks	Most Likely (Days)					Comments	
8	795	PD	Prepare Preliminary Design	1	10						В,
9]	795	PD	Generate RFP	1	10						
0	795	PD	Review RFP Reponses	1	10						_
1]	800	FD	Prepare Final Design	3	30						_
2 4	1000	FAB	Procure	2	200						_
3 4	1000	FAB	Fabrication		0						-
4 4	1000	FAB	Acceptance Testing	1	10						-
5 6					0						-
17			Subtotal:	9							
19	Object Code	Type of Etimate	Item	Man Wks	Qty	Unit	Unit Rate	Cost	Apply to ACTY ID	Pricing Assumptions	]
. <sub>0</sub> ]	abor	EE	Barrie B. Walden	9	324	HR					
1 l	abor	EE	Donald B. Peters	2	72	HR			7285, 7690		
2 1	abor	EE	J. Pat Hickey	2	72	HR					_
зl	abor	EE	Chris Lumping	2	72	HR					_
4					0	HR					-
5					0	HR					_
6 ] 7	Expenses: 1 Software, I	Meals, Travel Repair & Mai	Subtotal Labor: Domestic/International, Equipment, Intenance, Communication.	Supplies, St	540 ockroom	Supplies, 0	Outside Services	\$ 89,679.96 , Consulting Servic	es, Shipping	& Postage, Subcontracts, Computer	-
8	Supplies	VQ	tanks		2	tanks	\$ 135,000.00	\$ 270,000.00		vendor estimate	
9	Supplies	VQ	design, analysis & engineering		1	lot	\$ 350,000.00	\$ 350,000.00		vendor estimate	
0	Supplies	VQ	tooling		1	lot	\$ 250,000.00	\$ 250,000.00		vendor estimate	
1	Supplies	VQ	weld qualification		1	lot	\$ 120,000.00	\$ 120,000.00		vendor estimate	_
2	Supplies	VQ	qual testing		1	lot	\$ 120,000.00	\$ 120,000.00		vendor estimate	
3	Supplies	VQ	qual tank		2	ea	\$ 135,000.00	\$ 270,000.00		vendor estimate	_
4								\$ -			
15			Subtotal Expense:		8			\$ 1,380,000.00			-
17							Total:	\$ 1,469,679.96			
I	Notes:										
I											

В	С	D	E	F	G	Н		I	J	К	L
Project:	New Alvin	: Design and Fab (83340908)	Work Package:	A18 Pro	pulsion (O	ption B)			Technical Lead:	Lane J. Abrams	_
Description electronics be included spares.	<ul> <li>This work</li> <li>All detail detail detail detail detail detail</li> </ul>	package includes all engineering, pla esign, external labor and services, fab- sification submission. This will include	inning, proto rication cost de any procu	otyping and units and units and units and units and units and units and units and and and and and and and and a	nd docume it testing is osts and fa	ntation require included. The brication effor	ed to d e work rt requ	esign the p package i ired to bui	propulsion system includes gene ld and test all	stem electrical interface schematic and ration of ABS support documentation to components of functional system and	
Basis of	Estimate			*assume	es 1/2 time						
Activity ID	Project Phase	Description	LOE Driving Duration	Most Likely (Days)						Comments	]
6030	FD	Identify Motors	0	0							D
6035	FD	Identify Controllers	0	0							D
0 6040	FD	Prepare Schematic	1	10							B,D
1 6050	FD	Build/Test Prototype	0	0							D
2 6060	FD	Revise Schematic	1	10							B,D
3				0							-
5				0							
7		Subtotal:	2								
Object 9 Code	Type of Etimate	Item	Man Wks	Qty	Unit	Unit Rate		Cost	Apply to ACTY ID	Pricing Assumptions	]
labor	EE	Lane J. Abrams	2	72	HR						
1 labor	EE	Hugh Popenoe		0	HR				6050	1wk proto/1wk test	
2 labor	EE	Tom Lanagan		0	HR						<u>.</u>
albor	EE	Mechanical Engineer		0	HR						from B
4				0	HR						-
5				0	HR						
3 Expenses:	Meals Travel	Subtotal Labor:	Supplies St	72	Supplies (	Dutside Servic	\$	8,900.64	ervices Shin	ning & Postage Subcontracts Computer	
Software,	Repair & Mai	ntenance, Communication.	Supplies, St		Supplies,			Jiistitung 5	ervices, ship		
supplies	HD	Motors		0	EA	\$ 1,500.00	\$	-	6030		D
supplies	HD	Controllers		0	EA	\$ 2,000.00	\$	-	6035		D
supplies	EE	Motor Inner Space		0	EA	\$ 8,000.00	\$	-	6050	estimate provided by vendor	D
supplies	EE	Inner space modify housing		0	EA	\$ 1,000.00	\$	-	6050		D
subcontrac ts	EE	Tim Thiel test support		40	hr	\$ 110.00	\$	4,400.00		40 hrs @ 110	
3							\$	-			-
4		Subtotal Expense:		40			\$	4,400.00			+
6 Note::						Total:	\$ 1	3,300.64			⊥ T
inotes:											
L											1
and spares	k.										
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Basis of	Estimate			*assume	es 1/2 time						
Activity ID	Project Phase	Description	LOE Driving Duration	Most Likely (Days)					Comments		
6080	FD	Prepare Schematic - Hydraulic	0.5	5							
6090	FD	Prototype - Hydraulic	0.5	5							
6150	FD	Revise Schematic - Hydraulic	0.5	5							
6152	FD	C&C Integration	1	10							
				0							
				0							
				0							
				0							
				0							
		Subtotal:	2.5								
Object Code	Type of Etimate	Item	Man Wks	Qty	Unit	Unit Rate	Cost	Apply to ACTY ID	Pricing Assumptions		
labor	EE	Lane J. Abrams	2.5	90	HR						
labor	EE	Jonathan C. Howland	1	36	HR				C&C support and intergration		
				0	HR						
				0	HR						
		Subtotal Labor:		126			\$ 16,511.76				
Expenses: Computer	Meals, Trave Software, Re	Domestic/International, Equipment, S pair & Maintenance, Communication.	upplies, Sto	ockroom	Supplies, O	utside Serv	rices, Consulting	g Services, Sf	upping & Postage, Subcontracts,		
							\$ -				
							\$ -				
		Subtotal Expense:		0			\$-				

В	С	D	E	F	G	Н		1	J	К	l
2 Project	New Alvin	: Design and Fab (83340908)	Work Package:	A22 Me	rcury Trir	n (Option B,1	D)		Technical Lead:	Lane J. Abrams	
Description electrical and spares	on: This work interface scher s.	c package includes all engineering, plar matic and electronics. This will includ	ning, proto e any procu	otyping an irement c	d docume osts and fa	entation requi abrication eff	ired to fort req	cross dec uired to	ek the Alvin N build and test	Aercury Trim system and develop the all components of functional system	]
Basis of	Estimate			*assume	es 1/2 time	e					_
7 ID	Project Phase	Description	LOE Driving Duration	Most Likely (Days)					Hrs per Key Emp	Comments	
8 5940	FD	Prepare Schematic - Mercury Trim	0.5	5					18		B,I
9				0					0		_
10				0					0		_
11				0					0		_
12				0					0		_
13				0					0		-
14				0					0		4
16		Subtotal:	0.5						18		
Object Code	Type of Etimate	Item	Man Wks	Qty	Unit	Unit Rate	(	Cost	Apply to ACTY ID	Pricing Assumptions	
19 labor	EE	Lane J. Abrams	0.5	18	HR						_
20				0	HR						_
21				0	HR						_
22				0	HR		¢ •	225.16			_
Expenses:	Meals, Trave Software, Re	I Domestic/International, Equipment, S pair & Maintenance, Communication.	upplies, Sto	ockroom	Supplies,	Outside Serv	vices, C	,225.16 onsulting	g Services, Sh	ipping & Postage, Subcontracts,	_
G 1							¢				1
supplies	EE						\$	-			-
26							\$	-			-
27		Subtotal Expense:		0			\$ \$	-			_
30						Total:	\$ <u>2</u>	,225.16			
Notes:											٦.
32											

Г	В	С	D	E	F	G	Н	1	J	к	L
2	Project:	New Alvin:	Design and Fab (83340908)	Work Package:	A24 Life Supp	oort & Habit	ability (Option A	,B,D)	Technical Lead:	Lane J. Abrams	
4	Description corporation component	n: This work and all WHC ts of functiona	package includes all engineering, plann DI efforts to support outsourced work an I system and spares.	ing, prototy nd complete	ping and docun the ABS subm	nentation req ission. This	uired to design th will include any p	ne life support sy procurement cos	ystem. This ts and fabrica	includes all outsourced work to the LM tion effort required to build and test all	
6	Basis of	Estimate			*assumes 1/2	time					
7	Activity ID	Project Phase	Description	LOE Driving Duration	Most Likely (Days)					Comments	
8	6170	FD	Prepare Electric Schematic - Life Support	0.5	5						A,B,D
9	b		Component selection	1	10						
10	с		Prepare Mech Diagram	0.5	5						
11	d		Design Support	3	30						
12	e		Final Installation	3	30					possibly Al OPS tech effort	-
13					0						-
15			Subtotal:	8							
17	Object Code	Type of Etimate	Item	Man Wks	Qty	Unit	Unit Rate	Cost	Apply to ACTY ID	Pricing Assumptions	]
18	labor	EE	Lane J. Abrams	8	288	HR			а		-
19	labor	EE	Barrie B. Walden	3	108	HR			d		-
20	labor	EE	J. Pat Hickey	4.5	162	HR			b,c,e		-
21					0	HR					
22			Subtotal Labor:		558			\$ 80,382.06			
23	Expenses: Repair & M	Meals, Travel Aaintenance, O	Domestic/International, Equipment, Su Communication.	pplies, Stoc	kroom Supplie	s, Outside Se	ervices, Consultin	ng Services, Ship	pping & Posta	ige, Subcontracts, Computer Software,	-
24	subcontrac ts	VQ	PO D100126-0002		1	LS	\$ 180,354.00	\$ 180,354.00		Locheed Martin - specification	-
25	equip	EE	Components		1	LS	\$ 28,000.00	\$ 28,000.00		O2 bottles, values, regs flowmeters, O2 & CO2 monitors, piping, fitting, gauges, & cleaning	
26								\$ -			
27 28			Subtotal Expense:		2			\$ 208,354.00			-
29							Total:	\$ 288,736.06			
31	Notes:										

2	Project: Descriptio	<b>New Alvin</b> <b>on:</b> This work its. This include ement costs a	: Design and Fab (83340908) package includes all engineering, plar les a system schematic and effort requ nd fabrication effort required to build	Package: nning, proto nired to gene and test all	A28 Ser typing and erate ABS component	d documer support d	ses (Option B tation require ocumentation tional system	,D) d to to and	b cross deck t be included in l spares.	he Alvin Serv n ABS classif	Donald B. Peters vice Weight Release System electrical faction submission. This will include	_
4	Rasis of	Estimate			*26511770	ns 1/2 time						
7	Activity ID	Project Phase	Description	Man Wks	Most Likely (Days)	s 1/2 time				Hrs per Key Emp	Comments	
8	2395	PD	Determine requirements	1	10					31	mount plates & droppers	A,B,D
9	2395	PD	Prepare Plate preliminary design	1	10					31	mount plates	A,B,D
10	2400	FD	Prepare Plate Final Design	1	10					31	mount plates	A,B,D
11	4600	FAB	Procure, Fab & Oversight	1	10					31	mount plates	A,B,D
12		PD	Prepare Dropper preliminary design	1	10					31	droppers - assumes same location	B,D
13		FD	Prepare Dropper Final Design	2	20					62	droppers - assumes same location	B, D
14					0					0		
15			Subtotal:	7						216		
18	Object Code	Type of Etimate	Item	Man Wks	Qty	Unit	Unit Rate		Cost	Apply to ACTY ID	Pricing Assumptions	]
19	abor	EE	Chris Lumping	6	216	HR				Key Emp		_
20	abor	EE	Megan M. Carroll	1	36	HR						_
21					0	HR						
22					0	HR						
23	Expenses:	Meals Travel	Subtotal Labor:	Supplies St	252 ockroom	Supplies (	Dutside Servic	\$	25,505.64 Consulting S	ervices Shin	ning & Postage, Subcontracts, Compute	-r
24	Software, I	Repair & Mai	ntenance, Communication.			Supplies,			e on banning b	er riees, sinp		
25	Supplies	EE	materials & manufacture		1	Lot	\$ 5,000.00	\$	5,000.00			_
26								\$	-			
27								\$	-			
28								\$				
29 30			Subtotal Expense:		1			\$	5,000.00			
31							Total:	\$	30,505.64			
	Notes: ass	sumes release	e plates to be bolted to frame founda	ations. Ass	umes res	sue of mos	t major comp	on	ents.			7

	В	С	D	E	F	G	Н		1	J	К	L
-			-	Work						Technical		
2	Project:	New Alvin	: Design and Fab (83340908)	Package:	A28 Ser	rvice Relea	ses (Option	A,B,	D)	Lead:	Lane J. Abrams	_
4	Descriptio includes an ABS suppo component	n: This work alysis to deter ort documenta s of functiona	package includes all engineering, plant rmine placement based on weight and b tion to be included in ABS classification l system and spares.	ning, prototy alance crite n submission	ping and ria and de n. This v	l documenta esigns for d vill include	ation require ropper mou any procure	ed to inting ement	cross deck plate. The t costs and	the Alvin Ser e work packaş fabrication ef	vice Weight Release System. This ge includes work required to generate fort required to build and test all	
6	Basis of	Estimate			*assume	es 1/2 time						
7	Activity ID	Project Phase	Description	LOE Driving Duration	Most Likely (Days)						Comments	
8		FD	Prepare Schematic - Service Releases	0.5	5							A,B,D
9					0							
10					0							
11					0							
12												-
13			Subtotal:	0.5								
15	Object Code	Type of Etimate	Item	Man Wks	Qty	Unit	Unit Rate		Cost	Apply to ACTY ID	Pricing Assumptions	
16	labor	EE	Lane J. Abrams	0.5	18	HR						
17					0	HR						
18					0	HR						
19					0	HR						
20			Subtotal Labor:		18			\$	2,225.16			
21	Expenses: 1 Software, F	Meals, Travel Repair & Mai	Domestic/International, Equipment, Suntenance, Communication.	pplies, Stoc	kroom S	upplies, Ou	tside Servio	ces, C	Consulting S	Services, Ship	ping & Postage, Subcontracts, Computer	-
22								\$	-			-
23								\$	-			
24								\$	-			
25 26			Subtotal Expense:		0			\$	-			1
27							Total:	\$	2,225.16			
	Notes:											
29												

Project	c t: <u>New Alvin</u>	Design and Fab (83340908)	E Work Package:	Emerger	G ncy Releas	es (Option A	,B,D)	Technical Lead:	Lane J. Abrams	_
Descripti componer procurem	ion: This work nts. The work ent costs and f	c package includes all engineering, plan package includes work required to gene abrication effort required to build and te	ning, prototy rate ABS su st all compo	ping and pport do onents of	document cumentatic functional	ation require on to be inclu system and s	ed to cross decl ided in ABS cl spares.	the Alvin Emassification sub	ergency Release System electrical mission. This will include any	
Basis of	f Estimate			*assume	s 1/2 time					
Activity ID	Project Phase	Description	LOE Driving Duration	Most Likely (Days)					Comments	
6465	FD	Prepare Schematic - Emergency Releases	0.5	5						A F
0100			0.0	0						
				0						
				0						
				0						_
				0						
				0						
				0						
		Subtotal:	0.5							
Object Code	Type of Etimate	Item	Man Wks	Qty	Unit	Unit Rate	Cost	Apply to ACTY ID	Pricing Assumptions	
labor	EE	Lane J. Abrams	0.5	18	HR					
				0	HR					
				0	HR					
				0	HR					
_		Subtotal Labor:		18			\$ 2,225.16			
Expenses Software,	: Meals, Trave , Repair & Mai	l Domestic/International, Equipment, Su intenance, Communication.	pplies, Stoc	kroom Sı	applies, Or	itside Servic	es, Consulting	Services, Ship	ping & Postage, Subcontracts, Compute	r
							\$-			_
							\$ -			
							\$-			
		Subtotal Expense:		0			\$ -			+
						Total:	\$ 2,225.16			
Notes:										

	В	С	D	E	F	G	Н	1	J	К	L
2	Project:	New Alv	vin: Design and Fab (83340908)	Work Package:	Emerge	ncy Releas	es (Option B,I	D)	Technical Lead:	Donald B. Peters	_
4	Description This include generate A all compone	on: This w les all worl BS suppor lents of fur	ork package includes all engineering, pla k required to design a new basket and ma t documentation to be included in ABS c cctional system and spares.	nning, proto nipulator el lassification	otyping a ectrical, submiss	nd docume mechanica ion. This v	ntation require l and hydraulic will include an	ed to design the I c release mechan y procurement c	Emergency R ism. The wo osts and fabr	elease and Hydraulic Disconnect system. rk package includes work required to ication effort required to build and test	
6	Basis of	Estimat	e		*assume	es 1/2 time					
					Most						1
	Activity	Project	Decovirtion	Mon Wha	Likely					Commonto	
7	ID	rnase	Description	IVIAII VVKS	(Days)					Comments	4
8	2495	PD	Determine requirements	1	10						-
9	2495	PD	Prepare preliminary design	1	10					assume no work is required for PDR	-
10	2500	FD	FD (basket, manipulators, aux weight)	2	20						A,B,D
11	2505	FD	FD (rescue buoy)	1	10						B,D
12	4700	FAB	Procure & Oversight	1	10						
13	4700	FAB	Fabrication	1	60						_
14 15					0						_
16			Subtotal:	7							1
	Object	Type of							Apply to		i
18	Code	Etimate	Item	Man Wks	Qty	Unit	Unit Rate	Cost	ACTY ID	Pricing Assumptions	]
19	labor	EE	Chris Lumping	5	180	HR					-
20	labor	EE	Donald B. Peters	1	36	HR				oversight	
21					0	HR					_
22					0	HR					
23	Expenses:	Meals, Tra	Subtotal Labor: wel Domestic/International, Equipment,	Supplies, Sto	216 ockroom	Supplies,	Outside Servic	\$ 23,492.16 ces, Consulting S	ervices, Ship	ping & Postage, Subcontracts, Computer	
24	Software, I	Repair & N	Aaintenance, Communication.		1	1		1		1	4
25	repair	EE	WHOI machine shop		72	hrs				basket, manipulators, aux weight	A,B,D
26	repair	EE	WHOI machine shop		36	hrs				rescue buoy	B,D
27	Supplies	HD	materials (frangi bolts & other stock)		0.9	ea				basket (actualtor \$4,300; bolt \$250)	A,B,D
28	Supplies	EE	materials		0.9	ea				rescue buoy	B,D
29											
30 31			Subtotal Expense:		109.8			\$ 10,935.00			-
32							Total:	\$ 34,427.16			
	Notes:										
34											
<u> </u>											*

В	С	D	E	F	G	н	1	J	K	L
2 Project	New Alvin	: Design and Fab (83340908)	Work Package:	A30 Ma	nipulators	(Option B,D)		Technical Lead:	Lane J. Abrams	
Description     wire interfand spares     4	on: This work face system so 3.	package includes all engineering, plan chematic and electronics. This will inc	ning, protot lude any pro	typing an ocurement	d documer at costs and	tation require fabrication et	d to cross deck	the Alvin Mat build and tes	nipulator system and construct a four t all components of functional system	Ī
6 Basis of	Estimate			*assume	es 1/2 time					-
7 Activity ID	Project Phase	Description	LOE Driving Duration	Most Likely (Days)					Comments	
<u>8</u> 2600	FD	Final Design 4- Wire Telemetry	3	30						В,
9				0						
10				0						
11				0						
12				0						_
13				0						
15		Subtotal:	3							
17 Object	Type of Etimate	Item	Man Wks	Qty	Unit	Unit Rate	Cost	Apply to ACTY ID	Pricing Assumptions	Ī
18 labor	EE	Lane I. Abrams	3	108	HR					1
10				0	HR					
20				0	HR					
21				0	HR					
22		Subtotal Labor:		108			\$ 13,350.96			
Expenses: 23 Computer	Meals, Trave Software, Re	el Domestic/International, Equipment, S pair & Maintenance, Communication.	Supplies, Sto	ockroom	Supplies,	Outside Servic	es, Consulting S	Services, Ship	pping & Postage, Subcontracts,	
24 Supplies	EE	4- Wire Telemetry		1	EA	\$ 1,000.00	\$ 1,000.00			
25							\$-			
26							\$ -			
27		Subtotal Expense:		1			\$ 1,000.00			
29						Total:	\$ 14,350.96			
Notes:										1
31										
										<u> </u>

**Description:** This work package covers design, development, and building of the equipment the pilot and observers use to control the submarine and evaluate its real-time performance. Specifically, it includes the pilots joystick/hand box, the head-down display, and other submarine specific controls and indicators.

Basis of	Estimate			*assumes	1/2 time				
Activity ID	Project Phase	Description	Man Wks	Most Likely (Days)					Comments
12	Thuse	Description	intuit (( h)	(Dujs)					note in many of these tasks others (not
17	PD	Prepare Preliminary Design	0.4	4					jch) are the duration pacer
6470	FD	refine HDD design and provide input to drawings	1	10					
6480	FD	write HDD purchase spec and obtain quotes	1	10					
6490	FD	refine handbox design and provide input to drawings	1	10					
7210	FD	write purchase spec and obtain quotes for handbox	1	10					
6510	FD	refine design for remainder of controls and indicators	0.4	4					
7220	FAB	build handbox	0.2	2					
7230	FAB	integrate handbox	0.2	2					
7240	FAB	build HDD	0.2	2					
7250	FAB	integrate HDD	0.2	2					
4900	FAB	test handbox	0.2	2					
7004	FAB	test HDD	0.2	2					
				0					
		Subtotal:	6						
Object Code	Type of Etimate	Item	Man Wks	Qty	Unit	Unit Rate	Cost	Apply to ACTY ID	Pricing Assumptions
labor	EE	Jonathan C. Howland	6	216	HR				
labor	EE	J. Pat Hickey	0.2	7.2	HR			17	
labor	EE	Lane J. Abrams	0.5	18	HR			17	
labor	EE	Lane J. Abrams	0.5	18	HR			6470	
labor	EE	J. Pat Hickey	1	36	HR			6490	
labor	EE	Lane I Abrams	2	72	HR			6510	
labor	FE	Lane I. Abrams	1	36	HR			7220	
labor	FF	Hugh Ponence	0.5	18	HR			7230	
labor	EE	Lang L Abrows	0.5	10				7230	
labor	EE		0.5	18	нк			7240	
labor	EE	Hugh Popenoe	0.5	18	HK			/240	
labor	EE	Hugh Popenoe	0.5	18	HR			7250	
labor	EE	Hugh Popenoe	0.4	14.4	HR			4900	
1.1		1							
labor	EE	Hugh Popenoe	0.4	14.4	HR			7004	

Work A32 Operational Instruments & Equipment Package: (Option B,D)

Technical Lead: Jonathan C. Howland

Expenses: Computer	Meals, Travel Software, Rep	Domestic/International, Equipment, air & Maintenance, Communication.	Supplies, S	tockroom S	Supplies, C	utside Serv	ices	s, Consulting	Services, Shipping & Postag	e, Subcontracts,
subcontra							<u>^</u>			
cts	EE	Tim Thiel		112	hrs	\$ 110.00	\$	12,320.00		
							\$	-		
							\$	-		
		Subtotal Expense:		112			\$	12,320.00		
						Total:	\$	79,179.52		
Notes:										

В	С	D	E	F	G	Н		1	J	К	Т
Project	New Alvin	: Design and Fab (83340908)	Work Package:	A34 Sc	ience Instrum	nent & Equipmen	nt (C	Option B,D)	Technical Lead:	Lane J. Abrams	
Description communic includes a spares.	on: This work ations to scier pressure bottle	package includes all engineering, plannice gear located outside the vehicle. The to house all electronics. This will include the vehicle of t	ning, prototy is effort inc ude any pro	ping and ludes sci curemen	d documentat ence basket e it costs and fa	ion of the science electrical, hydrau abrication effort	ce in ilic a requ	terface system and optical fib aired to build a	n required to er interface and test all c	provide power and through hull and disconnect system. This WP omponents of functional system and	
Basis of	Estimate			*assum	es 1/2 time						_
Activity ID	Project Phase	Description	LOE Driving Duration	Most Likely (Days)					Hrs per Key Emp	Comments	
6520	FD	Schematic	2	20					24		В,
6530	FD	Science Panel	1	10					12		B,
6540	FD	Outside Bottle Schematic	1	10					12		В
6550	ED	Pottlo Dosign & Chassis	2	20					24		- <sup>D</sup> ,
0550	rD		2	20							D,
2				0					0		_
3				0					0		_
5		Subtotal:	6						72		
Object Code	Type of Etimate	Item	Man Wks	Qty	Unit	Unit Rate		Cost	Apply to ACTY ID	Pricing Assumptions	
labor	EE	Lane J. Abrams	2	72	HR				6520		
labor	EE	Mechanical Engineer	1	36	HR				6530		
labor	EE	Lane J. Abrams	1	36	HR				6540		
labor	EE	Mechanical Engineer	2	72	HR				6550		
labor				0	HR						
		Subtotal Labor:		216			\$	24,150.96			
Expenses: Software,	Meals, Travel Repair & Mai	Domestic/International, Equipment, Suntenance, Communication.	upplies, Stoo	kroom S	Supplies, Out	side Services, C	onsu	Iting Services	, Shipping &	& Postage, Subcontracts, Computer	
Supplies	FF	bottle		1	IS	\$ 50,000,00	s	50.000.00		assumes labor & 1/2 materials from	
Supplies				1	LO	\$ 50,000.00	÷	20,000.00			
							\$	-			-
,		Subtotal Expense:		1			\$ \$	-			-
9							-				7
0						Total:	\$	74,150.96			
Notes: N	OT REQUIR	ED for Base Configuration.									

Project	: New Al	lvin: Design and Fab (83340908)	Work Package:	A34 Extern (Option A,	nal Arrange B, D)	ement - Workspa	ace Design	Technical Lead:	Donald B. Peters
Description design and emergency mounting	on: This y d build of t y release system, sa	work package includes all engineering, pl the manipulator mounting system, sample ystem and hydraulic and electrical discor mple basket and light/camera mounting s	anning, prot e basket, and mect system system.	otyping and light/came . This inclu	document ra mountin des any pr	ation required to ag system. This ocurement costs	o design an effi- includes a kine and fabrication	cient pilot and o matic analysis o a effort required	bserver workspace layout including the f the manipulator and must consider the to build and test the manipulator
Basis of	Estima	te		*assumes 1	/2 time				
Activity ID	Project Phase	Description	Man Wks	Most Likely (Days)				Hrs per Key Emp	Comments
7325	PD	Determine requirements	1	10					
7326	PD	Prepare PD Inventor modeling	6	60					
7327	PD	Prepare PD Studio Max	3	30					
1055	FD	Prepare FD	4	40					
3105	FAB	Procure material	1	10					
3105	FAB	Oversee shop fabrication	2	20					
3105	FAB	Fabrication	0	25					
3105	FAB	Test	5	50					
				0					
		Subtotal:	22					0	
Object Code	Type of Etimate	Item	Man Wks	Qty	Unit	Unit Rate	Cost	Apply to ACTY ID	Pricing Assumptions
labor	EE	Matthew C. Heintz	5	180	HR				
labor	EE	Megan M. Carroll	3	108	HR				
labor	EE	Will Sellers	2	72	HR				assist with testing
labor	EE	Tito Collasius	2	72	HR				assist with testing
labor		Enktotel Lohom		0	HR		\$ 51.052.2	2	
Expenses: Software	Meals, Tr Repair &	avel Domestic/International, Equipment,	Supplies, S	tockroom S	upplies, O	utside Services,	S 51,052.3 Consulting Ser	vices, Shipping	& Postage, Subcontracts, Computer
Supplies	EE	WHOI machine shop	5	200	hrs	\$ 55.00	\$ 11,000.0	0	basket, manipulators, aux weight
Supplies	EE	materials		1	ea	\$ 20,000.00	\$ 20,000.0	0	basket & manipulator mounts
Supplies	EE	materials		1	ea	\$ 5,000.00	\$ 5,000.0	0	light bar
subcontrac ts	vo	Craig Johnson	2.67	500	HR	\$ 60.00	\$ 30.000 0	0	CJ Designs
							\$	-	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
-							\$	-	
		Subtotal Expense:		702			\$ 66,000.	)0	
						1			
						Total:	\$ 117,052.3	2	

в	C	U U	Work	F	6	п		Technical	K
Project: 1	New Alvin	: Design and Fab (83340908)	Package:	A34 Scier	ice Interfac	e System - Imagin	g (Option B)	Lead:	William N. Lange
Description: strobed) I FI	: This worl	x package includes all engineering, plan This will include any procurement and	ning, prototy fabrication e	ping and d	ocumentati ed to build	on required to des	ign the vehicle's	lighting plant. Thi	is includes high intensity (ramped and
subbed) LEI	D lighting.	This will include any procurement and	raorication e	non requi	eu to builu	and test an comp	shents of functio	nai system and spa	105.
Basis of F	Estimate			*accumec	1/2 time				
	stinute		LOE	Most					
Activity	Project	Offlood Data System	Driving	Likely (Days)					Commonts
ID.	rnase	Omoau Data System	Duration	(Days)					Comments
	FD	DESIGN & FABRICATION	5.8	58					
	FD	Situational Camera System	0	0					
	FD	Panoramic/Down Looking Camera	0	0					
	10	System	0	0					
	FD	Science Utiltity Camera System	4.5	45					
	FD	Science HDTV Camera System	2.9	29					
	FD	Primary Science Camera System	0	0					
	15	Camera Interface & Telemetry		0					
	FD	System	6.9	69					
	FD	Acquisition System (External)	3.7	37					
	FD	Still Image Acquistion Module	43	43					
		B							
	FD	Motion Image Buffering System	3.9	39					
	FD	Interior Hull Systems	3	30					
	FD	Internal Camera Interface & Telemetry System	3.9	39					
	FD	Internal Acquisition System Control/Display/Monitoring	4.9	49					
	FD	Distribution System	3.8	38					
	FD	Control Systems - Camera	1.2	12					
	FD	Control Systems - Still Acquistion	1.2	12					
	FD	Control Systems - Video Monitoring	1.2	12					
	FD	Control Systems - PATS	1.2	12					
	ED		1.0	10					
	FD	Control Systems - Video Record	1.2	12					
	FD	Monitoring Display System	3.3	33					
	FD	Video Distribution System	4.5	45					
	ED	Science Image Data Distribution	2.5	25					
	гIJ	Science image Data Distribution	3.3	33					
	FD	Offload Data System	2.4	24					
	FD	Alvin Data Duplication System	3.1	31					
	FD	Science Data Processing System	3.5	35					
	10	Selence Data i rocessing Systelli	5.5	35					
I	Fabrication	/Procurement/Assemble	0	0					
	FAB	Situational Camera System	0	0					
	FAB	Panoramic/Down Looking Camera System	0	0					
	FAB	Science Utility Camera System	8.3	83					
	FAB	Science HDTV Camera System	4.7	47					
	FAB	Primary Science Camera System	0	0					
		Camera Interface & Telemetry							
	FAB	System - External Camera Interface & Telemetry	7.1	71					
	FAB	System	5.3	53					
	EAD	A	11.0	110					

A	В	С	D	E	F	G	Н	I	J	К	L
	Project	New Alvin	Design and Eab (83340008)	Work Package:	A 34 Scien	ca Intarfac	e System Imaging	(Option P)	Technical Lead	William N. Lange	
2	Tioject			Tackage.	AJ4 SCICI		e System - maging		Leau.	winiani N. Lange	1
42		FAB	Control System	4.7	47						I
43		FAB	Control Systems - Camera	4	40						I
-10		E LE									I
44		FAB	Control Systems - Still Acquistion	3.6	36						I
45		FAB	Control Systems - Video Monitoring	4.8	48						I
46		FAB	Control Systems - PATS	2.6	26						I
47		FAB	Control Systems - Video Record	3	30						I
48		FAB	Monitoring Display System	7.8	78						I
49		FAB	image Data offload System	67	67						I
40											I
50		FAB	Image Data duplication System science image Data processing	8.3	83						I
51		FAB	System	9.5	95						I
52		FAB	system	7.1	71						I
53		FAB	ext. camera positioning system	3.9	39						I
54		FAB	ext. lighting positioning system	3.9	39						I
55		FAB	ext mechanical interfaces	2.1	21						I
56		FAB	ext electrical interfaces	6.7	67						I
57		FAB	ext fiber optic interfaces	4.3	43						I
		INITGR	Integration Dian	2.9	20						I
58		DITCD		5.6							I
59		INTGR	Imaging System Integration	8.8	88						I
60		INTGR	Imaging System Calibration	8.6	86						I
61 62					0						I
63			Subtotal:	215.4							I
	Object	Type of									
65	Code	Etimate	Item	Man Wks	Qty	Unit	Unit Rate	Cost		Pricing Assumptions	I
66	labor	EE	William N. Lange	8.7	313.2	HR					I
67	labor	EE	Lane J. Abrams	3	108	HR					I
68	labor	EE	Jonathan C. Howland	1.8	64.8	HR					I
Π	lahar	BE	Tim Thial SUDC	20	100.8	LID					I
. 69	labol	DE		2.0	100.8	пк					I
70	labor	EE	Electrical Engineer	8.5	306	HR					I
71	labor	EE	Electrical Engineer	3.7	133.2	HR					I
72	labor	EE	Electrical Engineer	1.3	46.8	HR					I
73	labor	EE	K. Faith Hampshire	0.9	32.4	HR					I
74	labor	EE	Wannop/DWG	2.1	75.6	HR					I
75	labor	EE	Donald B. Peters	0.2	7.2	HR					l
76	labor	EE	Megan M. Carroll	1.1	39.6	HR					I
Ĩ	labor	FF	Chris Lumping	2.1	111.4	шр					I
11	1.1	DD DD		5.1							I
78	labor	EE	Electrical Engineer	0	0	HR					I
79	labor	EE	Glen McDonald	0.6	21.6	HR					i
80	labor	EE	William N. Lange	7.3	262.8	HR					I
	labor	FF	Lane I. Abrams	63	226.8	HR					

	A B	С	D	E	F	G	Н		I	J	К	L
2	Project	New Alvin:	Design and Fab (83340908)	Work Package:	A34 Scien	ce Interfac	e System - Imaging	g (Op	tion B)	Technical Lead:	William N. Lange	
-					-			1	,		¥	-
82	labor	EE	Jonathan C. Howland	4.5	162	HR						-
	1.1	FF		10.4	AAC A	UD						
83	labor	EE	Tim Thiel - SUBC	12.4	446.4	HK						-
	labor	FE	Electrical Engineer	10.7	285.2	LID						
84	labol	EE	Electrical Engineer	10.7	363.2	пк						-
95	labor	FF	Electrical Engineer	53	190.8	HR						
00	luoor	LL		5.5	170.0	IIIV						-
86	labor	EE	Electrical Engineer	3.3	118.8	HR						
П			<u> </u>									
87	labor	EE	K. Faith Hampshire	1.1	39.6	HR						
88	labor	EE	Electrical Engineer	12.6	453.6	HR						
89	labor	EE	Donald B. Peters	0	0	HR						
90	labor	EE	Megan M. Carroll	0.2	7.842996	HR						
91	labor	EE	Chris Lumping	1.8	64.8	HR						_
				6.0								
92	labor	EE	Griner	6.9	248.4	HR						-
	1.1	FF		0	0	UD						
93	labor	EE	Glen McDonald	0	0	HK						-
					0	LID						
94					0	пк						-
95	Expanses:	Meals Travel	Subtotal Labor:	unnlies Stoo	3,968	lies Outs	ide Services, Consu	\$ Iting	432,857.70	ing & Postag	a Subcontracts Computer Software	-
06	Repair & I	Maintenance.	Communication.	upplies, 500c	ki ooni Supj	Jiles, Outs	ide Services, Consu	nung	, services, shippi	ing & Fostag	e, Subcontracts, Computer Software,	
30												-
97	Supplies	EE	Infrastructure Hardware		1	LS	\$ 245 920 00	\$	245 920 00			D
<u> </u>	suppress.								,			_
98	Supplies	EE	Camera System - reuse most existing		1	LS	\$ 153,000.00	\$	153,000.00			NO
									,			
99	Supplies	EE	Camera System		1	LS	\$ 184,533.00	\$	184,533.00			NO
100	Supplies	EE	SSSG Duping Station		1	LS	\$ 120,500.00	\$	120,500.00			NO
[]												
101	Supplies	EE	Science Processing Station		1	LS	\$ 60,250.00	\$	60,250.00			D
								1				
102								\$	-			_
103			Subtotal Expense:		5			\$	764,203.00			
104								-				-
105							Total:	\$	1.197.060.70			
100	Notee	1	1		1			1.5	, ,		1	-
	THORES:											1
107	1											1
107	1											1

Project: A-4500 HOV

Work Package: A34 Illumination Technical Lead: <u>Bill Lange</u>

Description: This work package includes all engineering, planning, prototyping and documentation required to design the vehicle's imaging and recording plant. This includes high intensity (ramped and strobed) LED lighting. New internal Infrastructure hardware including camera displays, Pan Tilt Zoom and Focus control, video routing and switching, audio, data and time code integration. Cross decking of several existing Alvin cameras, an upgrade to the existing HD camera from Analog to Digital output and replacement of imager with new. Addition of second HD Camera and external still image storage capability. Digital Upgrade to the Shipboard Science Support Group duplication station. Retooling of the Science Processing Station tools and addition of Non-Linear Editing capabilities to allow HD conversion to PC or Mac format. To include the integration of hese new tools and functions with the existing SDTV conversion tools. This will include any procurement and fabrication effort required to build and test all components of functional system and spares.

6	Basis of	Estimate									
7	Activity ID	Project Phase	Description	LOE Driving Duration	Most Likely (Days)					Hrs per Key Emp	Comments
8		DESIGN		4.7	47					14	
9		FD	Illumination Field Design	6.3	63					19	
10		FD	Light Head Design Specification	5.7	57					18	
11		FD	Power and Modulation System	8.1	81					25	
12		FD	Lighting Control System Design	3.9	39					12	
13		FABRICAT	TON								
14		FAB	Light Heads	6.1	61					19	
15		FAB	Power Control and Modulation	7.7	77					24	
18		FAB	Lighting Control	5.1	51					16	
17		FD	Lighting System Integration	8.6	86					26	
18					0					0	
19			S-14-4-1	560						173.0	
20	Object	Type of	Subtotai:	50.2						Apply to	
22	Code	Etimate	Item	Man Wks	Qty	Unit	Unit Rate		Cost	ACTY ID	Pricing Assumptions
23	labor	EE	Research Specialist	4.8	172.8	HR					
24	labor	EE	Research Engineer (4)	3.7	133.2	HR					
25	labor	EE	Senior Engineer (2)	0.9	32.4	HR					
28	labor	EE	Outside Services (3)	0.8	28.8	HR					
27	labor	EE	Electrical Engineer	11.25	405.0	HR					
28	labor	EE	Electrical Engineer	2.5	90	HR					
29	labor	EE	Electrical Engineer	0.4	14.4	HR					
30	labor	EE	Center Administrator	0.7	25.2	HR					
31	labor	EE	Sr Engineering Asst I	7.1	255.6	HR					
32	labor	EE	Senior Engineer (1)	0.1	3.6	HR					
33	labor	EE	Research Engineer (6)	1.6	57.6	HR					
34	labor	EE	Engineer II (1)	1.1	39.6	HR					
	labor	FF	Engineering Asst III (6)	2.5	90	HR		1			
30	labor	FF	Research Engineer (2)		0	нр					
30	14001		research Engineer (2)	0	0	III		1			
37			Subtotal Labor:		1,348	пК		\$	144,288.00		

1	A B Project:	с А-4500 НО	D V	E Work Package:	F A34 Illum	s ination		н	1	I	Technical Lead:	Bill Lange	L
39	Expenses: Software, J	Meals, Trave Repair & Mai	l Domestic/International, Equipment, intenance, Communication.	Supplies, Sto	ekroom Su	pplies, Ou	tsid	le Services, Con	isulti	ng Services, Sh	ipping & Pos	tage, Subcontracts, Computer	]
40	Supplies	EE	Lighting and Illuminataion Material		1	LS	\$	287,975.00	\$	287,975.00			B,D
41			Subtatel Frances						\$	-			-
42			Subtotal Expense:		1				3	287,975.00			1
44	Notes:							Total:	5	432,263.00			$\frac{1}{1}$
46													

Work

Package: A36 Software & Computers (Option B,D)

Technical Lead: Jonathan C. Howland

Description: This work package includes all engineering, planning, prototyping and documentation required to design the vehicle's imaging and recording plant. This includes high intensity (ramped and strobed) LED lighting. New internal Infrastructure hardware including camera displays, Pan Tilt Zoom and Focus control, video routing and switching, audio, data and time code integration. Cross decking of several existing Alvin cameras, an upgrade to the existing HD camera from Analog to Digital output and replacement of imager with new. Addition of second HD Camera and external still image storage capability. Digital Upgrade to the Science Support Group duplication station. Retooling of the Science Processing Station tools and addition of Non-Linear Editing capabilities to allow HD conversion to PC or Mac format. To include the integration of these new tools and functions with the existing SDTV conversion tools. This will include any procurement and fabrication effort required to build and test all components of functional system and spares.

Basis of	Estimate			*assumes	2 time	
				Most		
Activity ID	Project Phase	Description	Man Wks	Likely (Days)		Comments
ID	Thase	Description	Mail WKS	(Days)		Comments
29	PD	specify system architecture	0.6	6		]
		• • •				
30	PD	develop interface descriptions	1	10		
				10		
31	PD	complete preliminary design	I	10		
32	PD	complete costing and estimating	2	20		
52	10	specify computing needs of	2	20		
33	PD	COTS/legacy equipment	0.6	6		
		identify and design interfaces for				
1740	ED	legacy navigation, sonar and	2	20		
1/40	TD	complete software spec and design	2	20		
34	FD	for real time controller	1	10		
		complete software spec and design				
7470	FD	for pilot GUI	2	20		
		complete software spec and design				
7480	FD	for navigation engine	1	10		
37	FD	complete software spec and design	1	10		
57	10	complete software spec and design	1	10		
7510	FD	for data system	0.6	6		
		complete hardware spec for other				
7550	FD	computing needs	1	10		
		evaluate and specify computers for				
7590	FD	purchase	1	10		
7600	FD	design network and evaluate	0.6	6		
7000	10	evaluate approaches and specify	0.0	0		
7610	FD	A/D, D/A, and DIO approach	1	10		
		produce reference development				
7620	FD	platform	1	10		
7(20	ED	commission version control	1	10		
/630	FD	platform	1	10		
7650	FD	write final software test plan	1	10		
1000		purchase computer and network		10		
7490	FAB	systems	1	10		
		integrate and test computer and				
7520	FAB	network systems in T&D System	1	10		
7560	EAD	move computer and network	0.2	2		
/300	ГАД	develop and test code for A/D	0.2	2		
7640	FAB	D/A. and DIO	1	10		
7530	FAB	develop submarine simulators	0.5	5		
7570	FAB	develop navigation simulators	1	10		
7540	FAR	produce beta version of RTC	5	50		
, 570		produce octa version of KTC	5	50		
7580	FAB	produce beta version of Naveng	4	40		
7582	FAB	produce beta version of GUI	5	50		
7.504	ELD	1 1	_	50		
/584	FAB	produce beta version of Nav GUI	5	50		
7586	FAB	integrate and test new software	А	40		
1000	TAD	systems on naruwate	4	40		

Project:	New Alvin	: Design and Fab (83340908)	Work Package:	A36 Sof	tware & C	Compute	rs (Option	n B,D)	Technical Lead:	Jonathan C. Howland
				0						
		Subtotal:	47.1							
Object Code	Type of Etimate	Item	Man Wks	Qty	Unit	Uni	it Rate	Cost	Apply to ACTY ID	Pricing Assumptions
labor	EE	Jonathan C. Howland	47.1	1695.6	HR					
labor	EE	Lane J. Abrams	0.2	7.2	HR				30	
labor	EE	Lane J. Abrams	0.4	14.4	HR				33	
labor	EE	Barrie B. Walden	0.4	14.4	HR				33	
labor	EE	James Kinsey	1	36	HR				7480	
labor	EE	Dana Yoerger	1	36	HR				7480	
labor	EE	James Kinsey	1	36	HR				37	
labor	EE	Dana Yoerger	1	36	HR				37	
labor	EE	Scott McCue	1	36	HR				7510	
labor	EE	Fritz Sonnichsen	1	36	HR				7600	
labor	EE	Lane J. Abrams	1	36	HR				7610	
labor	EE	John Bailey	1	36	HR				7610	
labor	EE	Fritz Sonnichsen	1	36	HR				7600	
labor	EE	Hugh Popenoe	2	72	HR				7560	
labor	EE	Lane J. Abrams	0.4	14.4	HR				7640	
labor	EE	James Kinsey	1	36	HR				7570	
labor	EE	James Kinsey	5	180	HR				7580	
labor	EE	Dana Yoerger	2	72	HR				7580	
labor	EE	Dana Yoerger	2	72	HR			<b>•</b> • • • • • • • • • • • • • • • • • •	7584	
Expenses:	Meals, Trave Software, Rei	Subtotal Labor: 1 Domestic/International, Equipment, pair & Maintenance, Communication	Supplies, S	2,502 tockroor	n Supplies	, Outsid	e Service	\$ 354,516.01 s, Consulting Ser	rvices, Shipp	bing & Postage, Subcontracts,
subcontra	FE	Louis Whiteomh	-	480	hrs	¢	200.00	\$ 96,000,00		
subcontra	FE	Tim Thiel		540	hrs	\$	110.00	\$ 59,400,00		
supplies	EE	materials		1	LS	\$ 85	3.088.00	\$ 88,088.00		
Supprior		Subtotal Expense:		1021	10	<i>\</i>	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	\$ 243,488.00		
							Total:	\$ 598,004.01		
Notes:										

A	В	С	D	E	F	G	Н	1	J	К
2	Project:	A-4500: Co	onstruction & Test	Work Package:	Preconstruc	tion			Technical Lead:	Pat Hickey
÷	Description	n: Activities	include but are not limited to: High F	av overhead	1 crane load	testing gen	eral area clean	up additional light	ing installatio	on shop and office van installations
	shop and of	ffice van deck	ting and stairway installation, outside	storage van	setup, outsic	le van deck	ing and stairwa	y installation, area	work bench	assembly and setup, temporary wall
4	structure se transport fiz	tup, fabrication	on of old sphere transport and storage ALVIN 4500M personnel sphere.	fixture, WH	IOI safety of	fice inspect	tions, etc. This	task also includes	design and fa	brication of a sphere storage and
6	Basis of 1	Estimate	1				1			
	Activity	Project		LOE Driving	Most Likely					
7	ID	Phase	Description	Duration	(Days)					Comments
		FAB	Preparation for ship arrival	5	50					Activities include, but are not limited to: High Bay overhead crane load testing, general area cleanup, additional lighting installation, shop and office van installations, shop and office van decking and stairway installation, outside storage van setup, outside van
8										decking and stairway installation, area work bench assembly and setup, temporary wall structure setup, fabrication of old sphere transport and storage fixture, WHOI safety office inspections, etc
9		FAB	Fixture design	1	10					Design sphere storage and transport fixture for old ALVIN 4500M personnel sphere
10			Subtotal:	6						
12	Code	Type of Etimate	Item	Man Wks	Qty	Unit	Unit Rate	Cost		Pricing Assumptions
13	labor	EE	Barrie B. Walden	0	0	HR				
14	labor	EE	Donald B. Peters	0	0	HR				
15	labor	EE	Electrical Engineer	0	0	HR				
16	labor	EE	Griffith Outlaw	1	18	HR				
17	labor	EE	J. Pat Hickey	1	9	HR				
18	labor	EE	Richard S. Chandler	1	9	HR				
19	labor	EE	Jonathan C. Howland	0	0	HR				
20	labor	EE	Lane J. Abrams	1	4.5	HR				
21	labor	EE	Matthew C. Heintz	0	0	HR				
22	labor	EE	Mechanical Engineer	0	0	HR				
23	labor	EE	Philip E. Forte	0	0	HR				
24	labor	EE	Rodney M. Catanach	2	9	HR				
25	labor	EE	William N. Lange	0	0	HR				
26								¢ = ====		
27	Expenses: N Software, R	Meals, Travel Repair & Main	Subtotal Expense:           Domestic/International, Equipment, S           ntenance, Communication.	6 Supplies, Sto	50 ockroom Sup	plies, Outs	ide Services, C	a 5,539.50	, Shipping &	Postage, Subcontracts, Computer
29	Supplies	EE	WHOI Shop Services (Mech)		160	hr	\$ 55	\$ 8,800		Old sphere storage and transport fixture fabrication
30	Supplies	HD	WHOI Shop Services (Carpentry)		80	hr	\$ 55	\$ 4,400		High Bay & storage van misc carpentry, new benches
.31	Supplies	HD	WHOI Shop Services (Electrical)		40	hr	\$ 55	\$ 2,200		High Bay & storage van wiring, High Bay lighting
32	Supplies	EE	fixture materials		1	lot		\$ 10,000		High Bay & storage you miss
33	Supplies	EE	Misc carpentry supplies		1	lot		\$ 2,500		carpentry, new benches
34	Supplies	EE	Misc electrical supplies		1	lot		\$ 2,500		Bay lighting
35	Supplies	EE	Stockroom		1	ea	\$ 2,000	\$ 2,000		Misc supplies, brooms, barrels, etc

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-	A	В	С	D	E	F	G	Н	I	J	К	L
					Work					Technical		
2		Project:	A-4500: Co	instruction & Test	Package:	Preconstruc	tion			Lead:	Pat Hickey	
3	1											- 1
36									\$ -			_
37				Subtotal Non Labor		284			\$ 32,400.00			
38								Total:	\$ 37,939.50			
39												
40												
40												

Basis of I	Estimate								
Activity	Project	Description	Man Wooks					Hrs per	Comments
ID.	ST	Ship demobilization	14					38	Comments
									Activities include, but are not lir to: relocation of support ship sh temp work vans in High Bay, rel of all system spares to storage va High Bay, setup of temp shops,
	ST	Submersible disassembly	28					75	Activities include, our are nor infinite removal of all skins and fairings, ren all syntatic foam, strip out all interns components, removal of all battery s removal of all VB system componer removal of all hydraulic system components, removal of all mercury mercury trim components, removal all j-boxes and cabling, remc all j-boxes and cabling, remc all science sensors, removal and stor old personnel sphere, removal of fall associated materials and fixtures to frame, cleaning of the frame in prepi for transport to vendor service facili
		Safety training	5					13	WHOI mandatory safety training operations crew: forklift operato general shop safety, enclosed spi entry, cranes and rigging, hazma material handling, etc.
		Subtotal	: 47					126	
Code	Type of Etimate	Item	Man Wks	Qty	Unit	Unit Rate	Cost	Apply to ACTY ID	Pricing Assumptions
labor	EE	Korey Verhein	3.5	126	HR				
labor	EE	Susan Humphris	0	0	HR				
labor	EE	Electrical Engineer	3.5	126	HR				
labor	EE	Mechanical Engineer	3.5	126	HR				
labor	EE	Mark Spear	3.5	126	HR				
labor	EE	Jeffery McDonald	3.5	126	HR				
labor	EE	Casual 1/2 Time	0	0	HR				
labor	EE	Griffith Outlaw	2	36	HR				
labor	EE	J. Pat Hickey	2	18	HR				
labor	EE	Richard S. Chandler	2	18	HR				
labor	EE	Michael Skowronski	3.5	15.75	HR				
labor	EE	Lane J. Abrams	2	9	HR				
labor	EE	Sean Kelley	3.5	15.75	HR				
labor	EE	David Walter	3.5	15.75	HR				
labor	EE	Anton Zafereo	3.5	15.75	HR				
labor	EE	Rodney M. Catanach	2	9	HR				
labor	EE	William Strickrott	3.5	15.75	HR				
			1		1	1		1	1
labor	EE	Andrew S. Billings	2	9	HR				

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A	В	C	D	E	F	G	Н			I	J	К	L
				Work							Technical	L	
2	Project:	A-4500: Co	onstruction & Test	Package:	Support Shi	p Demob a	and Subm	ersible	e Disa	assembly	Lead:	Pat Hickey	
Fi -													
34	labor	EE	Chris German	0	0	HR							
Π													
35													
36			Subtotal Labor:	47	808				\$	69,731.87			
	Expenses: 1	Meals, Travel	Domestic/International, Equipment, S	Supplies, Sto	ockroom Sup	oplies, Outs	side Servi	ices, C	onsu	lting Services	, Shipping &	Postage, Subcontracts, Computer	
37	Software, F	Repair & Main	ntenance, Communication.										
			WHOI Shop Services										
38	Supplies	HD	(Mech/Elec/Carp)		160	hr	\$	55	\$	8,800	Misc shop so	ervices	_
	G	UD			1	1.4			¢	4 000	M.1.11	- C 1. 1. O	
39	Supplies	HD	Submersible & shop offload		I	lot			\$	4,000	Mobile cran	e for sub lift	
40	Supplies	FF	Old sphere storage materials		1	lot			\$	2 500	Tarps, Ioad I	binders, penetrator and window noie	
40	Supplies	LL	old sphere storage materials		1	101			Ψ	2,500	covers		-
41	Supplies	EE	Misc carpentry supplies		1	lot			\$	1,500	Misc jigs an	d fixtures needed for disassembly	
											Battery char	gers and HP air compressor cabling an	d
42	Supplies	EE	Misc electrical supplies		1	lot			\$	1,000	connectors		
43	Supplies	HD	Stockroom		1	ea	\$ 2	,000	\$	2,000	Misc supplie	es, rigging	_
									<i>•</i>				
44			Subtotal Expense:		160				\$	19,800.00			-
							1	Fotol	¢	80 531 87			
45								i otai.	φ	03,551.07			_
47													

jam i brane y sequences que se entre que la construcción de la constr	Lond to a long	and installation	on, new skin fit ups, new foam fit ups	s, new main	ballast syste	m compone	ent fit up, new s	sphere to frame n	nodification fit	up, support of ABS survey insp
Disk Bit Purplet         Description         Diring Diring         Paisame I /2 time           Activity         Project         Description         Diring         Likely         Image: Construction of the pair of the pai	and testing	as required, e	erc.							
Archite BescriptionDiving Diving Diving 	Basis of	Estimate		LOE	*assumes 1/ Most	2 time				
IDPhaseDescriptionDuration(0.98)(0	Activity	Project	<b>D</b>	Driving	Likely				Hrs per	
Image: Section of the section of th	ID	Phase FAB	Description Existing system refurbishment	75	(Days) 750				180	Comments
FAB     Integration     75     750     180     Active schedule, but are negative schedule, but										Activities include, but are not imm teardown, servicing and reassemb system, hydraulic system, Hg trim main battery tanks and cells, main system components to be reused, unmodified frame inspection and lifting tee inspection and repair, li system inspection and cleaning, s emergency system releases, Schill manipulator service, ISE manipul service, misc frame fixtures and b inspections and repairs, propulsio teardown, servicing and reassemb system components testing, perior survey inspections and testing as t
Image: Instant and the set of the set		FAB	Integration	75	750				180	Activities include, but are not limi
Object CodeLype of ElimateItemMan WasQtyUnitUnit RateCostApply to ACTY IDPricing AssumptionlaborEEKorey Verhein10.25369HRInternational ControlInternational ControlInternational ControlInternational ControlInternational ControlInternational ControlInternational ControllaborEEDonald B. Peters00HRInternational ControlInternational ControlInternational ControlInternational ControllaborEEInternational Engineer10.25369HRInternational ControlInternational ControlInternational ControllaborEEMechanical Engineer10.25369HRInternational ControlInternational ControlInternational ControllaborEEMark Spear10.25369HRInternational ControlInternational ControlInternational ControllaborEEInferenational Control10.25369HRInternational ControlInternational ControlInternational ControllaborEEInferenational Control10.25369HRInternational ControlInternational ControlInternational ControllaborEEInferenational Control10.25369HRInternational ControlInternational ControllaborEEInferenational Control10.2594.5HRInternational ControlInternational ControllaborEEInferenational Contr		FAB	Training	4	40				10	new huil bird cage tabrication and installation, new skin fitups, new fitups, new main ballast system co fitup, new sphere to frame modific fitup, ABS survey inspections and required, etc. WHOI ALOPS mandatory training operations crew & SEOG personn systems modification and operatio existing systems review, general si reviews, etc.
CodeEtimateItemMan WksQtyUnitUnit RateCostACTY IDPricing AssumplaborEEkorey Verhein10.25369HR </th <th>Object</th> <th>Type of</th> <th>Subtotal:</th> <th>154</th> <th></th> <th></th> <th></th> <th></th> <th>369 Apply to</th> <th></th>	Object	Type of	Subtotal:	154					369 Apply to	
laborEEKorey Verhein10.25369HRlaborEEDonald B. Peters00HRlaborEEElectrical Engineer10.25369HRlaborEEMechanical Engineer10.25369HRlaborEEMechanical Engineer10.25369HRlaborEEMark Spear10.25369HRlaborEEJeffery McDonald10.25369HRlaborEECasual 1/2 Time20720HRlaborEEGriffith Outlaw5.2594.5HRlaborEEJ. Pat Hickey5.2547.25HRlaborEERichard S. Chandler5.2547.25HRlaborEEMichael Skowronski10.2546.125HRlaborEELane J. Abrams5.2523.625HRlaborEELane J. Abrams5.2523.625HRlaborEESean Kelley10.2546.125HRlaborEESean Kelley10.2546.125HR	Code	Etimate	Item	Man Wks	Qty	Unit	Unit Rate	Cost	ACTY ID	Pricing Assumptions
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labor     EE     Mechanical Engineer     10.25     369     HR       labor     EE     Mark Spear     10.25     369     HR       labor     EE     Jeffery McDonald     10.25     369     HR       labor     EE     Jeffery McDonald     10.25     369     HR       labor     EE     Jeffery McDonald     10.25     369     HR       labor     EE     Casual 1/2 Time     20     720     HR       labor     EE     Griffith Outlaw     5.25     94.5     HR       labor     EE     J. Pat Hickey     5.25     47.25     HR       labor     EE     Richard S. Chandler     5.25     47.25     HR       labor     EE     Michael Skowronski     10.25     46.125     HR       labor     EE     Lane J. Abrams     5.25     23.625     HR       labor     EE     Sean Kelley     10.25     46.125     HR       labor     EE     Sean Kelley     10.25     46.125     HR	labor	EE	Electrical Engineer	10.25	369	HR				
labor       EE       Mechanical Engineer       10.25       369       HR         labor       EE       Mark Spear       10.25       369       HR         labor       EE       Jeffery McDonald       10.25       369       HR         labor       EE       Jeffery McDonald       10.25       369       HR         labor       EE       Jeffery McDonald       10.25       369       HR         labor       EE       Casual 1/2 Time       20       720       HR         labor       EE       Griffith Outlaw       5.25       94.5       HR         labor       EE       J. Pat Hickey       5.25       47.25       HR         labor       EE       Richard S. Chandler       5.25       47.25       HR         labor       EE       Michael Skowronski       10.25       46.125       HR         labor       EE       Lane J. Abrams       5.25       23.625       HR         labor       EE       Sean Kelley       10.25       46.125       HR         labor       EE       David Walter       10.25       46.125       HR	labor	EE	Machanical Engineer	10.25	260	LID				
labor       EE       Mark Spear       10.25       369       HR         labor       EE       Jeffery McDonald       10.25       369       HR         labor       EE       Casual 1/2 Time       20       720       HR         labor       EE       Griffith Outlaw       5.25       94.5       HR         labor       EE       Griffith Outlaw       5.25       47.25       HR         labor       EE       J. Pat Hickey       5.25       47.25       HR         labor       EE       Richard S. Chandler       5.25       47.25       HR         labor       EE       Michael Skowronski       10.25       46.125       HR         labor       EE       Lane J. Abrams       5.25       23.625       HR         labor       EE       Sean Kelley       10.25       46.125       HR         labor       EE       Sean Kelley       10.25       46.125       HR         labor       EE       David Walter       10.25       46.125       HR	1.1	FE	Med Succe	10.25	2(0					
labor       EE       Jeffery McDonald       10.25       369       HR         labor       EE       Casual 1/2 Time       20       720       HR	labor	EE	Mark Spear	10.25	369	HK				
labor       EE       Casual 1/2 Time       20       720       HR         labor       EE       Griffith Outlaw       5.25       94.5       HR         labor       EE       J. Pat Hickey       5.25       47.25       HR         labor       EE       J. Pat Hickey       5.25       47.25       HR         labor       EE       Richard S. Chandler       5.25       47.25       HR         labor       EE       Richard S. Chandler       5.25       47.25       HR         labor       EE       Michael Skowronski       10.25       46.125       HR         labor       EE       Lane J. Abrams       5.25       23.625       HR         labor       EE       Sean Kelley       10.25       46.125       HR         labor       EE       David Walter       10.25       46.125       HR	labor	EE	Jeffery McDonald	10.25	369	HR				
labor     EE     Griffith Outlaw     5.25     94.5     HR       labor     EE     J. Pat Hickey     5.25     47.25     HR       labor     EE     Richard S. Chandler     5.25     47.25     HR       labor     EE     Richard S. Chandler     5.25     47.25     HR       labor     EE     Michael Skowronski     10.25     46.125     HR       labor     EE     Lane J. Abrams     5.25     23.625     HR       labor     EE     Sean Kelley     10.25     46.125     HR       labor     EE     David Walter     10.25     46.125     HR	labor	EE	Casual 1/2 Time	20	720	HR				
labor     EE     J. Pat Hickey     5.25     47.25     HR       labor     EE     Richard S. Chandler     5.25     47.25     HR       labor     EE     Michael Skowronski     10.25     46.125     HR       labor     EE     Lane J. Abrams     5.25     23.625     HR       labor     EE     Sean Kelley     10.25     46.125     HR       labor     EE     Sean Kelley     10.25     46.125     HR	labor	EE	Griffith Outlaw	5.25	94.5	HR				
labor     EE     Richard S. Chandler     5.25     47.25     HR       labor     EE     Michael Skowronski     10.25     46.125     HR       labor     EE     Lane J. Abrams     5.25     23.625     HR       labor     EE     Sean Kelley     10.25     46.125     HR       labor     EE     Sean Kelley     10.25     46.125     HR	labor	EE	J. Pat Hickey	5.25	47.25	HR				
labor     EE     Michael Skowronski     10.25     46.125     HR       labor     EE     Lane J. Abrams     5.25     23.625     HR       labor     EE     Sean Kelley     10.25     46.125     HR       labor     EE     David Walter     10.25     46.125     HR	labor	EE	Richard S. Chandler	5.25	47.25	HR				
labor     EE     Lane J. Abrams     5.25     23.625     HR       labor     EE     Sean Kelley     10.25     46.125     HR       labor     EE     David Walter     10.25     46.125     HR	labor	EE	Michael Skowronski	10.25	46.125	HR				
labor     EE     Sean Kelley     10.25     46.125     HR       labor     EE     David Walter     10.25     46.125     HR	labor	EE	Lane J. Abrams	5.25	23.625	HR				
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	labor			10.05	46.125	HR				
labor     EE     Anton Zafereo     10.25     46.125     HR	labor labor	EE	David Walter	10.25						
labor EE Rodney M. Catanach 5.25 23.625 HR	labor labor labor	EE EE	David Walter Anton Zafereo	10.25	46.125	HR				
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	A	В	С	D	E	F	G	Н			1	J	К	L
					Work							Technical		
2		Project:	A-4500: Co	onstruction & Test	Package:	Refurbishm	ent & Integ	gration				Lead:	Pat Hickey	
-	1	-			-		`					1		- T
32														
33				Subtotal Labor:	154	3,056				\$	228,399.44			]
		Expenses: 1	Meals, Travel	Domestic/International, Equipment, S	Supplies, Sto	ockroom Sup	plies, Out	side Serv	ices, C	onsu	ilting Services	, Shipping &	Postage, Subcontracts, Computer	
34		Software, F	Repair & Main	ntenance, Communication.										
				WHOI Shop Services										1
35		Supplies	HD	(Mech/Elec/Carp)		250	hr	\$	55	\$	13,750	Misc shop se	ervices	
Π		Supplies	HD	Outside services		1	lot			\$	378,112	Activities inc	clude but are not limited to:	1
												transportatio	n of frame to New Jersey and additional	
												frame inspec	tions and repairs not included with	
												frame modif	ication, VB sphere NDT inspection	
												services, VB	sphere hydro testing, Schilling	
												manipulator	vendor servicing, fiberglass skin repair	
36												and painting,	, etc.	4
37		Supplies	HD	Stockroom		1	ea			\$	2,000	Misc supplie	s, rigging	
												Cabling, wire	e, compensation and hydraulic hose,	
38		Supplies	HD	Repair Parts and Equipment		1	lot			\$	5,000	piping and fi	ttings, etc.	
												Services asso	ciated with work packages and	
39		Supplies	HD	Graphic Services and duplication		1	lot			\$	1,000	documentatio	on	
40				Subtotal Expense:		254				\$	399,862.00			]
41									Total:	\$	628,261.44			
42														+
43														
43														•

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Note that and names of solution and under the in two package count documatation.       Jasks of Futures       Interpretation of the documentation of the documentati	D	escription	n:This work p	package includes all efforts, planning,	and docume	entation requ	ired to reas	semble all con	ponents of the A-	4500 vehicle	and support periodic ABS survey
Dasis of Estimate         LUE         Marky Dasis         Marky Dasis	111	ispections	and testing a	s required. This task also includes col	inpiction and	a closule of	an work pa	ckage control c	locumentation.		
Artisty ID         Project Place         Description Description         Lock Data Duration         Milest Data (Days)         Histop (Days)         Histop (Days)         Comments Histop (Days)           313         Subscription August Place         Sile	В	Basis of 1	Estimate								
Interplane         Description         Dock         Dock         Description         Dock         Description         Description           ID         SN         Schmenike Assembly         150	Ē		During		LOE	Most				T	
S1     Saharanbir Assemby     150     150     150     150     Activity exclude, but are net limited in early sheet components, including and early sheet components, including sheet components, including sheet components, including and early sheet components, including sh	1	ID	Phase	Description	Duration	(Days)				Key Emp	Comments
Image: state of the state of			51	Submersible Assembly	150	1500				359	Activities include, but are not innited to: install all skins and fairings, install all syntactic foam, install all internal sphere components, install main battery systems, install all VB system components, install all hydraulic system components, install mercury and mercury trim components, install all J-boxes and cabling, install all propulsion system components, install all science and submersible sensors, install ner personnel sphere, install all other associated materials and fixtures to the bare frame, install manipulators, nstall viewports, install manipulators, nstall viewports, install manipulators, periodic ABS survey inspections and testing as required, completion and closure of work package control documentation
ViewVi				Training	4	40				10	WHOI ALOPS mandatory training for operations crew & SEOG personnel: new systems integration and operation, existing systems modification and operations, existing systems review, general safety reviews, etc.
Urget Code         Type is Etimate         Type is Item         Man Wks         Qty         Unit         Unit Rate         Cost         ACTY ID         Pricing Assumptions           labor         EE         Korey Verhein         10.25         369         HR				Subtotal:	154					369	
labor       EE       Korey Verhein       10.25       369       HR       Image: Constraint of the state		Object Code	Type of Etimate	Item	Man Wks	Qty	Unit	Unit Rate	Cost	Apply to ACTY ID	Pricing Assumptions
labor       EE       Korey Verhein       10.25       369       HR       Image: Constraint of the second se						2.62					
laborEEDonald B. Peters00HRlaborEEElectrical Engineer10.25369HRlaborEEMechanical Engineer10.25369HRlaborEEMark Spear10.25369HRlaborEEJeffery McDonald10.25369HRlaborEEJeffery McDonald10.25369HRlaborEESeaul 1/2 Time20720HRlaborEEGriffith Outlaw5.2594.5HRlaborEEJ. Pat Hickey5.2547.25HRlaborEERichard S. Chandler5.2547.25HRlaborEENichael Skowronski10.2546.125HRlaborEELane J. Abrams5.2523.625HRlaborEESean Kelley10.2546.125HRlaborEEDavid Walter10.2546.125HRlaborEEAnton Zafereo10.2546.125HRlaborEENichney M. Catanach5.2523.625HRlaborEEWiliam Strickrott10.2546.125HRlaborEENatherson5.2523.625HRlaborEENatherson5.2523.625HRlaborEENitherson5	la	ibor	EE	Korey Verhein	10.25	369	HR				
laborEEElectrical Engineer10.25369HRlaborEEMechanical Engineer10.25369HRlaborEEMark Spear10.25369HRlaborEEJeffery McDonald10.25369HRlaborEEJeffery McDonald10.25369HRlaborEEJeffery McDonald10.25369HRlaborEECasual 1/2 Time20720HRlaborEEGriffith Outlaw5.2594.5HRlaborEEJ Pat Hickey5.2547.25HRlaborEERichard S. Chandler5.2547.25HRlaborEERichard S. Chandler5.2523.625HRlaborEELane J. Abrams5.2523.625HRlaborEELane J. Abrams5.2523.625HRlaborEEDavid Walter10.2546.125HRlaborEEDavid Walter10.2546.125HRlaborEEAnton Zafereo10.2546.125HRlaborEERodney M. Catanach5.2523.625HRlaborEEWilliam Strickrott10.2546.125HRlaborEEWilliam Strickrott10.2546.125HRlaborEEWilliam Strickrott10.2546.125HRlaborEEWilliam Strickrott10.2546.125HR <td>la</td> <td>ibor</td> <td>EE</td> <td>Donald B. Peters</td> <td>0</td> <td>0</td> <td>HR</td> <td></td> <td></td> <td></td> <td></td>	la	ibor	EE	Donald B. Peters	0	0	HR				
laborEEMechanical Engineer10.25369HRImage: constraint of the second seco	la	ibor	EE	Electrical Engineer	10.25	369	HR				
laborEEMark Spear10.25369HRImage: constraint of the system	la	ıbor	EE	Mechanical Engineer	10.25	369	HR				
laborEEJeffery McDonald10.25369HRImage: constraint of the state o	la	ıbor	EE	Mark Spear	10.25	369	HR				
laborEECasual 1/2 Time20720HRImage: HRlaborEEGriffith Outlaw5.2594.5HRImage: HRlaborEEJ. Pat Hickey5.2547.25HRImage: HRlaborEERichard S. Chandler5.2547.25HRImage: HRlaborEENichael Skowronski10.2546.125HRImage: HRlaborEELane J. Abrams5.2523.625HRImage: HRlaborEESean Kelley10.2546.125HRImage: HRlaborEEDavid Walter10.2546.125HRImage: HRlaborEEDavid Walter10.2546.125HRImage: HRlaborEENaton Zafereo10.2546.125HRImage: HRlaborEERodney M. Catanach5.2523.625HRImage: HRlaborEENaton Zafereo10.2546.125HRImage: HRlaborEENaton Zafereo10.2546.125HRImage: HRlaborEENaton Strickrott10.2546.125HRImage: HRlaborEENaton Strickrott10.2546.125HRImage: HRlaborEENaton Strickrott10.2546.125HRImage: HRlaborEENaton Strickrott10.2546.125HRImage: HRlaborEENaton Strickrott10.2546.125 <td< td=""><td>la</td><td>ıbor</td><td>EE</td><td>Jeffery McDonald</td><td>10.25</td><td>369</td><td>HR</td><td></td><td></td><td></td><td></td></td<>	la	ıbor	EE	Jeffery McDonald	10.25	369	HR				
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labor       EE       Richard S. Chandler       5.25       47.25       HR         labor       EE       Richard S. Chandler       5.25       47.25       HR         labor       EE       Michael Skowronski       10.25       46.125       HR         labor       EE       Lane J. Abrams       5.25       23.625       HR         labor       EE       Lane J. Abrams       5.25       23.625       HR         labor       EE       Sean Kelley       10.25       46.125       HR         labor       EE       Sean Kelley       10.25       46.125       HR         labor       EE       David Walter       10.25       46.125       HR         labor       EE       Anton Zafereo       10.25       46.125       HR         labor       EE       Rodney M. Catanach       5.25       23.625       HR         labor       EE       William Strickrott       10.25       46.125       HR         labor       EE       Andrew S. Billings       5.25       23.625       HR       Image: Context and the strick and the strick and the strick and the strick and the strick and the strick and the strick and the strick and the strick and the strick and the strick and the strick and the strick and the strick and the stri	10	ibor	FF	I Pat Hickey	5.25	47.25	HB				
labor       EE       Michael Skowronski       10.25       46.125       HR         labor       EE       Lane J. Abrams       5.25       23.625       HR         labor       EE       Lane J. Abrams       5.25       23.625       HR         labor       EE       Sean Kelley       10.25       46.125       HR         labor       EE       Sean Kelley       10.25       46.125       HR         labor       EE       David Walter       10.25       46.125       HR         labor       EE       David Walter       10.25       46.125       HR         labor       EE       Anton Zafereo       10.25       46.125       HR         labor       EE       Rodney M. Catanach       5.25       23.625       HR         labor       EE       William Strickrott       10.25       46.125       HR         labor       EE       William Strickrott       10.25       46.125       HR         labor       EE       Andrew S. Billings       5.25       23.625       HR	10	ibor	EF	Richard S. Chandler	5.25	47.25	HR				
Index     End     Find       Iabor     EE     Lane J. Abrams     5.25     23.625     HR       Iabor     EE     Sean Kelley     10.25     46.125     HR       Iabor     EE     David Walter     10.25     46.125     HR       Iabor     EE     David Walter     10.25     46.125     HR       Iabor     EE     Anton Zafereo     10.25     46.125     HR       Iabor     EE     Rodney M. Catanach     5.25     23.625     HR       Iabor     EE     William Strickrott     10.25     46.125     HR       Iabor     EE     Midney M. Catanach     5.25     23.625     HR       Iabor     EE     William Strickrott     10.25     46.125     HR       Iabor     EE     Andrew S. Billings     5.25     23.625     HR	la	ibor	EE	Michael Skowronski	10.25	46 125	HR				
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International and the second secon	19	ibor	EE	Sean Kelley	10.25	46 125	HR				
labor     EE     Anton Zafereo     10.25     46.125     HR       labor     EE     Rodney M. Catanach     5.25     23.625     HR       labor     EE     William Strickrott     10.25     46.125     HR       labor     EE     William Strickrott     10.25     46.125     HR       labor     EE     Andrew S. Billings     5.25     23.625     HR	la	ıbor	EE	David Walter	10.25	46.125	HR				
labor     EE     Rodney M. Catanach     5.25     23.625     HR       labor     EE     William Strickrott     10.25     46.125     HR       labor     EE     Andrew S. Billings     5.25     23.625     HR	la	ıbor	EE	Anton Zafereo	10.25	46.125	HR				
labor     EE     William Strickrott     10.25     46.125     HR       labor     EE     Andrew S. Billings     5.25     23.625     HR	14	ibor	EE	Rodney M. Catanach	5 25	23 625	HR				
labor     EE     Andrew S. Billings     5.25     23.625     HR	la	ıbor	EE	William Strickrott	10.25	46.125	HR				
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A	В	C	D	E	F	G	Н		1	J	К	
				Work						Technical		
2	Project:	A-4500: Co	onstruction & Test	Package:	Assembly					Lead:	Pat Hickey	
33			Subtotal Labor:		3,056			\$	228,399.44			
	Expenses:	Meals, Travel	Domestic/International, Equipment, S	Supplies, St	ockroom Sup	plies, Outs	ide Services, C	Cons	ulting Services	, Shipping &	Postage, Subcontracts, Computer	
34	Software, I	Repair & Mai	ntenance, Communication.									
35	Supplies	HD	WHOI Shop Services (Mech/Elec/Carp)		250	hr	\$ 55	\$	13,750	Misc shop se	ervices	
36	Supplies	HD	Outside services		1	lot		\$	20,000	Activities ind transportatio cleaning serv and electrica	clude but are not limited to: n of frame to Woods Hole, oxygen vices for life support system, mechanica l calibration services	ıl
37	Supplies	HD	Stockroom		1	ea		\$	2,000	Misc supplie	s, rigging	
38	Supplies	HD	Repair parts and equipment		1	lot		\$	5,000	Cabling, wir piping and fi	e, compensation and hydraulic hose, ttings, etc.	
39	Supplies	HD	Graphic Services and duplication		1	lot		\$	1,000	Services asso documentation	ociated with work packages and on	_
40			Subibilit Expense.		234			.,	41,750.00			-
41 42							Total:	\$	270,149.44			-
												T
43												

Descriptio	n: This work	package includes all engineering, plar	ning and do	cumentation	n required t	o perform all p	ost assembly hang	ar (dry) testin	g including complete end-to-end
submersible inspections shops and s	e systems ring as required. stowage of sy	g out with fully-powered test (POELC This task also includes return of supp stem spares, and return tested submer	CO), closed-b ort equipments sible to supp	nt and syste	pied habital m spares fr	polity test, close om the tempora	d-boat occupied h ary work and stora	abitability test ge vans in Hig	t, and support of ABS survey and the Bay to the support ship, setup
Basis of	Estimate			*assumes 1	/2 time	1		1	1
Activity	Project		Man					Hrs per	
ID	Phase	Description	Weeks					Key Emp	Comments
1	FAB	Hangar testing	14					42	Activities include, but are not li to: complete end-to-end subme systems ring out with fully-pow test (POELCO), closed-boat unoccupied habitability test, clo boat occupied habitability test, survey and inspections as requi
2	FAB	System mobilization	28					83	Activities include, but are not li to: return of shops from temp v vans in High Bay to support shi return of all system spares from vans and High Bay to support s setup of shops and stowage of s spares, return tested submersibl support ship, etc.
3		Training	5					15	WHOI ALOPS mandatory train operations crew & SEOG perso new systems integration and ope at sea operations procedures rev requalifications as required, sup ship general safety reviews, etc.
		Subtotal:	47					140	
Object Code	Type of Etimate	Item	Man Wks	Qty	Unit	Unit Rate	Cost	Apply to ACTY ID	Pricing Assumptions
labor	EE	Korey Verhein	3.5	126	HR				
lahan	EE	Susan Humphria	0	0	IID				
labol	EE	Susan Humphris	0	0	пк				
labor	EE	Electrical Engineer	3.5	126	HR				
labor	EE	Mechanical Engineer	3.5	126	HR				
labor	EE	Mark Spear	3.5	126	HR				
labor	EE	Jeffery McDonald	3.5	126	HR				
labor	FF	Casual 1/2 Time	0	0	HR				
14001	EE	Casual 1/2 Time	Ū	0	III				
labor	EE	Griffith Outlaw	2	36	HR				
labor	EE	J. Pat Hickey	2	18	HR				
labor	EE	Richard S. Chandler	2	18	HR				
labor	EE	Michael Skowronski	3.5	15.75	HR				
labor	EE	Lane J. Abrams	2	9	HR				
lab c r	EE EE	Saar Vallas	-	15.75					
labor	EE	Scall Kelley	3.3	15./5	нк				
labor	EE	David Walter	3.5	15.75	HR				
	1	And an Z. Come	3.5	15.75	HR				
labor	EE	Anton Zarereo							
labor labor	EE	Rodney M. Catanach	2	9	HR				
labor labor labor	EE EE EE	Rodney M. Catanach William Strickrott	2 3.5	9 15.75	HR HR				
labor labor labor labor	EE EE EE EE	Anton Zarereo         Rodney M. Catanach         William Strickrott         Andrew S. Billings	2 3.5 2	9 15.75 9	HR HR HR				
labor labor labor labor labor	EE EE EE EE	Anton Zatereo         Rodney M. Catanach         William Strickrott         Andrew S. Billings         Andy Bowen	2 3.5 2 0	9 15.75 9 0	HR HR HR				

Project	: <u>A-4500: C</u>	onstruction & Test	E Work Package:	⊦ Hangar Test	and Ship	Mobiliz	ation		I	Technical Lead:	Pat Hickey
Expenses: Software,	Meals, Trave Repair & Ma	Subtotal Labor: 1 Domestic/International, Equipment, S intenance, Communication.	47 Supplies, Sto	808 ockroom Sup	plies, Out	side Serv	vices, C	\$ onsu	69,731.87 Ilting Services	, Shipping &	Postage, Subcontracts, Computer
Supplies	HD	WHOI Shop Services (Mech/Elec/Carp)		160	hr	\$	55	\$	8,800	Misc shop so to return har	ervices following vacation of High Ba agar to ready status
Supplies	HD	Submersible & shop load		1	lot			\$	4,000	Mobile cran	e for sub lift
Supplies	HD	Stockroom Subtotal Expense:		1 162	ea			\$ \$	5,000	Misc supplie	es, consumables
							Total:	\$	87,531.87		1

Project:	A-4500: Construction & Test	

Work Package: Dockside Testing and Sea Trials Technical Lead: Pat Hickey

Description: This work package includes all engineering, planning and documentation required to perform all tests leading to the acceptance and commissioning of the vehicle by the National Science Foundation for regular deep sea operations. This includes all dockside testing activities including, but not limited to: A-frame fit up, tethered powered system testing, inclination and stability tests, untethered surface propulsion testing, and departure and transit to Bermuda. This also includes all sea trial tests including continuation of shallow water test program, initial shallow water harbor dives, communications and obstacle avoidance testing, open water slope dive program to increasing depths, open water deep dive program to full service depth, culminating with ABS survey and inspections and certification class approval and certification of remaining pilots by test pilots.

Activity ID	Project Phase	Description	Man Weeks					Hrs per Key Emp	Comments
	ST	Dockside testing - Woods Hole	24					36	Activities include, but are not limi to: A-frame fitup, tethered power system testing, inclination and stal tests, untethered surface propulsio testing, ABS survey and inspectio required, departure and transit to Bermuda
	ST	Sea trials - Bermuda	72					108	Activities include, but are not limi to: continuation of shallow water the program, initial shallow water hard dives, communications and obstace avoidance testing, open water slop dive program to increasing depths open water deep dive program to service depth, culminating with A survey and inspections and certific class approval. Certification of remaining pilots by test pilots.
Object	Type of	Subtotal:	96					144 Apply to	1
Code	Etimate	Item	Man Wks	Qty	Unit	Unit Rate	Cost	ACTY ID	Pricing Assumptions
labor	EE	Korey Verhein	4	144	HR				
labor	EE	Susan Humphris	4	36	HR				
labor	EE	Electrical Engineer	4	144	HR				
labor	EE	Mechanical Engineer	4	144	HR				
labor	EE	Mark Spear	4	144	HR				
labor	EE	Jeffery McDonald	4	144	HR				
labor	EE	Project Manager	4	144	HR				
labor	EE	Griffith Outlaw	4	72	HR				
labor	EE	J. Pat Hickey	4	36	HR				
labor	EE	Richard S. Chandler	4	36	HR				
labor	EE	Michael Skowronski	4	18	HR				
labor	EE	Lane J. Abrams	4	18	HR				
labor	EE	Sean Kelley	4	18	HR				
labor	EE	David Walter	4	18	HR				
labor	EE	Anton Zafereo	4	18	HR				
labor	EE	Rodney M. Catanach	4	18	HR				
labor	EE	William Strickrott	4	18	HR				
labor	EE	Andrew S. Billings	4	18	HR				
labor	EE	Andy Bowen	4	18	HR				

-	A	В	С	D	E	F	G	Н		I	J	К	L
2		Project:	A-4500: Co	onstruction & Test	Work Package:	Dockside Te	esting and	Sea Trials			Lead:	Pat Hickey	_
33	•	labor	EE	Anthony Tarantino	4	18	HR						1
34		labor	EE	Barrie Walden	4	18	HR						
35		labor	EE	Jonathan Howland	4	18	HR						
36	-	labor	EE	Don Peters	4	18	HR						_
37	-												_
38	-	Expenses: I	Meals, Travel	Subtotal Labor: Domestic/International, Equipment, S	96 Supplies, Sto	1,296 ockroom Sup	plies, Outs	side Services, C	\$ Consult	135,931.68 ting Services	, Shipping &	Postage, Subcontracts, Computer	-
39	-	Software, F											
40 41	-	Supplies	HD	Various vendors Subtotal Expense:		1	ea		\$ \$	20,000 20,000.00	At-sea consu	imables	-
42								Total:	\$	155,931.68		1	
43	ſ			1	1		<u> </u>	1	1				1
44													

Basis of E Activity ID	Estimate								
Activity ID	Istimate								
Activity ID			LOE	*assumes 1/ Most	2 time				
	Project Phase	Description	Driving Duration	Likely (Days)				Hrs per Key Emp	Comments
	ST	Sea Trials	4	40				108	
				0				0	
		Subtotal:	4					108	
Code	Type or Etimate	Item	Man Wks	Qty	Unit	Unit Rate	Cost	Apply to ACTY ID	Pricing Assumptions
labor	EE	Barrie B. Walden	3	108	HR				assumes 1 wk covered under typica overhaul budget
labor	EE	Donald B. Peters	4	36	HR				
labor	EE	Electrical Engineer	8	288	HR				
labor	EE	Griffith Outlaw	3	54	HR				assumes 1 wk covered under typica overhaul budget
labor	EE	J. Pat Hickey	3	27	HR				assumes 1 wk covered under typica overhaul budget
labor	EE	Jonathan C. Howland	4	18	HR				
labor	EE	Lane J. Abrams	3	13.5	HR				assumes 1 wk covered under typica overhaul budget
labor	EE	Matthew C. Heintz	4	18	HR				
labor	EE	Mechanical Engineer	8	36	HR				
labor	EE	Philip E. Forte	4	18	HR				
labor	EE	Rodney M. Catanach	2	9	HR				assumes 1 wk covered under typica overhaul budget
labor	EE	William N. Lange	4	18	HR				
labor	EE	Cruise leave adjustment					\$ 33,237.00		see attached backup from Faith
							* ******		
Expenses: M	feals, Travel	Domestic/International, Equipment, S	Supplies, Sto	ockroom Sup	plies, Outs	ide Services, C	onsulting Services	, Shipping &	Postage, Subcontracts, Computer
Software, Re	epair & Maii	ntenance, Communication.							
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		C 14-4-1 N I -1		0			\$ _		